LinkPred

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1 LinkPred: A high performance library for link prediction in complex networks 1

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Chapter 1

LinkPred: A high performance library for link prediction in complex networks

This is LinkPred, a high performance library for link prediction in complex networks.

LinkPred provides the following functionalities:

Basic data structures to efficiently store and access network data.

Basic graph algorithms such graph traversal, shortest path algorithms, and graph embedding methods.

Implementation of several topological similarity index predictors, for example: common neighbors, Adamic-Adard index and Jackard index among other predictors (a full list is available in the library documentation).

Implementation of several state-of-the-art global link predictors (a full list is available in the library documentation).

Implementation of several link prediction algorithms based on graph embedding techniques.

Test data generation from ground truth networks.

Performance evaluation functionalities.

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Contains the implementation of the hypermap link predictor 1092
include/linkpred/predictors/undirected/ujidpredictor.hpp
Contains the implementation of a Jackard index link predictor 1094
include/linkpred/predictors/undirected/ukabpredictor.hpp
Contains the implementation of a scalable popularity-similarity link predictor 1096
include/linkpred/predictors/undirected/ulcppredictor.hpp
Contains the implementation of a local path link predictor 1098
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include/linkpred/predictors/undirected/unedpredictor.hpp
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include/linkpred/predictors/undirected/upatpredictor.hpp
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Contains the implementation of a link predictor that prestores the scores of edges 1108
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Contains the implementation of a resource allocation link predictor 1109
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Contains the implementation of a random link predictor 1111
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Contains the implementation of a Sorensen index link predictor 1118
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include/linkpred/simp/perfres.hpp
Contains the definition of a structure to store performance results 1123
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Includes all headers of the essential interface 1126
include/linkpred/utils/log.hpp
Contains the implementation of a log class 1127
include/linkpred/utils/loglevel.hpp
Contains the definition of log levels 1128
include/linkpred/utils/miscutils.hpp
Contains the implementation of miscellaneous useful methods 1129
include/linkpred/utils/randomgen.hpp
Contains the implementation of a random number generator 1132
include/linkpred/utils/utils.hpp
Includes the headers related to utility classes 1133

Chapter 7

Module Documentation

7.1 Core classes

This group contains core classes.

Files

- file core.hpp

  Includes the headers related to core classes.
- file dnetwork.hpp

  Contains the implementation of a directed network data structure.
- file bheap.hpp

  Contains the implementation of a templated binary heap.
- file ds.hpp

  Includes the headers related to data structures.
- file lmapqueue.hpp

  Contains the implementation of a templated map-priority queue with limit on the capacity.
- file unetwork.hpp

  Contains the implementation of an undirected network data structure.

7.1.1 Detailed Description

This group contains core classes.

7.2 Graph algorithms.

This group contains graph algorithms.

Files

- file deepwalk.hpp

    DeepWalk encoder.
- file encoder.hpp

    Contains the interface of a network encoder.
- file encoders.hpp

    Includes the headers related to network encoders.
- file hmsm.hpp

    Contains the implementation of an algorithm for embedding a network using a a hidden metric space model.
- file largevis.hpp

    LargeVis encoder.
- file lem.hpp

    Contains the implementation of Laplacian eigenmaps embedding (LEM).
- file line.hpp

    The LINE (Large-scale Information Network Embedding) encoder.
- file lle.hpp

    Contains the implementation of locally linear graph embedding (LLE).
- file matfact.hpp

    Contains the implementation of an algorithm for embedding a network using matrix factorization. Reference: Koren, Y., Bell, R., and Volinsky, C. (2009). Matrix factorization techniques for recommender systems. Computer, 42(8)↩ :30–37 Ahmed, A., Shervashidze, N., Narayanamurthy, S., Josifovski, V., and Smola, A. J. (2013). Distributed large-scale natural graph factorization. In Proceedings of the 22nd International Conference on World Wide Web, WWW '13, pages 37–48, New York, NY, USA. Association for Computing Machinery.
- file matfactcg.hpp

    Contains the implementation of the optimization problem associated with matrix factorization.
- file node2vec.hpp

    A node2vec encoder.
- file graphalg.hpp

    Includes the headers related to graph algorithms.
- file dijkstra.hpp

    Contains an implementation of Dijkstra's algorithm.
- file netdistcalculator.hpp

    Contains the implementation of classes for computing distances in network.
- file shortestpaths.hpp

    Includes the headers related to shortest paths algorithms.
- file graphtraversal.hpp

    Contains the implementation of graph traversal algorithms.
- file traversal.hpp

    Includes the headers related to graph traversal algorithms.

7.2.1 Detailed Description

This group contains graph algorithms.

7.3 Machine learning classes

This group contains classes related to supervised learning algorithms.

Files

- file classifier.hpp

  Contains the interface of a classifier.
- file classifiers.hpp

  Includes the headers related to classifiers.
- file ffn.hpp

  Contains a wrapper of mlpack::ann::FFN (feed-forward neural network).
- file linearsvm.hpp

  Contains a wrapper of mlpack::smv::LinearSVM.
- file logisticregresser.hpp

  Contains the implementation of a logistic regression algorithm.
- file logregcg.hpp

  Contains the implementation of a logistic regression optimization problem.
- file naivebayes.hpp

  Contains a wrapper of mlpack::maive_bayes::NaiveBayesClassifier.
- file rndclassifier.hpp

  Contains a random classiffier (for debugging purposes).
- file ml.hpp

  Includes the headers related to learning-based predictors.
- file cosinesim.hpp

  Contains the implementation of cosine similarity.
- file dotprod.hpp

  Contains the implementation of the dot product similarity measure.
- file l1sim.hpp

  Contains the implementation of L1 similarity.
- file l2sim.hpp

  Contains the implementation of L2 similarity.
- file lpsim.hpp

  Contains the implementation of LP similarity.
- file pearson.hpp

  Contains the implementation of Perason similarity.
- file simmeasure.hpp

  Contains the interface of a similarity measure.
- file simmeasures.hpp

  Includes the headers related to similarity measures.

7.3.1 Detailed Description

This group contains classes related to supervised learning algorithms.

7.4 Numerical classes and algorithms

This group contains classes related to numerical data structures and algorithms.

Files

- file gfmatrix.hpp

  Contains the implementation of a full matrix.
- file vec.hpp

  Contains the implementation of a vector (in the sense of linear algebra).
- file logmdscg.hpp

  Contains the implementation of the optimization problem associated with multidimensional scaling using the logarithmic (MULTISCALE) loss function.
- file mds.hpp

  Contains the implementation of a solver of the multidimensional scaling problem using the logarithmic (MULTISCALE) loss function.
- file fastsig.hpp

  Contains the implementation of a fast sigmoid.
- file numerical.hpp

  Includes the headers related to numerical algorithms.

7.4.1 Detailed Description

This group contains classes related to numerical data structures and algorithms.

7.5 Performance evaluation classes

This group contains classes related to performance evaluation.

Files

- file networkmanipulator.hpp

  Contains the implementation of test data related classes.
- file perf.hpp

  Includes the headers related to performance evaluation classes.
- file perfevaluator.hpp

  Includes the headers related to core classes.
- file perfmeasure.hpp

  Contains the implementation of several performance measures.
- file predresults.hpp

  Contains the implementation of a class to store and manage prediction results.

7.5.1 Detailed Description

This group contains classes related to performance evaluation.

7.6 Link prediction algorithms

This group contains link prediction algorithms.

Files

- file dadapredictor.hpp

  Contains the implementation of a common neighbor link predictor.
- file dcnepredictor.hpp

  Contains the implementation of a common neighbor link predictor.
- file dhdipredictor.hpp

  Contains the implementation of a common neighbor link predictor.
- file dhpipredictor.hpp

  Contains the implementation of a common neighbor link predictor.
- file directed.hpp

  Includes the headers of link predictors for directed networks.
- file djidpredictor.hpp

  Contains the implementation of a common neighbor link predictor.
- file dlcppredictor.hpp

  Contains the implementation of a directed LCP link predictor.
- file dlhnpredictor.hpp

  Contains the implementation of a common neighbor link predictor.
- file dlpredictor.hpp

  Contains the interface of a link predictor.
- file dpatpredictor.hpp

  Contains the implementation of a common neighbor link predictor.
- file dpstpredictor.hpp

  Contains the implementation of a link predictor that prestores the scores of edges.
- file dsaipredictor.hpp

  Contains the implementation of a common neighbor link predictor.
- file dsoipredictor.hpp

  Contains the implementation of a common neighbor link predictor.
- file predictors.hpp

  Includes the headers of link predictors.
- file uadapredictor.hpp

  Contains the implementation of an Adamic Adar index link predictor.
- file ucnepredictor.hpp

  Contains the implementation of a common neighbor link predictor.
- file ucrapredictor.hpp

  Contains the implementation of the Cannistraci Resource Allocation link predictor.
- file ucstpredictor.hpp

  Contains the implementation of a constant link predictor.
- file ueclpredictor.hpp

  Contains the implementation of an encoder-classifier link predictor.
- file uesmpredictor.hpp

  Contains the implementation of an encoder-similarity measure link predictor.
- file ufbmpredictor.hpp

  Contains the implementation of the fast blocking model link predictor.
- file uhdipredictor.hpp

Contains the implementation of a hub depromoted index link predictor.

- file uhpipredictor.hpp

  Contains the implementation of a hub promoted index link predictor.
- file uhrgpredictor.hpp

  Contains the implementation of the HRG link predictor.
- file uhyppredictor.hpp

  Contains the implementation of the hypermap link predictor.
- file ujidpredictor.hpp

  Contains the implementation of a Jackard index link predictor.
- file ukabpredictor.hpp

  Contains the implementation of a scalable popularity-similarity link predictor.
- file ulcppredictor.hpp

  Contains the implementation of a local path link predictor.
- file ulhnpredictor.hpp

  Contains the implementation of a Leicht-Holme-Newman index link predictor.
- file ulpredictor.hpp

  Contains the interface of a link predictor.
- file umpspredictor.hpp

  Contains the implementation of a scalable popularity similarity link predictor.
- file undirected.hpp

  Includes the headers of link predictors for undirected networks.
- file unedpredictor.hpp

  Contains the implementation of a link prediction algorithm based on the degrees of neighbors.
- file upatpredictor.hpp

  Contains the implementation of a preferential attachment link predictor.
- file upstpredictor.hpp

  Contains the implementation of a link predictor that prestores the scores of edges.
- file uralpredictor.hpp

  Contains the implementation of a resource allocation link predictor.
- file urndpredictor.hpp

  Contains the implementation of a random link predictor.
- file usaipredictor.hpp

  Contains the implementation of a Salton index link predictor.
- file usbmpredictor.hpp

  Contains the implementation of the stochastic block model link predictor.
- file ushppredictor.hpp

  Contains the implementation of a shortest path link predictor.
- file usoipredictor.hpp

  Contains the implementation of a Sorensen index link predictor.
- file usumpredictor.hpp

  Contains the implementation of a sum-of-degrees link predictor.

7.6.1 Detailed Description

This group contains link prediction algorithms.

7.7 Simplified interface

This group contains a simplified interface for LinkPred that includes the essential functionalities.

Files

- file edgescore.hpp

  Contains the definition of a structure to store the score of an edge.
- file evaluator.hpp

  Contains the definition of a class that simplifies the evaluation of link prediction algorithms.
- file perfres.hpp

  Contains the definition of a structure to store performance results.
- file predictor.hpp

  Contains the definition of a class that simplifies the use of link prediction algorithms.
- file simp.hpp

  Includes all headers of the essential interface.

7.7.1 Detailed Description

This group contains a simplified interface for LinkPred that includes the essential functionalities.

7.8 Utility functions and classes

This group contains various utility functions and classes.

Files

- file log.hpp

  Contains the implementation of a log class.
- file loglevel.hpp

  Contains the definition of log levels.
- file miscutils.hpp

  Contains the implementation of miscellaneous useful methods.
- file randomgen.hpp

  Contains the implementation of a random number generator.
- file utils.hpp

  Includes the headers related to utility classes.

7.8.1 Detailed Description

This group contains various utility functions and classes.

Chapter 8

Namespace Documentation

8.1 LinkPred Namespace Reference

Main namespace.

Namespaces

- Simp
  Simplified interface. Contains a simplified interface for LinkPred that includes the essential functionalities.
- Utils
  Some utility functions.

Classes

- class ASPDistCalculator
  Approximate shortest path distance calculator.
- class ASPDsimCalculator
  Approximate shortest path dissimilarity calculator.
- class BFS
  BFS graph traversal.
- class BHeap
  A binary heap.
- class Bhmap
  A bidirectional half map.
- class Classifier
  Interface of a binary classifier.
- class Collector
  A class that collects nodes during traversal.
- class CosineSim
  Cosine similarity.
- class Counter
  A class that counts nodes during traversal.
- class DADAPredictor
  Common neighbor link predictor adapted to directed networks.

- class DCNEPredictor

  Common neighbor link predictor adapted to directed networks.
- class DeepWalk

  DeepWalk encoder. Reference: Perozzi, B., Al-Rfou, R., and Skiena, S. (2014). Deepwalk: Online learning of social representations. In Proceedings of the 20th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, KDD '14, pages 701–710, New York, NY, USA. Association for Computing Machinery. This implementation is based on the code `https://github.com/xgfs/deepwalk-c`.
- class DESPLDistCalculator

  Exact shortest path distance calculator on a directed network with limits on the number of hops.
- class DFS

  DFS graph traversal.
- class DHDIPredictor

  Common neighbor link predictor adapted to directed networks.
- class DHPIPredictor

  Common neighbor link predictor adapted to directed networks.
- class Dijkstra

  An implementation of Dijkstra's algorithm.
- class DJIDPredictor

  Common neighbor link predictor adapted to directed networks.
- class DLCPPredictor

  Common neighbor link predictor adapted to directed networks.
- class DLHNPredictor

  Common neighbor link predictor adapted to directed networks.
- class DLPredictor

  The interface of a link predictor in a directed network.
- class DNetwork

  This class represents a directed network in the sense of graph theory.
- class DotProd

  A simple dot product similarity measure.
- class DPATPredictor

  Common neighbor link predictor adapted to directed networks.
- class DPSTPredictor

  A link predictor that prestores edge scores. This allows to seemingly integrate results from external link prediction algorithms to LinkPred (for example, users may implement their own link prediction algorithm and then use this link predictor to use compare their results to algorithms available in LinkPred).
- class DSAIPredictor

  Common neighbor link predictor adapted to directed networks.
- class DSOIPredictor

  Common neighbor link predictor adapted to directed networks.
- class Encoder

  The interface of a network encoder.
- class ESPDistCalculator

  Exact shortest path distance calculator.
- class ESPDsimCalculator

  Exact shortest path dissimilarity calculator.
- class ESPIndSimlCalculator

  Exact shortest path distance calculator.
- class ESPLDistCalculator

  Exact shortest path distance calculator with limits on the number of hops.
- class ESPLSimlCalculator

  Exact shortest path distance calculator.
- class ESPSimlCalculator

Exact shortest path distance calculator.
- class FastSig

    A fast sigmoid.
- class GCurve

    General performance curve.
- class GFMatrix

    Generalized full matrix. The storage scheme used is column-major.
- class GraphTraversal

    Graph traversal interface.
- class HMSM

    Contains the implementation of an algorithm for embedding a network using a a hidden metric space model. Reference: R. Alharbi, H. Benhidour, and S. Kerrache. "Link Prediction in Complex Net-works Based on a Hidden Variables Model". In: 2016 UKSim-AMSS 18th Inter-national Conference on Computer Modelling and Simulation (UKSim). 2016,pages 119–124.
- class L1Sim

    L1 similarity (negative the L1 norm or Manhattan distance).
- class L2Sim

    L2 similarity (negative the Euclidean distance).
- class LargeVis

    LargeVis encoder. Reference: Tang, J., Liu, J., Zhang, M., and Mei, Q. (2016b). Visualizing large-scale and high-dimensional data. In Bourdeau, J., Hendler, J., Nkambou, R., Horrocks, I., and Zhao, B. Y., editors, WWW, pages 287–297. ACM. This implementation is based on the code `https://github.com/lferry007/LargeVis`.
- class LINE

    LINE encoder.
- class LMapQueue

    A map-priority queue with limit on the capacity.
- class Log

    A log class.
- class LogisticRegresser

    Logistic regression algorithm.
- class LogMDSCG

    Optimization problem associated with multidimensional scaling using the logarithmic (MULTISCALE) loss function.
- class LogRegCG

    Logistic regression optimization problem.
- class LPSim

    LP similarity (negative the Lp norm).
- class MatFact

    Contains the implementation of an algorithm for embedding a network using matrix factorization. Reference: Koren, Y., Bell, R., and Volinsky, C. (2009). Matrix factorization techniques for recommender systems. Computer, 42(8)←↩ :30–37 Ahmed, A., Shervashidze, N., Narayanamurthy, S., Josifovski, V., and Smola, A. J. (2013). Distributed large-scale natural graph factorization. In Proceedings of the 22nd International Conference on World Wide Web, WWW '13, pages 37–48, New York, NY, USA. Association for Computing Machinery.
- class MatFactCG

    Optimization problem associated with matrix factorization.
- struct MatFactPbData

    A simple structure to store matrix factoization problem data.
- class MDS

    Solve the MDS problem.
- class NetDistCalculator

    Interface for calculating the distance between nodes in a network.
- class NetIndSimlCalculator

    Interface for calculating the indirect similarity between nodes in a network.
- class NetSimlCalculator

Interface for calculating the similarity between nodes in a network.
- class NetworkManipulator

  Class to manipulate network by removing or adding edges.
- class Node2Vec

  Node2Vec encoder. References: Grover, A. and Leskovec, J. (2016). Node2vec: Scalable feature learning for networks. In Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, KDD'16, pages 855–864, New York, NY, USA. Association for Computing Machinery. This implementation is based on the code `https://github.com/xgfs/node2vec-c`.
- class Pearson

  Pearson similarity (Pearson correlation coefficient).
- class PEFactory

  Factory class to create link predictors and performance measures.
- class PerfCurve

  Abstract performance curve.
- struct PerfeEvalExpDescp

  Structure storing experiment description.
- class PerfEvalExp

  Performance evaluation experiment.
- class PerfEvaluator

  Performance evaluator.
- class PerfMeasure

  Abstract performance measure.
- class PR

  The precision recall curve.
- class PredResults

  A class to store and manage prediction results.
- class RandomGen

  A random number generator.
- class RndClassifier

  Random classifier.
- class ROC

  Receiver Operating Characteristic curve.
- class SimMeasure

  Interface of a similarity measure.
- class TestData

  Test data.
- class TestEdgeGen

  Generate true positives and true negatives.
- class TPR

  Compute top precision.
- class UADAPredictor

  Adamic Adar index link predictor.
- class UCNEPredictor

  Common neighbor link predictor.
- class UCRAPredictor

  Local path link predictor.
- class UCSTPredictor

  Constant link predictor.
- class UECLPredictor

  Encoder-classifier link predictor.
- class UESMPredictor

Encoder-Similarity measure link predictor.
- class UFBMPredictor

  Fast blocking model link predictor.
- class UHDIPredictor

  Hub depromoted index link predictor.
- class UHPIPredictor

  Hub promoted index link predictor.
- class UHRGPredictor

  HRG predictor.
- class UHYPPredictor

  Hypermap predictor.
- class UJIDPredictor

  Jackard index link predictor.
- class UKABPredictor

  A scalable popularity similarity link predictor proposed in: "Kerrache, S., Alharbi, R. & Benhidour, H. A Scalable Similarity-Popularity Link Prediction Method. Sci Rep 10, 6394 (2020)". `https://doi.org/10.↩ 1038/s41598-020-62636-1`.
- class ULCPPredictor

  Local path link predictor.
- class ULHNPredictor

  Leicht-Holme-Newman index link predictor.
- class ULPredictor

  The interface of a link predictor in an undirected network.
- class UMPSPredictor

  A scalable popularity similarity link predictor.
- class UNEDPredictor

  A neighbors degree link predictor.
- class UNetwork

  This class represents an undirected network in the sense of graph theory.
- class UPATPredictor

  A preferential attachment link predictor.
- class UPSTPredictor

  A link predictor that prestores edge scores. This allows to seemingly integrate results from external link prediction algorithms to LinkPred (for example, users may implement their own link prediction algorithm and then use this link predictor to use compare their results to algorithms available in LinkPred).
- class URALPredictor

  A resource allocation link predictor.
- class URNDPredictor

  A random link predictor.
- class USAIPredictor

  A Salton index link predictor.
- class USBMPredictor

  The stochastic block model link predictor.
- class USHPPredictor

  A shortest path link predictor link predictor.
- class USOIPredictor

  A Sorensen index link predictor.
- class USUMPredictor

  A sum-of-degrees link predictor.
- class Vec

  This class represent a vector (in the sense of linear algebra).

Typedefs

- using PerfResults = std::map< std::string, double >

Enumerations

- enum CacheLevel { NoCache, NodeCache, NetworkCache }

    Cache levels.
- enum MDSAlg { IpoptMDS, CGMDS }

    MDS solution methods.
- enum LinkClass { TP, FN, FP, TN }

    Enumeration of all classes of links.
- enum LogLevel {
  logError, logWarning, logInfo, logDebug,
  logDebug1, logDebug2, logDebug3 }

    Enumeration of log levels.
- enum SortOrder { None, Inc, Dec }

    Enumeration of different sorting orders.

Functions

- Vec operator+ (Vec const &v1, Vec const &v2)
- Vec operator- (Vec const &v1, Vec const &v2)
- Vec operator∗ (Vec const &v1, Vec const &v2)
- Vec operator/ (Vec const &v1, Vec const &v2)
- Vec operator+ (double a, Vec const &v)
- Vec operator- (double a, Vec const &v)
- Vec operator∗ (double a, Vec const &v)
- Vec operator/ (double a, Vec const &v)
- Vec operator+ (Vec const &v, double a)
- Vec operator- (Vec const &v, double a)
- Vec operator∗ (Vec const &v, double a)
- Vec operator/ (Vec const &v, double a)
- double operator^ (Vec const &v1, Vec const &v2)

Variables

- constexpr double MathPI = 3.141592653589793238462643383279502884L

8.1.1 Detailed Description

Main namespace.

The main namespace of the library.

8.1.2 Typedef Documentation

8.1.2.1 PerfResults

```
using LinkPred::PerfResults = typedef std::map<std::string, double>
```

Map of performance results.Performance results are stored in a map, with the key being the identifier of the performance measure and the data being the value.

8.1.3 Enumeration Type Documentation

8.1.3.1 CacheLevel

```
enum LinkPred::CacheLevel
```

Cache levels.

Enumerator

NoCache	No cache.
NodeCache	Cache at node level.
NetworkCache	Cache at network level.

8.1.3.2 LinkClass

```
enum LinkPred::LinkClass
```

Enumeration of all classes of links.

Enumerator

TP	True positive link.
FN	False negative link.
FP	False positive link.
TN	True negative link.

8.1.3.3 LogLevel

```
enum LinkPred::LogLevel
```

Enumeration of log levels.

Enumerator

logError	At this level, only errors are reported.
logWarning	Warnings are included at this level.
logInfo	Running information included at this level.
logDebug	Debug level.
logDebug1	Debug level 1.
logDebug2	Debug level 2.
logDebug3	Debug level 3.

8.1.3.4 MDSAlg

```
enum LinkPred::MDSAlg
```

MDS solution methods.

Enumerator

IpoptMDS	Solution using Ipopt.
CGMDS	Solution using the CG Descent algorithm.

8.1.3.5 SortOrder

```
enum LinkPred::SortOrder
```

Enumeration of different sorting orders.

Enumerator

None	Not sorted.
Inc	Sorted in increasing order.
Dec	Sorted in decreasing order.

8.1.4 Function Documentation

8.1.4.1 operator*() [1/3]

```
Vec LinkPred::operator* (
             double a,
             Vec const & v )
```

Scalar-vector multiplication.

Parameters

a	The scalar.
v	The vector.

Returns

a ∗ v.

8.1.4.2 operator∗() [2/3]

```
Vec LinkPred::operator* (
            Vec const & v,
            double a )
```

Vector-scalar multiplication.

Parameters

v	The vector.
a	The scalar.

Returns

v ∗ a.

8.1.4.3 operator∗() [3/3]

```
Vec LinkPred::operator* (
            Vec const & v1,
            Vec const & v2 )
```

Vector element-wise multiplication.

Parameters

v1	The first vector.
v2	The second vector.

Returns

v1 .∗ v2.

8.1.4.4 operator+() [1/3]

```
Vec LinkPred::operator+ (
             double a,
             Vec const & v )
```

Scalar-vector addition.

Parameters

a	The scalar.
v	The vector.

Returns

a + v.

8.1.4.5 operator+() [2/3]

```
Vec LinkPred::operator+ (
             Vec const & v,
             double a )
```

Vector-scalar addition.

Parameters

v	The vector.
a	The scalar.

Returns

v + a.

8.1.4.6 operator+() [3/3]

```
Vec LinkPred::operator+ (
             Vec const & v1,
             Vec const & v2 )
```

Vector addition.

Parameters

v1	The first vector.
v2	The second vector.

Returns

v1 + v2.

8.1.4.7 operator-() [1/3]

```
Vec LinkPred::operator- (
            double a,
            Vec const & v )
```

Scalar-vector subtraction.

Parameters

a	The scalar.
v	The vector.

Returns

a - v.

8.1.4.8 operator-() [2/3]

```
Vec LinkPred::operator- (
            Vec const & v,
            double a )
```

Vector-scalar subtraction.

Parameters

v	The vector.
a	The scalar.

Returns

v - a.

8.1.4.9 operator-() [3/3]

```
Vec LinkPred::operator- (
            Vec const & v1,
            Vec const & v2 )
```

Vector subtraction.

Parameters

v1	The first vector.
v2	The second vector.

Returns

v1 - v2.

8.1.4.10 operator/() [1/3]

```
Vec LinkPred::operator/ (
             double a,
             Vec const & v )
```

Scalar-vector division.

Parameters

a	The scalar.
v	The vector.

Returns

a / v.

8.1.4.11 operator/() [2/3]

```
Vec LinkPred::operator/ (
             Vec const & v,
             double a )
```

Vector-scalar division.

Parameters

v	The vector.
a	The scalar.

Returns

v / a.

8.1.4.12 operator/() [3/3]

```
Vec LinkPred::operator/ (
            Vec const & v1,
            Vec const & v2 )
```

Vector element-wise division.

Parameters

v1	The first vector.
v2	The second vector.

Returns

v1 ./ v2.

8.1.4.13 operator^()

```
double LinkPred::operator^ (
            Vec const & v1,
            Vec const & v2 )
```

Dot product.

Parameters

v1	The first vector.
v2	The second vector.

Returns

v1' ∗ v2.

8.1.5 Variable Documentation

8.1.5.1 MathPI

```
constexpr double LinkPred::MathPI = 3.141592653589793238462643383279502884L  [constexpr]
```

Pi.

8.2 LinkPred::Simp Namespace Reference

Simplified interface. Contains a simplified interface for LinkPred that includes the essential functionalities.

Classes

- struct EdgeScore

  A structure to store the score of an edge.
- struct EdgeScoreByID

  A structure to store the score of an edge. The node IDs are used instead of labels.
- class Evaluator

  A class that simplifies the evaluation of link prediction algorithms.
- struct PerfRes

  A structure to store performance results.
- class Predictor

  A class that simplifies the use of link prediction algorithms.

8.2.1 Detailed Description

Simplified interface. Contains a simplified interface for LinkPred that includes the essential functionalities.

8.3 LinkPred::Utils Namespace Reference

Some utility functions.

Classes

- struct EdgeScore

  A structure to store the score of an edge.
- struct PairCompRight

  Class for comparing pairs based on second elements only.

Functions

- std::string & ltrim (std::string &str, const char ∗spaces=" \t\n\r\f\v")
- std::string & rtrim (std::string &str, const char ∗spaces=" \t\n\r\f\v")
- std::string & trim (std::string &str, const char ∗spaces=" \t\n\r\f\v")
- template<typename T >
  void clear (std::queue< T > &q)
- template<typename IteratorT >
  void sort (IteratorT begin, IteratorT end, SortOrder sortOrder)
- std::vector< std::size_t > getRndPerm (std::size_t n)
- std::vector< std::size_t > getRndPerm (std::size_t n, long int seed)
- std::pair< double, double > plFit (std::vector< std::size_t > const &data)
- std::pair< double, double > plFit (std::vector< double > const &data)

- template<typename T >
  void print (std::vector< T > const &v, std::string name)
- template<typename U , typename V >
  std::pair< V, U > flip (const std::pair< U, V > &p)
- template<typename U , typename V >
  std::multimap< V, U > flipMap (const std::map< U, V > &map)
- template<typename RandomIterator >
  std::set< typename std::iterator_traits< RandomIterator >::value_type > selectRandom (RandomIterator begin, RandomIterator end, std::size_t k, long int seed)
- template<typename RandomIterator >
  void selectRandomInPlace (RandomIterator begin, RandomIterator end, std::size_t k, long int seed)
- template<typename T , typename InputIterator , typename InserterIt , typename Compare >
  void selectTopK (InputIterator begin, InputIterator end, InserterIt inserter, std::size_t k)
- template<typename RandomIterator >
  RandomIterator getRandom (RandomIterator begin, RandomIterator end, long int seed)
- template<typename T , typename InputIterator , typename InserterIt >
  void filter (InputIterator begin, InputIterator end, std::set< T > const &excepts, InserterIt inserter)
- template<typename InputIterator >
  void print (InputIterator begin, InputIterator end, std::string const &title, std::ostream &out)
- template<typename InputIterator >
  void print (InputIterator begin, InputIterator end, std::string const &title)
- template<typename InputIterator , typename Network >
  void printEdges (InputIterator begin, InputIterator end, Network const &net, std::string const &title, std↩ ::ostream &out)
- template<typename InputIterator , typename Network >
  void printEdges (InputIterator begin, InputIterator end, Network const &net, std::string const &title)
- template<typename InputIterator >
  double norm (InputIterator begin, InputIterator end)
- int int_cast (std::size_t source)
- template<typename InputIterator >
  void assertNoNaN (InputIterator begin, InputIterator end)
- std::pair< std::size_t, std::size_t > localRange (std::size_t n, int nbProcs, int procID)
- template<typename RandomIterator >
  void shuffle (RandomIterator begin, RandomIterator end, long int seed)
- template<typename Label = std::string>
  std::vector< std::pair< Label, Label > > readEdges (std::string fileName, bool ignoreLoops=true)
- template<typename Label = std::string>
  std::vector< EdgeScore< Label > > readEdgeScores (std::string fileName)
- template<typename Label = std::string>
  void writeEdgeScores (std::string fileName, std::vector< EdgeScore< Label >> const &esv)

8.3.1 Detailed Description

Some utility functions.

8.3.2 Function Documentation

8.3.2.1 assertNoNaN()

```
template<typename InputIterator >
void LinkPred::Utils::assertNoNaN (
            InputIterator begin,
            InputIterator end )
```

Check for NaN and throws exception if it finds it.

8.3.2.2 clear()

```
template<typename T >
void LinkPred::Utils::clear (
            std::queue< T > & q )
```

Clear the queue (q becomes empty after the call).

Template Parameters

T	the data type stored in the queue.

Parameters

q	The queue.

8.3.2.3 filter()

```
template<typename T , typename InputIterator , typename InserterIt >
void LinkPred::Utils::filter (
            InputIterator begin,
            InputIterator end,
            std::set< T > const & excepts,
            InserterIt inserter )
```

Filter a range.

8.3.2.4 flip()

```
template<typename U , typename V >
std::pair<V, U> LinkPred::Utils::flip (
            const std::pair< U, V > & p )
```

Flip a pair.

Parameters

p	The original pair.

Returns

The flipped pair.

8.3.2.5 flipMap()

```
template<typename U , typename V >
std::multimap<V, U> LinkPred::Utils::flipMap (
             const std::map< U, V > & map )
```

Flip a map.

Parameters

map	The original map.

Returns

The flipped map.

8.3.2.6 getRandom()

```
template<typename RandomIterator >
RandomIterator LinkPred::Utils::getRandom (
             RandomIterator begin,
             RandomIterator end,
             long int seed )
```

Select a random element from a range.

8.3.2.7 getRndPerm() [1/2]

```
std::vector<std::size_t> LinkPred::Utils::getRndPerm (
             std::size_t n )
```

Parameters

n	Size of the permutation.

Returns

A vector containing a random permutation of [0..n-1].

8.3.2.8 getRndPerm() [2/2]

```
std::vector<std::size_t> LinkPred::Utils::getRndPerm (
             std::size_t n,
             long int seed )
```

Parameters

n	Size of the permutation.
seed	The seed.

Returns

A vector containing a random permutation of [0..n-1].

8.3.2.9 int_cast()

```
int LinkPred::Utils::int_cast (
             std::size_t source )  [inline]
```

Controlled numerical cast.

8.3.2.10 localRange()

```
std::pair<std::size_t, std::size_t> LinkPred::Utils::localRange (
             std::size_t n,
             int nbProcs,
             int procID )
```

Compute local range in a distributed setting.

Parameters

n	Total range size.
nbProcs	Number of processors.
procID	The processor ID.

Returns

Pair containing start and end of the range (end is not included in the range).

8.3.2.11 ltrim()

```
std::string& LinkPred::Utils::ltrim (
             std::string & str,
             const char * spaces = " \t\n\r\f\v" )  [inline]
```

Trim the string from left.

Parameters

str	Input string.
spaces	List of spaces.

8.3.2.12 norm()

```
template<typename InputIterator >
double LinkPred::Utils::norm (
            InputIterator begin,
            InputIterator end )
```

Returns

The norm of a range.

8.3.2.13 plFit() [1/2]

```
std::pair<double, double> LinkPred::Utils::plFit (
            std::vector< double > const & data )
```

Fit a continuous power law.

Parameters

data	The data to be fitted.

Returns

A pair containing respectively, the power of the power law and the minimum value.

8.3.2.14 plFit() [2/2]

```
std::pair<double, double> LinkPred::Utils::plFit (
            std::vector< std::size_t > const & data )
```

Fit a discrete power law.

Parameters

data	The data to be fitted.

Returns

A pair containing respectively, the power of the power law and the minimum value.

8.3.2.15 print() [1/3]

```
template<typename InputIterator >
void LinkPred::Utils::print (
            InputIterator begin,
            InputIterator end,
            std::string const & title )
```

Print data.

8.3.2.16 print() [2/3]

```
template<typename InputIterator >
void LinkPred::Utils::print (
            InputIterator begin,
            InputIterator end,
            std::string const & title,
            std::ostream & out )
```

Print data.

8.3.2.17 print() [3/3]

```
template<typename T >
void LinkPred::Utils::print (
            std::vector< T > const & v,
            std::string name )
```

Print vector to standard output.

Parameters

v	The vector.
name	String prefixed to the print.

8.3.2.18 printEdges() [1/2]

```
template<typename InputIterator , typename Network >
void LinkPred::Utils::printEdges (
            InputIterator begin,
            InputIterator end,
            Network const & net,
            std::string const & title )
```

Print edges.

8.3.2.19 printEdges() [2/2]

```
template<typename InputIterator , typename Network >
void LinkPred::Utils::printEdges (
            InputIterator begin,
            InputIterator end,
            Network const & net,
            std::string const & title,
            std::ostream & out )
```

Print edges.

8.3.2.20 readEdges()

```
template<typename Label = std::string>
std::vector<std::pair<Label, Label> > LinkPred::Utils::readEdges (
            std::string fileName,
            bool ignoreLoops = true )
```

Read edges from file.

Parameters

fileName	The file containing the edges.
ignoreLoops	Whether to ignore loops (an edge from a node to itself).

Returns

A vector containing the edge represented as std::pair.

8.3.2.21 readEdgeScores()

```
template<typename Label = std::string>
std::vector<EdgeScore<Label> > LinkPred::Utils::readEdgeScores (
            std::string fileName )
```

Read edges and their scores from file.

Parameters

fileName	The file containing the edges and their scores.

Returns

A vector containing the edges with their scores.

8.3.2.22 rtrim()

```
std::string& LinkPred::Utils::rtrim (
            std::string & str,
            const char * spaces = " \t\n\r\f\v" )  [inline]
```

Trim the string from right.

Parameters

str	Input string.
spaces	List of spaces.

8.3.2.23 selectRandom()

```
template<typename RandomIterator >
std::set< typename std::iterator_traits<RandomIterator>::value_type> LinkPred::Utils::select←
Random (
            RandomIterator begin,
            RandomIterator end,
            std::size_t k,
            long int seed )
```

Randomly select k elements without repetition using Floyd's selection algorithm.

Parameters

begin	Iterator pointing to the start of elements.
end	Iterator pointing to the end of elements.
k	The number of elements to select. If k is larger than the actual number of elements, std::out_of_range is thrown.
seed	Seed for the random number generator.

8.3.2.24 selectRandomInPlace()

```
template<typename RandomIterator >
void LinkPred::Utils::selectRandomInPlace (
            RandomIterator begin,
            RandomIterator end,
            std::size_t k,
            long int seed )
```

Randomly select k elements without repetition using Floyd's selection algorithm. The selected elements are put at the end of the range.

Parameters

begin	Iterator pointing to the start of elements.
end	Iterator pointing to the end of elements.
k	The number of elements to select. If k is larger than the actual number of elements, std::out_of_range is thrown.
seed	Seed for the random number generator.

8.3.2.25 selectTopK()

```
template<typename T , typename InputIterator , typename InserterIt , typename Compare >
void LinkPred::Utils::selectTopK (
            InputIterator begin,
            InputIterator end,
            InserterIt inserter,
            std::size_t k )
```

Randomly select k largest or smallest elements.

Parameters

begin	Iterator pointing to the start of elements.
end	Iterator pointing to the end of elements.
inserter	An inserter iterator where the selected elements will be inserted.
k	The number of elements to select. If k is larger than the actual number of elements, std::out_of_range is thrown.

8.3.2.26 shuffle()

```
template<typename RandomIterator >
void LinkPred::Utils::shuffle (
            RandomIterator begin,
            RandomIterator end,
            long int seed )
```

Randomly shuffle a range.

8.3.2.27 sort()

```
template<typename IteratorT >
void LinkPred::Utils::sort (
            IteratorT begin,
            IteratorT end,
            SortOrder sortOrder )
```

Sort a range.

Template Parameters

T	The data type.
IteratorT	The iterator type.

Parameters

begin	Iterator to the first element in the range.
end	Iterator to one-past-the-last element in the range.
sortOrder	The requested sorting order.

8.3.2.28 trim()

```
std::string& LinkPred::Utils::trim (
            std::string & str,
            const char * spaces = " \t\n\r\f\v" )  [inline]
```

Trim the string from left and right.

Parameters

str	Input string.
spaces	List of spaces.

8.3.2.29 writeEdgeScores()

```
template<typename Label = std::string>
void LinkPred::Utils::writeEdgeScores (
            std::string fileName,
            std::vector< EdgeScore< Label >> const & esv )
```

Write edges and their scores to file.

Parameters

fileName	The file where the edges and their scores will be written.
esv	A vector containing the edges with their scores.

Chapter 9

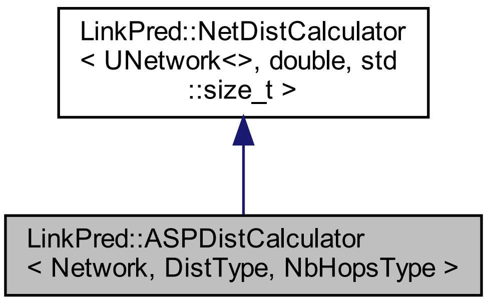
Class Documentation

9.1 LinkPred::ASPDistCalculator< Network, DistType, NbHopsType > Class Template Reference

Approximate shortest path distance calculator.

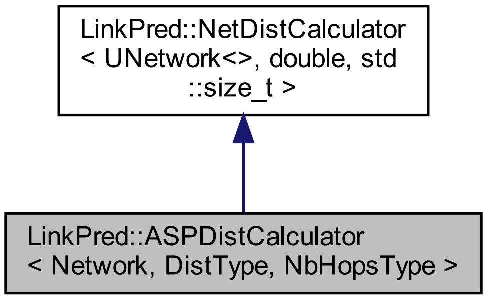
```
#include <netdistcalculator.hpp>
```

Inheritance diagram for LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >:



LinkPred::NetDistCalculator < UNetwork<>, double, std ::size_t >
LinkPred::ASPDistCalculator < Network, DistType, NbHopsType >

Collaboration diagram for LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >:


LinkPred::NetDistCalculator < UNetwork<>, double, std ::size_t >
LinkPred::ASPDistCalculator < Network, DistType, NbHopsType >

Public Types

- using LengthMapIdType = typename NetDistCalculator< Network, DistType, NbHopsType >↩ ::LengthMapIdType
- using NetworkSP = typename NetDistCalculator< Network, DistType, NbHopsType >::NetworkSP
- using NodeID = typename NetDistCalculator< Network, DistType, NbHopsType >::NodeID
- using Label = typename NetDistCalculator< Network, DistType, NbHopsType >::Label
- using Edge = typename NetDistCalculator< Network, DistType, NbHopsType >::Edge
- using NodeDistMap = typename NetDistCalculator< Network, DistType, NbHopsType >::NodeDistMap
- using NodeDistMapSP = typename NetDistCalculator< Network, DistType, NbHopsType >::NodeDistMapSP
- using EdgeLengthMap = typename NetDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMap
- using EdgeLengthMapSP = typename NetDistCalculator< Network, DistType, NbHopsType >↩ ::EdgeLengthMapSP

Public Member Functions

- ASPDistCalculator (Dijkstra< Network, DistType, NbHopsType > &dijkstra, EdgeLengthMapSP length)
- ASPDistCalculator (ASPDistCalculator const &that)=default
- ASPDistCalculator & operator= (ASPDistCalculator const &that)=default
- ASPDistCalculator (ASPDistCalculator &&that)=default
- ASPDistCalculator & operator= (ASPDistCalculator &&that)=default
- template<typename InputIterator >
  void setLandmarks (InputIterator landmarksBegin, InputIterator landmarksEnd)
- virtual std::pair< DistType, NbHopsType > getDist (NodeID const &i, NodeID const &j)
- virtual std::pair< DistType, NbHopsType > getIndDist (NodeID const &i, NodeID const &j)
- virtual NodeDistMapSP getDist (NodeID const &i)
- virtual ∼ASPDistCalculator ()

9.1.1 Detailed Description

template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType = std::size_t>
class LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >

Approximate shortest path distance calculator.

This class implements a fast method to approximate shortest path distances in large networks. First, a set of landmarks is provided, then the distance between any two nodes is computed as the minimum over the sums of distances between the two nodes and any landmark.

Template Parameters

Network	The network type.
DistType	The distance type (can be an integer or floating point type).
NbHopsType	The type of the number of hops (must be an integer type).

9.1.2 Member Typedef Documentation

9.1.2.1 Edge

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::Edge = typename NetDistCalculator<Network
DistType, NbHopsType>::Edge
```

Edge type.

9.1.2.2 EdgeLengthMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMap = typename
NetDistCalculator<Network, DistType, NbHopsType>::EdgeLengthMap
```

Edge length map.

9.1.2.3 EdgeLengthMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMapSP = typename
NetDistCalculator<Network, DistType, NbHopsType>::EdgeLengthMapSP
```

Shared pointer to an edge length map.

9.1.2.4 Label

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::Label = typename NetDistCalculator<Netwo
DistType, NbHopsType>::Label
```

Nodes label type.

9.1.2.5 LengthMapIdType

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::LengthMapIdType = typename
NetDistCalculator<Network, DistType, NbHopsType>::LengthMapIdType
```

Length map ID type.

9.1.2.6 NetworkSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::NetworkSP = typename
NetDistCalculator<Network, DistType, NbHopsType>::NetworkSP
```

Shared pointer to network.

9.1.2.7 NodeDistMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::NodeDistMap = typename
NetDistCalculator<Network, DistType, NbHopsType>::NodeDistMap
```

Distance map.

9.1.2.8 NodeDistMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::NodeDistMapSP = typename
NetDistCalculator<Network, DistType, NbHopsType>::NodeDistMapSP
```

Shared pointer to a distance map.

9.1.2.9 NodeID

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::NodeID = typename NetDistCalculator<Netw
DistType, NbHopsType>::NodeID
```

Nodes ID type.

9.1.3 Constructor & Destructor Documentation

9.1.3.1 ASPDistCalculator() [1/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::ASPDistCalculator (
            Dijkstra< Network, DistType, NbHopsType > & dijkstra,
            EdgeLengthMapSP length )  [inline]
```

Constructor.

Parameters

dijkstra	A Dijkstra algorithm object.
length	The length map.

9.1.3.2 ASPDistCalculator() [2/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::ASPDistCalculator (
            ASPDistCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.1.3.3 ASPDistCalculator() [3/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::ASPDistCalculator (
            ASPDistCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.1.3.4 ∼ASPDistCalculator()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::∼ASPDistCalculator ( )
[inline], [virtual]
```

Destructor.

9.1.4 Member Function Documentation

9.1.4.1 getDist() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual NodeDistMapSP LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::getDist (
            NodeID const & i )  [virtual]
```

Parameters

i	Source node.

Returns

The distance from i to all other nodes.

9.1.4.2 getDist() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DistType, NbHopsType> LinkPred::ASPDistCalculator< Network, DistType, Nb↩
HopsType >::getDist (
            NodeID const & i,
            NodeID const & j )  [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j.

9.1.4.3 getIndDist()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DistType, NbHopsType> LinkPred::ASPDistCalculator< Network, DistType, Nb↩
HopsType >::getIndDist (
            NodeID const & i,
            NodeID const & j )  [inline], [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j ignoring the edge between i and j.

9.1.4.4 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
ASPDistCalculator& LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::operator= (
             ASPDistCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.1.4.5 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
ASPDistCalculator& LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::operator= (
             ASPDistCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.1.4.6 setLandmarks()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
template<typename InputIterator >
void LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >::setLandmarks (
             InputIterator landmarksBegin,
             InputIterator landmarksEnd )  [inline]
```

Set the landmarks.

Parameters

landmarksBegin	Iterator to the first landmarks.
landmarksEnd	Iterator to one past the last landmarks.

The documentation for this class was generated from the following file:

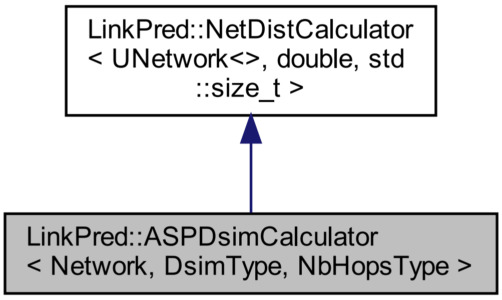
- include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp

9.2 LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType > Class Template Reference

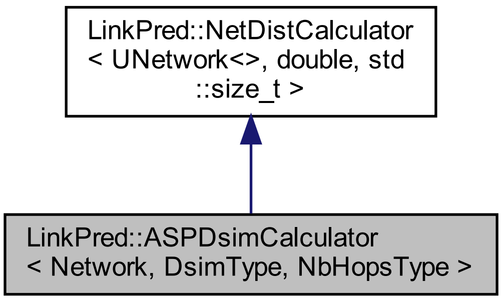
Approximate shortest path dissimilarity calculator.

```
#include <netdistcalculator.hpp>
```

Inheritance diagram for LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >:


LinkPred::NetDistCalculator < UNetwork<>, double, std ::size_t >
LinkPred::ASPDsimCalculator < Network, DsimType, NbHopsType >

Collaboration diagram for LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >:


LinkPred::NetDistCalculator < UNetwork<>, double, std ::size_t >
LinkPred::ASPDsimCalculator < Network, DsimType, NbHopsType >

Public Types

- using LengthMapIdType = typename NetDistCalculator< Network, DsimType, NbHopsType >↩ ::LengthMapIdType
- using NetworkSP = typename NetDistCalculator< Network, DsimType, NbHopsType >::NetworkSP
- using NodeID = typename NetDistCalculator< Network, DsimType, NbHopsType >::NodeID
- using Label = typename NetDistCalculator< Network, DsimType, NbHopsType >::Label
- using Edge = typename NetDistCalculator< Network, DsimType, NbHopsType >::Edge
- using NodeDsimMap = typename NetDistCalculator< Network, DsimType, NbHopsType >::NodeDistMap
- using NodeDsimMapSP = typename NetDistCalculator< Network, DsimType, NbHopsType >↩ ::NodeDistMapSP
- using EdgeLengthMap = typename NetDistCalculator< Network, DsimType, NbHopsType >::EdgeLengthMap
- using EdgeLengthMapSP = typename NetDistCalculator< Network, DsimType, NbHopsType >↩ ::EdgeLengthMapSP

Public Member Functions

- ASPDsimCalculator (Dijkstra< Network, DsimType, NbHopsType > &dijkstra, EdgeLengthMapSP length)
- ASPDsimCalculator (ASPDsimCalculator const &that)=default
- ASPDsimCalculator & operator= (ASPDsimCalculator const &that)=default
- ASPDsimCalculator (ASPDsimCalculator &&that)=default
- ASPDsimCalculator & operator= (ASPDsimCalculator &&that)=default
- template<typename InputIterator >
  void setLandmarks (InputIterator landmarksBegin, InputIterator landmarksEnd)
- virtual std::pair< DsimType, NbHopsType > getDist (NodeID const &i, NodeID const &j)
- virtual std::pair< DsimType, NbHopsType > getIndDist (NodeID const &i, NodeID const &j)
- virtual NodeDsimMapSP getDist (NodeID const &i)
- virtual ~ASPDsimCalculator ()

9.2.1 Detailed Description

template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType = std::size_t>
class LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >

Approximate shortest path dissimilarity calculator.

Template Parameters

Network	The network type.
DistType	The distance type (can be an integer or floating point type).
NbHopsType	The type of the number of hops (must be an integer type).

9.2.2 Member Typedef Documentation

9.2.2.1 Edge

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
```

```
using LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::Edge = typename NetDistCalculator<Network
DsimType, NbHopsType>::Edge
```

Edge type.

9.2.2.2 EdgeLengthMap

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::EdgeLengthMap = typename
NetDistCalculator<Network, DsimType, NbHopsType>::EdgeLengthMap
```

Edge length map.

9.2.2.3 EdgeLengthMapSP

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::EdgeLengthMapSP = typename
NetDistCalculator<Network, DsimType, NbHopsType>::EdgeLengthMapSP
```

Shared pointer to an edge length map.

9.2.2.4 Label

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::Label = typename NetDistCalculator<Networ
DsimType, NbHopsType>::Label
```

Nodes label type.

9.2.2.5 LengthMapIdType

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::LengthMapIdType = typename
NetDistCalculator<Network, DsimType, NbHopsType>::LengthMapIdType
```

Length map ID type.

9.2.2.6 NetworkSP

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::NetworkSP = typename
NetDistCalculator<Network, DsimType, NbHopsType>::NetworkSP
```

Shared pointer to network.

9.2.2.7 NodeDsimMap

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::NodeDsimMap = typename
NetDistCalculator<Network, DsimType, NbHopsType>::NodeDistMap
```

Dissimilarity map.

9.2.2.8 NodeDsimMapSP

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::NodeDsimMapSP = typename
NetDistCalculator<Network, DsimType, NbHopsType>::NodeDistMapSP
```

Shared pointer to a Dissimilarity map.

9.2.2.9 NodeID

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::NodeID = typename NetDistCalculator<Netwo
DsimType, NbHopsType>::NodeID
```

Nodes ID type.

9.2.3 Constructor & Destructor Documentation

9.2.3.1 ASPDsimCalculator() [1/3]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::ASPDsimCalculator (
             Dijkstra< Network, DsimType, NbHopsType > & dijkstra,
             EdgeLengthMapSP length )  [inline]
```

Constructor.

Parameters

dijkstra	A Dijkstra algorithm object.
length	The length map.

9.2.3.2 ASPDsimCalculator() [2/3]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::ASPDsimCalculator (
            ASPDsimCalculator< Network, DsimType, NbHopsType > const & that ) [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.2.3.3 ASPDsimCalculator() [3/3]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::ASPDsimCalculator (
            ASPDsimCalculator< Network, DsimType, NbHopsType > && that ) [default]
```

Move constructor.

Parameters

that	The object to move.

9.2.3.4 ∼ASPDsimCalculator()

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
virtual LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::~ASPDsimCalculator ( )
[inline], [virtual]
```

Destructor.

9.2.4 Member Function Documentation

9.2.4.1 getDist() [1/2]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
virtual NodeDsimMapSP LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::getDist (
            NodeID const & i ) [virtual]
```

Parameters

i	Source node.

Returns

The distance from i to all other nodes.

9.2.4.2 getDist() [2/2]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DsimType, NbHopsType> LinkPred::ASPDsimCalculator< Network, DsimType, Nb↩
HopsType >::getDist (
            NodeID const & i,
            NodeID const & j )  [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j.

9.2.4.3 getIndDist()

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DsimType, NbHopsType> LinkPred::ASPDsimCalculator< Network, DsimType, Nb↩
HopsType >::getIndDist (
            NodeID const & i,
            NodeID const & j )  [inline], [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j ignoring the edge between i and j.

9.2.4.4 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
ASPDsimCalculator& LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::operator= (
            ASPDsimCalculator< Network, DsimType, NbHopsType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.2.4.5 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
ASPDsimCalculator& LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::operator= (
            ASPDsimCalculator< Network, DsimType, NbHopsType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.2.4.6 setLandmarks()

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
template<typename InputIterator >
void LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >::setLandmarks (
            InputIterator landmarksBegin,
            InputIterator landmarksEnd )  [inline]
```

Set the landmarks.

Parameters

landmarksBegin	Iterator to the first landmarks.
landmarksEnd	Iterator to one past the last landmarks.

The documentation for this class was generated from the following file:

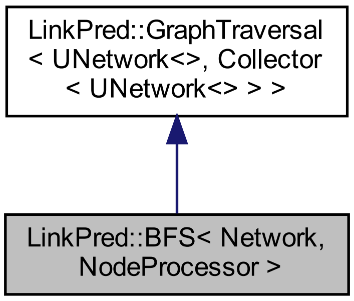
- include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp

9.3 LinkPred::BFS< Network, NodeProcessor > Class Template Reference

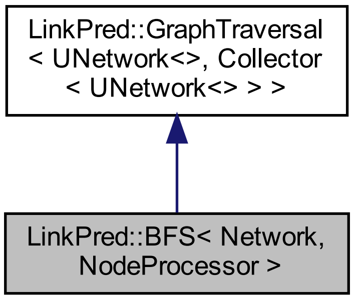
BFS graph traversal.

`#include <graphtraversal.hpp>`

Inheritance diagram for LinkPred::BFS< Network, NodeProcessor >:



Collaboration diagram for LinkPred::BFS< Network, NodeProcessor >:



Public Member Functions

- BFS (std::shared_ptr< Network const > net)
- BFS (BFS const &that)=default
- BFS & operator= (BFS const &that)=default
- BFS (BFS &&that)=default
- BFS & operator= (BFS &&that)=default
- virtual void traverse (typename Network::NodeID srcNode, NodeProcessor &processor)
- virtual ∼BFS ()=default

9.3.1 Detailed Description

template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
class LinkPred::BFS< Network, NodeProcessor >

BFS graph traversal.

Template Parameters

Network	The network type.
NodeProcessor	The node processor type.

9.3.2 Constructor & Destructor Documentation

9.3.2.1 BFS() [1/3]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
LinkPred::BFS< Network, NodeProcessor >::BFS (
            std::shared_ptr< Network const > net )  [inline]
```

< The network on which traversal is done. Constructor.

Parameters

net	The network on which traversal is done.

9.3.2.2 BFS() [2/3]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
LinkPred::BFS< Network, NodeProcessor >::BFS (
            BFS< Network, NodeProcessor > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.3.2.3 BFS() [3/3]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
```

```
LinkPred::BFS< Network, NodeProcessor >::BFS (
            BFS< Network, NodeProcessor > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.3.2.4 ∼BFS()

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
virtual LinkPred::BFS< Network, NodeProcessor >::∼BFS ( )  [virtual], [default]
```

Destructor.

9.3.3 Member Function Documentation

9.3.3.1 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
BFS& LinkPred::BFS< Network, NodeProcessor >::operator= (
            BFS< Network, NodeProcessor > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.3.3.2 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
BFS& LinkPred::BFS< Network, NodeProcessor >::operator= (
            BFS< Network, NodeProcessor > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.3.3.3 traverse()

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
virtual void LinkPred::BFS< Network, NodeProcessor >::traverse (
            typename Network::NodeID srcNode,
            NodeProcessor & processor )  [inline], [virtual]
```

Traverse the graph in BFS order.

Parameters

srcNode	The source node.
processor	The node processor.

The documentation for this class was generated from the following file:

- include/linkpred/graphalg/traversal/graphtraversal.hpp

9.4 LinkPred::BHeap< T, P, ComparatorT, ComparatorP > Class Template Reference

A binary heap.

```
#include <bheap.hpp>
```

Public Member Functions

- BHeap ()
- BHeap (BHeap const &that)=default
- BHeap & operator= (BHeap const &that)=default
- BHeap (BHeap &&that)=default
- BHeap & operator= (BHeap &&that)=default
- std::size_t size ()
- bool push (T const &elem, P const &pr)
- const std::pair< T, P > & top () const
- void pop ()
- void set (T const &elem, P const &pr)
- void increase (T const &elem, P const &pr)
- void decrease (T const &elem, P const &pr)
- bool tryIncrease (T const &elem, P const &pr)
- bool tryDecrease (T const &elem, P const &pr)
- bool contains (T const &elem)
- void print ()
- virtual ~BHeap ()=default

9.4.1 Detailed Description

**template<typename T, typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP = std::less<P>>
class LinkPred::BHeap< T, P, ComparatorT, ComparatorP >**

A binary heap.

This class implements a binary heap priority queue offering O(log n) insert, remove, and O(log n)^2 priority update.

Template Parameters

T	The stored data type.
P	The priority type.
ComparatorT	The data comparator.
ComparatorP	The priority comparator.

9.4.2 Constructor & Destructor Documentation

9.4.2.1 BHeap() [1/3]

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::BHeap ( )  [inline]
```

Constructor.

9.4.2.2 BHeap() [2/3]

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::BHeap (
             BHeap< T, P, ComparatorT, ComparatorP > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.4.2.3 BHeap() [3/3]

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::BHeap (
             BHeap< T, P, ComparatorT, ComparatorP > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.4.2.4 ∼BHeap()

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
virtual LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::∼BHeap ( )  [virtual], [default]
```

Destructor.

9.4.3 Member Function Documentation

9.4.3.1 contains()

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
bool LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::contains (
             T const & elem )  [inline]
```

Check if an element exists.

Parameters

elem	The element to be checked.

Returns

True if `elem` exists in the heap, false otherwise.

9.4.3.2 decrease()

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
void LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::decrease (
             T const & elem,
             P const & pr )  [inline]
```

Decrease the priority of an element.

Parameters

elem	The element.
pr	The new priority. This must not be greater than the current one.

9.4.3.3 increase()

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
void LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::increase (
            T const & elem,
            P const & pr )  [inline]
```

Increase the priority of an element.

Parameters

elem	The element.
pr	The new priority. This must not be smaller than the current one.

9.4.3.4 operator=() [1/2]

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
BHeap& LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::operator= (
            BHeap< T, P, ComparatorT, ComparatorP > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.4.3.5 operator=() [2/2]

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
BHeap& LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::operator= (
            BHeap< T, P, ComparatorT, ComparatorP > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.4.3.6 pop()

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
void LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::pop ( )  [inline]
```

Remove the element with the highest priority.

9.4.3.7 print()

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
void LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::print ( )  [inline]
```

Print the heap content to std::cout.

9.4.3.8 push()

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
bool LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::push (
             T const & elem,
             P const & pr )  [inline]
```

Push an element. If the element already exists, its priority is updated.

Parameters

elem	The element to be pushed.
pr	The priority.

Returns

True if the element is inserted, false if it already exists.

9.4.3.9 set()

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
void LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::set (
             T const & elem,
             P const & pr )  [inline]
```

Set the priority of an element.

Parameters

elem	The element.
pr	The new priority.

9.4.3.10 size()

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
std::size_t LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::size ( )  [inline]
```

Returns

The size of the heap.

9.4.3.11 top()

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
const std::pair<T, P>& LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::top ( ) const  [inline]
```

Return the element with the highest priority. This method does not remove the element.

Returns

A constant reference to pair, where the first element is the data and the second is the associated priority.

9.4.3.12 tryDecrease()

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
bool LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::tryDecrease (
             T const & elem,
             P const & pr )  [inline]
```

Try to decrease the priority.

Parameters

elem	The element.
pr	The new priority. The priority is updated only if this is smaller than the current one.

Returns

True if the priority is updated, false otherwise.

9.4.3.13 tryIncrease()

```
template<typename T , typename P = int, typename ComparatorT = std::less<T>, typename ComparatorP
= std::less<P>>
bool LinkPred::BHeap< T, P, ComparatorT, ComparatorP >::tryIncrease (
            T const & elem,
            P const & pr )  [inline]
```

Try to increase the priority.

Parameters

elem	The element.
pr	The new priority. The priority is updated only if this is greater than the current one.

Returns

True if the priority is updated, false otherwise.

The documentation for this class was generated from the following file:

- include/linkpred/core/ds/bheap.hpp

9.5 LinkPred::Bhmap< K, P, Comparator > Class Template Reference

A bidirectional half map.

`#include <bhmap.hpp>`

Public Types

- using k_const_iterator = typename std::map< K, P, Comparator >::const_iterator
- using p_const_iterator = typename std::vector< std::pair< P, K > >::const_iterator

Public Member Functions

- Bhmap ()=default
- Bhmap (Bhmap const &that)=default
- Bhmap & operator= (Bhmap const &that)=default
- Bhmap (Bhmap &&that)=default
- Bhmap & operator= (Bhmap &&that)=default
- std::pair< P, bool > insert (K const &key)
- std::size_t size () const
- p_const_iterator pbegin () const
- p_const_iterator pend () const
- k_const_iterator kbegin () const
- k_const_iterator kend () const
- const P & pos (K const &key) const
- const K & key (P const &pos) const
- k_const_iterator pfind (K const &key) const
- p_const_iterator kfind (P const &pos) const
- virtual ~Bhmap ()=default

9.5.1 Detailed Description

template<typename K, typename P = std::size_t, typename Comparator = std::less<K>>
class LinkPred::Bhmap< K, P, Comparator >

A bidirectional half map.

This is a special type of a bidirectional map, where user-provided keys are mapped to positions. The latter are contiguous from 0 to n-1, and are assigned according to insertion order. The lookup of position given the key is done in O(log n), whereas the reverse lookup is done is O(1).

Template Parameters

K	The key type.
P	The position type (must be integer).
Comparator	Key comparator.

9.5.2 Member Typedef Documentation

9.5.2.1 k_const_iterator

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
using LinkPred::Bhmap< K, P, Comparator >::k_const_iterator = typename std::map<K, P, Comparator>↩
::const_iterator
```

Constant iterator over keys.

9.5.2.2 p_const_iterator

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
using LinkPred::Bhmap< K, P, Comparator >::p_const_iterator = typename std::vector<std↩
::pair<P, K> >::const_iterator
```

Constant iterator over positions.

9.5.3 Constructor & Destructor Documentation

9.5.3.1 Bhmap() [1/3]

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
LinkPred::Bhmap< K, P, Comparator >::Bhmap ( )  [default]
```

Constructor.

9.5.3.2 Bhmap() [2/3]

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
LinkPred::Bhmap< K, P, Comparator >::Bhmap (
            Bhmap< K, P, Comparator > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.5.3.3 Bhmap() [3/3]

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
LinkPred::Bhmap< K, P, Comparator >::Bhmap (
            Bhmap< K, P, Comparator > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.5.3.4 ∼Bhmap()

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
virtual LinkPred::Bhmap< K, P, Comparator >::∼Bhmap ( )  [virtual], [default]
```

Destructor.

9.5.4 Member Function Documentation

9.5.4.1 insert()

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
std::pair<P, bool> LinkPred::Bhmap< K, P, Comparator >::insert (
            K const & key )  [inline]
```

Add an element if it does not already exist.

Parameters

key	The key.

Returns

True if the key is added, false if it already exists.

9.5.4.2 kbegin()

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
k_const_iterator LinkPred::Bhmap< K, P, Comparator >::kbegin ( ) const  [inline]
```

Returns

Begin iterator.

9.5.4.3 kend()

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
k_const_iterator LinkPred::Bhmap< K, P, Comparator >::kend ( ) const  [inline]
```

Returns

End iterator.

9.5.4.4 key()

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
const K& LinkPred::Bhmap< K, P, Comparator >::key (
             P const & pos ) const  [inline]
```

Returns

A reference to the mapped key.

9.5.4.5 kfind()

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
p_const_iterator LinkPred::Bhmap< K, P, Comparator >::kfind (
             P const & pos ) const  [inline]
```

Find a position. This operation is O(1).

Parameters

pos	The position.

Returns

An iterator to the position.

9.5.4.6 operator=() [1/2]

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
Bhmap& LinkPred::Bhmap< K, P, Comparator >::operator= (
            Bhmap< K, P, Comparator > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.5.4.7 operator=() [2/2]

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
Bhmap& LinkPred::Bhmap< K, P, Comparator >::operator= (
            Bhmap< K, P, Comparator > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.5.4.8 pbegin()

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
p_const_iterator LinkPred::Bhmap< K, P, Comparator >::pbegin ( ) const  [inline]
```

Returns

Begin iterator.

9.5.4.9 pend()

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
p_const_iterator LinkPred::Bhmap< K, P, Comparator >::pend ( ) const [inline]
```

Returns

End iterator.

9.5.4.10 pfind()

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
k_const_iterator LinkPred::Bhmap< K, P, Comparator >::pfind (
             K const & key ) const [inline]
```

Find a key. This operation is O(log(n)).

Parameters

key	The key.

Returns

An iterator to the key.

9.5.4.11 pos()

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
const P& LinkPred::Bhmap< K, P, Comparator >::pos (
             K const & key ) const [inline]
```

Returns

A reference to the mapped key.

9.5.4.12 size()

```
template<typename K , typename P = std::size_t, typename Comparator = std::less<K>>
std::size_t LinkPred::Bhmap< K, P, Comparator >::size ( ) const [inline]
```

Returns

The size of the map.

The documentation for this class was generated from the following file:

- include/linkpred/core/ds/bhmap.hpp

9.6 LinkPred::Classifier< InRndIt, OutRndIt, ScoreRndIt > Class Template Reference

Interface of a binary classifier.

```
#include <classifier.hpp>
```

Public Member Functions

- Classifier ()=default
- Classifier (Classifier const &that)=default
- Classifier & operator= (Classifier const &that)=default
- Classifier (Classifier &&that)=default
- Classifier & operator= (Classifier &&that)=default
- virtual void learn (InRndIt trInBegin, InRndIt trInEnd, OutRndIt trOutBegin, OutRndIt trOutEnd)=0
- virtual void predict (InRndIt inBegin, InRndIt inEnd, ScoreRndIt scoresBegin)=0
- const std::string & getName () const
- void setName (const std::string &name)
- virtual ~Classifier ()=default

9.6.1 Detailed Description

template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename std::vector<bool>↩ ::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
class LinkPred::Classifier< InRndIt, OutRndIt, ScoreRndIt >

Interface of a binary classifier.

Template Parameters

InRndIt	Input (features) iterator type. Must be a random iterator to LinkPred::Vec.
OutRndIt	Output (class) iterator type. Must be a random iterator to LinkPred::Vec.
Score↩ RndIt	Classification scores iterator type. Must be a random iterator to bool.

9.6.2 Constructor & Destructor Documentation

9.6.2.1 Classifier() [1/3]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
LinkPred::Classifier< InRndIt, OutRndIt, ScoreRndIt >::Classifier ( )  [default]
```

Default constructor.

9.6.2.2 Classifier() [2/3]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
LinkPred::Classifier< InRndIt, OutRndIt, ScoreRndIt >::Classifier (
            Classifier< InRndIt, OutRndIt, ScoreRndIt > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.6.2.3 Classifier() [3/3]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
LinkPred::Classifier< InRndIt, OutRndIt, ScoreRndIt >::Classifier (
            Classifier< InRndIt, OutRndIt, ScoreRndIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.6.2.4 ∼Classifier()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
virtual LinkPred::Classifier< InRndIt, OutRndIt, ScoreRndIt >::∼Classifier ( )  [virtual],
[default]
```

Destructor.

9.6.3 Member Function Documentation

9.6.3.1 getName()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
const std::string& LinkPred::Classifier< InRndIt, OutRndIt, ScoreRndIt >::getName ( ) const
[inline]
```

Returns

The name of the classifier.

9.6.3.2 learn()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
virtual void LinkPred::Classifier< InRndIt, OutRndIt, ScoreRndIt >::learn (
             InRndIt trInBegin,
             InRndIt trInEnd,
             OutRndIt trOutBegin,
             OutRndIt trOutEnd )  [pure virtual]
```

Learn from data.

Parameters

trInBegin	Iterator to the first example features (input).
trInEnd	Iterator to one-past-the-last example features (input).
trOutBegin	Iterator to the first example class (output).
trOutEnd	Iterator to one-past-the-last example class (output).

9.6.3.3 operator=() [1/2]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
Classifier& LinkPred::Classifier< InRndIt, OutRndIt, ScoreRndIt >::operator= (
             Classifier< InRndIt, OutRndIt, ScoreRndIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.6.3.4 operator=() [2/2]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
Classifier& LinkPred::Classifier< InRndIt, OutRndIt, ScoreRndIt >::operator= (
            Classifier< InRndIt, OutRndIt, ScoreRndIt > const & that ) [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.6.3.5 predict()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
virtual void LinkPred::Classifier< InRndIt, OutRndIt, ScoreRndIt >::predict (
            InRndIt inBegin,
            InRndIt inEnd,
            ScoreRndIt scoresBegin ) [pure virtual]
```

Predict.

Parameters

inBegin	Iterator to the first instance features (input).
inEnd	Iterator to one-past-the-last instance features (input).
scoresBegin	Iterator to the first location where to store prediction scores. Memory must be pre-allocated.

9.6.3.6 setName()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
void LinkPred::Classifier< InRndIt, OutRndIt, ScoreRndIt >::setName (
            const std::string & name ) [inline]
```

Set the name of the classifier.

Parameters

name	The new name of the classifier.

The documentation for this class was generated from the following file:

- include/linkpred/ml/classifiers/classifier.hpp

9.7 LinkPred::Collector< Network > Class Template Reference

A class that collects nodes during traversal.

```
#include <graphtraversal.hpp>
```

Public Member Functions

- Collector ()=default
- Collector (Collector const &that)=default
- Collector & operator= (Collector const &that)=default
- Collector (Collector &&that)=default
- Collector & operator= (Collector &&that)=default
- bool process (typename Network::NodeID const &i)
- const std::queue< typename Network::NodeID > & getVisited () const
- virtual ~Collector ()=default

9.7.1 Detailed Description

template<typename Network = UNetwork<>>
class LinkPred::Collector< Network >

A class that collects nodes during traversal.

Template Parameters

Network	The network type.

9.7.2 Constructor & Destructor Documentation

9.7.2.1 Collector() [1/3]

```
template<typename Network = UNetwork<>>
LinkPred::Collector< Network >::Collector ( )  [default]
```

Constructor.

9.7.2.2 Collector() [2/3]

```
template<typename Network = UNetwork<>>
LinkPred::Collector< Network >::Collector (
            Collector< Network > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.7.2.3 Collector() [3/3]

```
template<typename Network = UNetwork<>>
LinkPred::Collector< Network >::Collector (
            Collector< Network > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.7.2.4 ∼Collector()

```
template<typename Network = UNetwork<>>
virtual LinkPred::Collector< Network >::∼Collector ( )  [virtual], [default]
```

Destructor.

9.7.3 Member Function Documentation

9.7.3.1 getVisited()

```
template<typename Network = UNetwork<>>
const std::queue<typename Network::NodeID>& LinkPred::Collector< Network >::getVisited ( )
const  [inline]
```

Returns

The visited nodes.

9.7.3.2 operator=() [1/2]

```
template<typename Network = UNetwork<>>
Collector& LinkPred::Collector< Network >::operator= (
            Collector< Network > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.7.3.3 operator=() [2/2]

```
template<typename Network = UNetwork<>>
Collector& LinkPred::Collector< Network >::operator= (
             Collector< Network > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.7.3.4 process()

```
template<typename Network = UNetwork<>>
bool LinkPred::Collector< Network >::process (
             typename Network::NodeID const & i )  [inline]
```

Node processing.

Parameters

i	The node's ID.

The documentation for this class was generated from the following file:

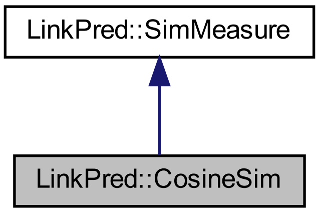
- include/linkpred/graphalg/traversal/graphtraversal.hpp

9.8 LinkPred::CosineSim Class Reference

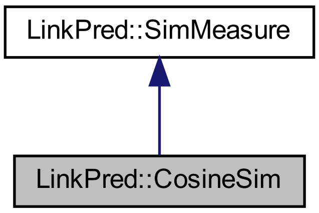
Cosine similarity.

```
#include <cosinesim.hpp>
```

Inheritance diagram for LinkPred::CosineSim:



Collaboration diagram for LinkPred::CosineSim:



Public Member Functions

- CosineSim ()
- CosineSim (CosineSim const &that)=default
- CosineSim & operator= (CosineSim const &that)=default
- CosineSim (CosineSim &&that)=default
- CosineSim & operator= (CosineSim &&that)=default
- virtual double sim (Vec const &v1, Vec const &v2)
- virtual ∼CosineSim ()=default

9.8.1 Detailed Description

Cosine similarity.

9.8.2 Constructor & Destructor Documentation

9.8.2.1 CosineSim() [1/3]

```
LinkPred::CosineSim::CosineSim ( )  [inline]
```

Constructor.

9.8.2.2 CosineSim() [2/3]

```
LinkPred::CosineSim::CosineSim (
             CosineSim const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.8.2.3 CosineSim() [3/3]

```
LinkPred::CosineSim::CosineSim (
             CosineSim && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.8.2.4 ∼CosineSim()

```
virtual LinkPred::CosineSim::∼CosineSim ( )  [virtual], [default]
```

Destructor.

9.8.3 Member Function Documentation

9.8.3.1 operator=() [1/2]

```
CosineSim& LinkPred::CosineSim::operator= (
             CosineSim && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.8.3.2 operator=() [2/2]

```
CosineSim& LinkPred::CosineSim::operator= (
            CosineSim const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.8.3.3 sim()

```
virtual double LinkPred::CosineSim::sim (
            Vec const & v1,
            Vec const & v2 )  [virtual]
```

Compute the similarity between two vectors.

Parameters

v1	First vector.
v2	Second vector. Must be of the same dimension as v1.

Returns

The similarity between v1 and v2.

Implements LinkPred::SimMeasure.

The documentation for this class was generated from the following file:

- include/linkpred/ml/simmeasures/cosinesim.hpp

9.9 LinkPred::Counter< Network > Class Template Reference

A class that counts nodes during traversal.

```
#include <graphtraversal.hpp>
```

Public Member Functions

- Counter ()=default
- Counter (Counter const &that)=default
- Counter & operator= (Counter const &that)=default
- Counter (Counter &&that)=default
- Counter & operator= (Counter &&that)=default
- bool process (typename Network::NodeID const &i)
- std::size_t getCount () const
- void resetCount ()
- virtual ~Counter ()=default

9.9.1 Detailed Description

template<typename Network = UNetwork<>>
class LinkPred::Counter< Network >

A class that counts nodes during traversal.

Template Parameters

Network	The network type.

9.9.2 Constructor & Destructor Documentation

9.9.2.1 Counter() [1/3]

```
template<typename Network = UNetwork<>>
LinkPred::Counter< Network >::Counter ( )  [default]
```

Constructor.

9.9.2.2 Counter() [2/3]

```
template<typename Network = UNetwork<>>
LinkPred::Counter< Network >::Counter (
             Counter< Network > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.9.2.3 Counter() [3/3]

```
template<typename Network = UNetwork<>>
LinkPred::Counter< Network >::Counter (
             Counter< Network > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.9.2.4 ∼Counter()

```
template<typename Network = UNetwork<>>
virtual LinkPred::Counter< Network >::∼Counter ( )  [virtual], [default]
```

Destructor.

9.9.3 Member Function Documentation

9.9.3.1 getCount()

```
template<typename Network = UNetwork<>>
std::size_t LinkPred::Counter< Network >::getCount ( ) const  [inline]
```

Returns

The nodes count.

9.9.3.2 operator=() [1/2]

```
template<typename Network = UNetwork<>>
Counter& LinkPred::Counter< Network >::operator= (
             Counter< Network > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.9.3.3 operator=() [2/2]

```
template<typename Network = UNetwork<>>
Counter& LinkPred::Counter< Network >::operator= (
            Counter< Network > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.9.3.4 process()

```
template<typename Network = UNetwork<>>
bool LinkPred::Counter< Network >::process (
            typename Network::NodeID const & i )  [inline]
```

Node processing.

Parameters

i	The node's ID.

9.9.3.5 resetCount()

```
template<typename Network = UNetwork<>>
void LinkPred::Counter< Network >::resetCount ( )  [inline]
```

Reset he nodes count to 0.

The documentation for this class was generated from the following file:

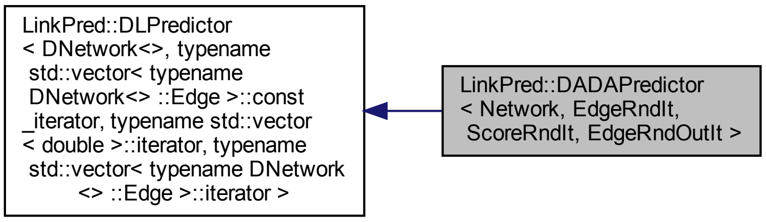
- include/linkpred/graphalg/traversal/graphtraversal.hpp

9.10 LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

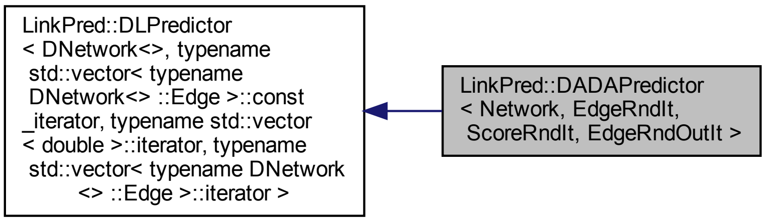
Common neighbor link predictor adapted to directed networks.

```
#include <dadapredictor.hpp>
```

Inheritance diagram for LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DADAPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DADAPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- DADAPredictor (std::shared_ptr< Network const > net)
- DADAPredictor (DADAPredictor const &that)=default
- DADAPredictor & operator= (DADAPredictor const &that)=default
- DADAPredictor (DADAPredictor &&that)=default
- DADAPredictor & operator= (DADAPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ∼DADAPredictor ()=default

Additional Inherited Members

9.10.1 Detailed Description

**template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >**

Common neighbor link predictor adapted to directed networks.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.10.2 Constructor & Destructor Documentation

9.10.2.1 DADAPredictor() [1/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DADAPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.10.2.2 DADAPredictor() [2/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DADAPredictor (
            DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.10.2.3 DADAPredictor() [3/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DADAPredictor (
             DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.10.2.4 ∼DADAPredictor()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼DADAPredictor
( )  [virtual], [default]
```

Destructor.

9.10.3 Member Function Documentation

9.10.3.1 init()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.10.3.2 learn()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learn.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.10.3.3 operator=() [1/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DADAPredictor& LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.10.3.4 operator=() [2/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DADAPredictor& LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.10.3.5 predict()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

9.10.3.6 score()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.10.3.7 top()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
virtual std::size_t LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

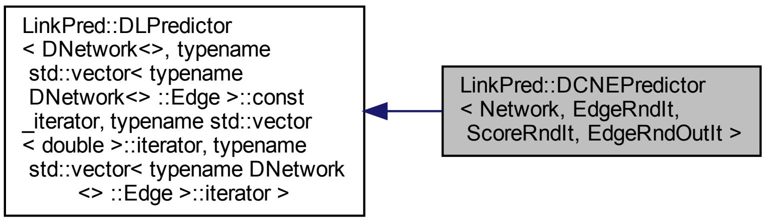
- include/linkpred/predictors/directed/dadapredictor.hpp

9.11 LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

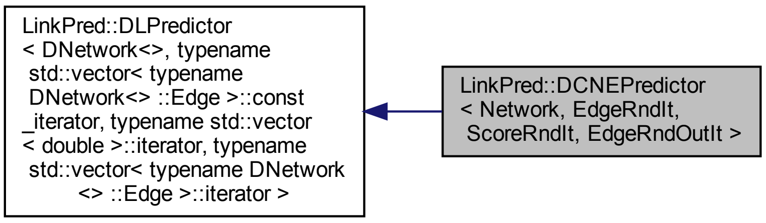
Common neighbor link predictor adapted to directed networks.

```
#include <dcnepredictor.hpp>
```

Inheritance diagram for LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DCNEPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DCNEPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- DCNEPredictor (std::shared_ptr< Network const > net)
- DCNEPredictor (DCNEPredictor const &that)=default
- DCNEPredictor & operator= (DCNEPredictor const &that)=default
- DCNEPredictor (DCNEPredictor &&that)=default
- DCNEPredictor & operator= (DCNEPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ∼DCNEPredictor ()=default

Additional Inherited Members

9.11.1 Detailed Description

**template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >**

Common neighbor link predictor adapted to directed networks.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.11.2 Constructor & Destructor Documentation

9.11.2.1 DCNEPredictor() [1/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DCNEPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.11.2.2 DCNEPredictor() [2/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DCNEPredictor (
            DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.11.2.3 DCNEPredictor() [3/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DCNEPredictor (
            DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.11.2.4 ∼DCNEPredictor()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼DCNEPredictor
( )  [virtual], [default]
```

Destructor.

9.11.3 Member Function Documentation

9.11.3.1 init()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.11.3.2 learn()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [inline], [virtual]
```

Learn.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.11.3.3 operator=() [1/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DCNEPredictor& LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.11.3.4 operator=() [2/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DCNEPredictor& LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.11.3.5 predict()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
             EdgeRndIt begin,
             EdgeRndIt end,
             ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

9.11.3.6 score()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.11.3.7 top()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >←
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

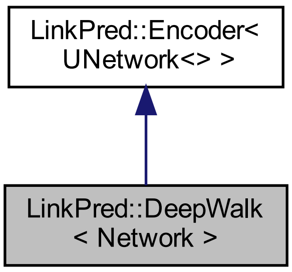
- include/linkpred/predictors/directed/dcnepredictor.hpp

9.12 LinkPred::DeepWalk< Network > Class Template Reference

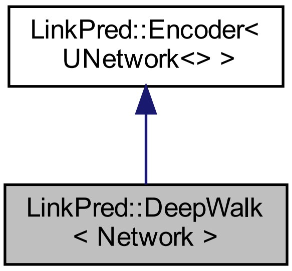
DeepWalk encoder. Reference: Perozzi, B., Al-Rfou, R., and Skiena, S. (2014). Deepwalk: Online learning of social representations. In Proceedings of the 20th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, KDD '14, pages 701–710, New York, NY, USA. Association for Computing Machinery. This implementation is based on the code `https://github.com/xgfs/deepwalk-c`.

```
#include <deepwalk.hpp>
```

Inheritance diagram for LinkPred::DeepWalk< Network >:


LinkPred::Encoder< UNetwork<> >
LinkPred::DeepWalk < Network >

Collaboration diagram for LinkPred::DeepWalk< Network >:


LinkPred::Encoder< UNetwork<> >
LinkPred::DeepWalk < Network >

Public Member Functions

- DeepWalk (std::shared_ptr< Network const > net, long int seed)
- DeepWalk (DeepWalk const &that)=default
- DeepWalk & operator= (DeepWalk const &that)=default
- DeepWalk (DeepWalk &&that)=default
- DeepWalk & operator= (DeepWalk &&that)=default
- virtual void init ()

- virtual void encode ()
- float getInitLR () const
- void setInitLR (float initLR)
- int getNbWalks () const
- void setNbWalks (int nbWalks)
- int getWalkLength () const
- void setWalkLength (int walkLength)
- int getWindowSize () const
- void setWindowSize (int windowSize)
- virtual void setWeightMap (const WeightMapSP &weightMap)
- float getAlpha () const
- void setAlpha (float alpha)
- const int getMaxCodeLength () const
- int getNbNodeWalks () const
- void setNbNodeWalks (int nbNodeWalks)
- long long getStepInterval () const
- void setStepInterval (long long stepInterval)
- long long getTotalSteps () const
- const int getDefaultDim () const
- virtual ∼DeepWalk ()=default

Additional Inherited Members

9.12.1 Detailed Description

template<typename Network = UNetwork<>>
class LinkPred::DeepWalk< Network >

DeepWalk encoder. Reference: Perozzi, B., Al-Rfou, R., and Skiena, S. (2014). Deepwalk: Online learning of social representations. In Proceedings of the 20th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, KDD ’14, pages 701–710, New York, NY, USA. Association for Computing Machinery. This implementation is based on the code `https://github.com/xgfs/deepwalk-c`.

Template Parameters

Network	The network type.

9.12.2 Constructor & Destructor Documentation

9.12.2.1 DeepWalk() [1/3]

```
template<typename Network = UNetwork<>>
LinkPred::DeepWalk< Network >::DeepWalk (
            std::shared_ptr< Network const > net,
            long int seed ) [inline]
```

Constructor.

Parameters

net	The network.
seed	Random number generator seed.

9.12.2.2 DeepWalk() [2/3]

```
template<typename Network = UNetwork<>>
LinkPred::DeepWalk< Network >::DeepWalk (
             DeepWalk< Network > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.12.2.3 DeepWalk() [3/3]

```
template<typename Network = UNetwork<>>
LinkPred::DeepWalk< Network >::DeepWalk (
             DeepWalk< Network > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.12.2.4 ∼DeepWalk()

```
template<typename Network = UNetwork<>>
virtual LinkPred::DeepWalk< Network >::∼DeepWalk ( )  [virtual], [default]
```

Destructor.

9.12.3 Member Function Documentation

9.12.3.1 encode()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::DeepWalk< Network >::encode ( )  [virtual]
```

Encode the network.

Implements LinkPred::Encoder< UNetwork<> >.

9.12.3.2 getAlpha()

```
template<typename Network = UNetwork<>>
float LinkPred::DeepWalk< Network >::getAlpha ( ) const  [inline]
```

Returns

The probability of continuing random walk in initialization.

9.12.3.3 getDefaultDim()

```
template<typename Network = UNetwork<>>
const int LinkPred::DeepWalk< Network >::getDefaultDim ( ) const  [inline]
```

Returns

Default embedding dimension.

9.12.3.4 getInitLR()

```
template<typename Network = UNetwork<>>
float LinkPred::DeepWalk< Network >::getInitLR ( ) const  [inline]
```

Returns

Initial learning rate.

9.12.3.5 getMaxCodeLength()

```
template<typename Network = UNetwork<>>
const int LinkPred::DeepWalk< Network >::getMaxCodeLength ( ) const  [inline]
```

Returns

Maximum code length.

9.12.3.6 getNbNodeWalks()

```
template<typename Network = UNetwork<>>
int LinkPred::DeepWalk< Network >::getNbNodeWalks ( ) const  [inline]
```

Returns

The number of walks per node in the PageRank initialization.

9.12.3.7 getNbWalks()

```
template<typename Network = UNetwork<>>
int LinkPred::DeepWalk< Network >::getNbWalks ( ) const  [inline]
```

Returns

Number of walks per vertex ("\gamma").

9.12.3.8 getStepInterval()

```
template<typename Network = UNetwork<>>
long long LinkPred::DeepWalk< Network >::getStepInterval ( ) const  [inline]
```

Returns

The number of steps after which the learning rate is updated.

9.12.3.9 getTotalSteps()

```
template<typename Network = UNetwork<>>
long long LinkPred::DeepWalk< Network >::getTotalSteps ( ) const  [inline]
```

Returns

The total number of steps.

9.12.3.10 getWalkLength()

```
template<typename Network = UNetwork<>>
int LinkPred::DeepWalk< Network >::getWalkLength ( ) const  [inline]
```

Returns

DeepWalk parameter "t" = length of the walk.

9.12.3.11 getWindowSize()

```
template<typename Network = UNetwork<>>
int LinkPred::DeepWalk< Network >::getWindowSize ( ) const  [inline]
```

Returns

DeepWalk parameter "w" = window size.

9.12.3.12 init()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::DeepWalk< Network >::init ( )  [virtual]
```

Initialize encoder.

Implements LinkPred::Encoder< UNetwork<> >.

9.12.3.13 operator=() [1/2]

```
template<typename Network = UNetwork<>>
DeepWalk& LinkPred::DeepWalk< Network >::operator= (
             DeepWalk< Network > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.12.3.14 operator=() [2/2]

```
template<typename Network = UNetwork<>>
DeepWalk& LinkPred::DeepWalk< Network >::operator= (
            DeepWalk< Network > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.12.3.15 setAlpha()

```
template<typename Network = UNetwork<>>
void LinkPred::DeepWalk< Network >::setAlpha (
            float alpha )  [inline]
```

Set the probability of continuing random walk in initialization.

Parameters

alpha	Probability of continuing random walk in initialization.

9.12.3.16 setInitLR()

```
template<typename Network = UNetwork<>>
void LinkPred::DeepWalk< Network >::setInitLR (
            float initLR )  [inline]
```

Set the initial learning rate.

Parameters

initLR	Initial learning rate.

9.12.3.17 setNbNodeWalks()

```
template<typename Network = UNetwork<>>
void LinkPred::DeepWalk< Network >::setNbNodeWalks (
             int nbNodeWalks )  [inline]
```

Set the number of walks per node in the PageRank initialization.

Parameters

nbNodeWalks	The number of walks per node in the PageRank initialization.

9.12.3.18 setNbWalks()

```
template<typename Network = UNetwork<>>
void LinkPred::DeepWalk< Network >::setNbWalks (
             int nbWalks )  [inline]
```

Set the number of walks per vertex ("\gamma").

Parameters

nbWalks	Number of walks per vertex ("\gamma").

9.12.3.19 setStepInterval()

```
template<typename Network = UNetwork<>>
void LinkPred::DeepWalk< Network >::setStepInterval (
             long long stepInterval )  [inline]
```

Set the number of steps after which the learning rate is updated.

Parameters

stepInterval	Number of steps after which the learning rate is updated.

9.12.3.20 setWalkLength()

```
template<typename Network = UNetwork<>>
void LinkPred::DeepWalk< Network >::setWalkLength (
             int walkLength )  [inline]
```

Set the DeepWalk parameter "t" = length of the walk.

Parameters

walkLength	DeepWalk parameter "t" = length of the walk.

9.12.3.21 setWeightMap()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::DeepWalk< Network >::setWeightMap (
             const WeightMapSP & weightMap )  [inline], [virtual]
```

Set edge weight map.

Reimplemented from LinkPred::Encoder< UNetwork<> >.

9.12.3.22 setWindowSize()

```
template<typename Network = UNetwork<>>
void LinkPred::DeepWalk< Network >::setWindowSize (
             int windowSize )  [inline]
```

Set the DeepWalk parameter "w" = window size.

Parameters

windowSize	DeepWalk parameter "w" = window size.

The documentation for this class was generated from the following file:

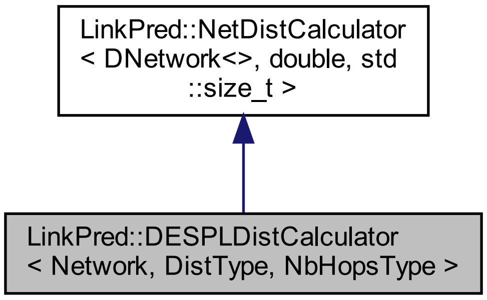
- include/linkpred/graphalg/encoders/deepwalk/deepwalk.hpp

9.13 LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType > Class Template Reference

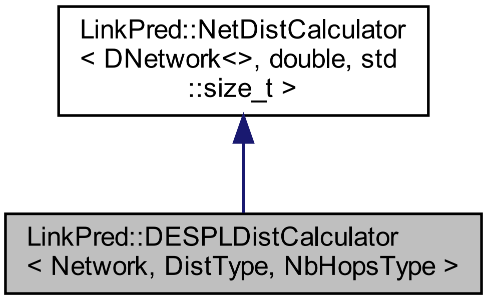
Exact shortest path distance calculator on a directed network with limits on the number of hops.

```
#include <netdistcalculator.hpp>
```

Inheritance diagram for LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >:


LinkPred::NetDistCalculator < DNetwork<>, double, std ::size_t >
LinkPred::DESPLDistCalculator < Network, DistType, NbHopsType >

Collaboration diagram for LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >:


LinkPred::NetDistCalculator < DNetwork<>, double, std ::size_t >
LinkPred::DESPLDistCalculator < Network, DistType, NbHopsType >

Public Types

- using LengthMapIdType = typename NetDistCalculator< Network, DistType, NbHopsType >↩ ::LengthMapIdType
- using NetworkSP = typename NetDistCalculator< Network, DistType, NbHopsType >::NetworkSP
- using NodeID = typename NetDistCalculator< Network, DistType, NbHopsType >::NodeID
- using Label = typename NetDistCalculator< Network, DistType, NbHopsType >::Label
- using Edge = typename NetDistCalculator< Network, DistType, NbHopsType >::Edge
- using NodeDistMap = typename NetDistCalculator< Network, DistType, NbHopsType >::NodeDistMap
- using NodeDistMapSP = typename NetDistCalculator< Network, DistType, NbHopsType >::NodeDistMapSP
- using NodeSDistMap = typename Network::template NodeSMap< std::pair< DistType, NbHopsType > >
- using NodeSDistMapSP = typename Network::template NodeSMapSP< std::pair< DistType, NbHopsType > >
- using EdgeLengthMap = typename NetDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMap
- using EdgeLengthMapSP = typename NetDistCalculator< Network, DistType, NbHopsType >↩ ::EdgeLengthMapSP

Public Member Functions

- DESPLDistCalculator (Dijkstra< Network, DistType, NbHopsType > &dijkstra, EdgeLengthMapSP length, std::size_t lim, CacheLevel cacheLevel=CacheLevel::NetworkCache)
- DESPLDistCalculator (DESPLDistCalculator const &that)=default
- DESPLDistCalculator & operator= (DESPLDistCalculator const &that)=default
- DESPLDistCalculator (DESPLDistCalculator &&that)=default
- DESPLDistCalculator & operator= (DESPLDistCalculator &&that)=default
- virtual std::pair< DistType, NbHopsType > getDist (NodeID const &i, NodeID const &j)
- virtual std::pair< DistType, NbHopsType > getIndDist (NodeID const &i, NodeID const &j)
- virtual NodeDistMapSP getDist (NodeID const &i)
- virtual NodeSDistMapSP getSDistMap (NodeID const &i)
- virtual NodeSDistMapSP getFinDistMapNoNeighb (NodeID const &srcNode)
- virtual std::pair< DistType, NbHopsType > getDist (Edge const &e)
- std::size_t getMaxNbNodesInCache () const
- void setMaxNbNodesInCache (std::size_t maxNbNodesInCache)
- std::size_t getLim () const
- virtual ∼ DESPLDistCalculator ()

9.13.1 Detailed Description

**template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType = std::size_t>
class LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >**

Exact shortest path distance calculator on a directed network with limits on the number of hops.

This class offers an additional layer over Dijkstra which provides memory management functionalities by caching computed distances.

Template Parameters

Network	The network type.
DistType	The distance type (can be an integer or floating point type).
NbHopsType	The type of the number of hops (must be an integer type).

9.13.2 Member Typedef Documentation

9.13.2.1 Edge

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::Edge = typename NetDistCalculator<Netwo
DistType, NbHopsType>::Edge
```

Edge type.

9.13.2.2 EdgeLengthMap

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMap = typename
NetDistCalculator<Network, DistType, NbHopsType>::EdgeLengthMap
```

Edge length map.

9.13.2.3 EdgeLengthMapSP

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMapSP = typename
NetDistCalculator<Network, DistType, NbHopsType>::EdgeLengthMapSP
```

Shared pointer to an edge length map.

9.13.2.4 Label

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::Label = typename NetDistCalculator<Netw
DistType, NbHopsType>::Label
```

Nodes label type.

9.13.2.5 LengthMapIdType

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::LengthMapIdType = typename
NetDistCalculator<Network, DistType, NbHopsType>::LengthMapIdType
```

Length map ID type.

9.13.2.6 NetworkSP

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::NetworkSP = typename
NetDistCalculator<Network, DistType, NbHopsType>::NetworkSP
```

Shared pointer to network.

9.13.2.7 NodeDistMap

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::NodeDistMap = typename
NetDistCalculator<Network, DistType, NbHopsType>::NodeDistMap
```

Distance map.

9.13.2.8 NodeDistMapSP

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::NodeDistMapSP = typename
NetDistCalculator<Network, DistType, NbHopsType>::NodeDistMapSP
```

Shared pointer to a distance map.

9.13.2.9 NodeID

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::NodeID = typename NetDistCalculator<Net
DistType, NbHopsType>::NodeID
```

Nodes ID type.

9.13.2.10 NodeSDistMap

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::NodeSDistMap = typename
Network::template NodeSMap<std::pair<DistType, NbHopsType> >
```

Distance map.

9.13.2.11 NodeSDistMapSP

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::NodeSDistMapSP = typename
Network::template NodeSMapSP<std::pair<DistType, NbHopsType> >
```

Shared pointer to a distance map.

9.13.3 Constructor & Destructor Documentation

9.13.3.1 DESPLDistCalculator() [1/3]

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::DESPLDistCalculator (
             Dijkstra< Network, DistType, NbHopsType > & dijkstra,
             EdgeLengthMapSP length,
             std::size_t lim,
             CacheLevel cacheLevel = CacheLevel::NetworkCache )  [inline]
```

Constructor.

Parameters

dijkstra	A Dijkstra algorithm object.
lim	Horizon limit.
length	The length map.
cacheLevel	The cache level.

9.13.3.2 DESPLDistCalculator() [2/3]

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::DESPLDistCalculator (
            DESPLDistCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.13.3.3 DESPLDistCalculator() [3/3]

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::DESPLDistCalculator (
            DESPLDistCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.13.3.4 ∼ DESPLDistCalculator()

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::∼ DESPLDistCalculator
( )  [inline], [virtual]
```

Destructor.

9.13.4 Member Function Documentation

9.13.4.1 getDist() [1/3]

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DistType, NbHopsType> LinkPred::DESPLDistCalculator< Network, DistType,
NbHopsType >::getDist (
            Edge const & e )  [inline], [virtual]
```

Parameters

e	An input edge.

Returns

The distance between start and end of e.

9.13.4.2 getDist() [2/3]

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual NodeDistMapSP LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::getDist
(
            NodeID const & i )  [virtual]
```

Returns

The distance from srcNode.

Parameters

i	The source node.

9.13.4.3 getDist() [3/3]

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DistType, NbHopsType> LinkPred::DESPLDistCalculator< Network, DistType,
NbHopsType >::getDist (
            NodeID const & i,
            NodeID const & j )  [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j.

9.13.4.4 getFinDistMapNoNeighb()

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual NodeSDistMapSP LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::get←
FinDistMapNoNeighb (
            NodeID const & srcNode )  [virtual]
```

Returns

A sparse distance map of nodes having finite distance to a given source node. Only nodes not connected to srcNode are considered. The node srcNode itself is also excluded.

Parameters

srcNode	The source node.

9.13.4.5 getIndDist()

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DistType, NbHopsType> LinkPred::DESPLDistCalculator< Network, DistType,
NbHopsType >::getIndDist (
            NodeID const & i,
            NodeID const & j )  [inline], [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j ignoring the edge between i and j.

9.13.4.6 getLim()

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::size_t LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::getLim ( ) const
[inline]
```

Returns

The limit on the number of hops.

9.13.4.7 getMaxNbNodesInCache()

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::size_t LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::getMaxNbNodesIn←
Cache ( ) const  [inline]
```

Returns

The maximum number of nodes allowed in cache.

9.13.4.8 getSDistMap()

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual NodeSDistMapSP LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::getS←
DistMap (
            NodeID const & i )  [virtual]
```

Returns

The sparse distance from srcNode.

Parameters

i	The source node.

9.13.4.9 operator=() [1/2]

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
```

```
DESPLDistCalculator& LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::operator=
(
            DESPLDistCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.13.4.10 operator=() [2/2]

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
DESPLDistCalculator& LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::operator=
(
            DESPLDistCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.13.4.11 setMaxNbNodesInCache()

```
template<typename Network = DNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
void LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >::setMaxNbNodesInCache (
            std::size_t maxNbNodesInCache )  [inline]
```

Set the maximum number of nodes in cache (for each node a map of distance to all other nodes is kept in memory).

Parameters

maxNbNodesInCache	New value for the maximum number of nodes in cache.

The documentation for this class was generated from the following file:

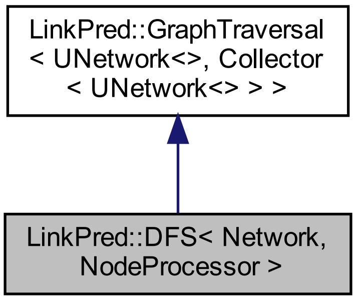
- include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp

9.14 LinkPred::DFS< Network, NodeProcessor > Class Template Reference

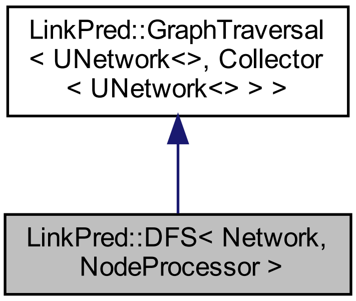
DFS graph traversal.

```
#include <graphtraversal.hpp>
```

Inheritance diagram for LinkPred::DFS< Network, NodeProcessor >:


LinkPred::GraphTraversal < UNetwork<>, Collector < UNetwork<> > >
LinkPred::DFS< Network, NodeProcessor >

Collaboration diagram for LinkPred::DFS< Network, NodeProcessor >:


LinkPred::GraphTraversal < UNetwork<>, Collector < UNetwork<> > >
LinkPred::DFS< Network, NodeProcessor >

Public Member Functions

- DFS (std::shared_ptr< Network const > net)
- DFS (DFS const &that)=default
- DFS & operator= (DFS const &that)=default
- DFS (DFS &&that)=default
- DFS & operator= (DFS &&that)=default
- virtual void traverse (typename Network::NodeID srcNode, NodeProcessor &processor)
- virtual ~DFS ()=default

9.14.1 Detailed Description

template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
class LinkPred::DFS< Network, NodeProcessor >

DFS graph traversal.

Template Parameters

Network	The network type.
NodeProcessor	The node processor type.

9.14.2 Constructor & Destructor Documentation

9.14.2.1 DFS() [1/3]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
LinkPred::DFS< Network, NodeProcessor >::DFS (
            std::shared_ptr< Network const > net )  [inline]
```

< The network on which traversal is done. Constructor.

Parameters

net	The network on which traversal is done.

9.14.2.2 DFS() [2/3]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
LinkPred::DFS< Network, NodeProcessor >::DFS (
            DFS< Network, NodeProcessor > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.14.2.3 DFS() [3/3]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
LinkPred::DFS< Network, NodeProcessor >::DFS (
            DFS< Network, NodeProcessor > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.14.2.4 ∼DFS()

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
virtual LinkPred::DFS< Network, NodeProcessor >::∼DFS ( )  [virtual], [default]
```

Destructor.

9.14.3 Member Function Documentation

9.14.3.1 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
DFS& LinkPred::DFS< Network, NodeProcessor >::operator= (
            DFS< Network, NodeProcessor > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.14.3.2 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
DFS& LinkPred::DFS< Network, NodeProcessor >::operator= (
            DFS< Network, NodeProcessor > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.14.3.3 traverse()

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
virtual void LinkPred::DFS< Network, NodeProcessor >::traverse (
            typename Network::NodeID srcNode,
            NodeProcessor & processor ) [inline], [virtual]
```

Traverse the graph in DFS order.

Parameters

srcNode	The source node.
processor	The node processor.

The documentation for this class was generated from the following file:

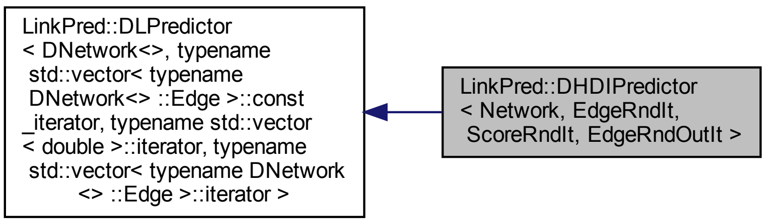
- include/linkpred/graphalg/traversal/graphtraversal.hpp

9.15 LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

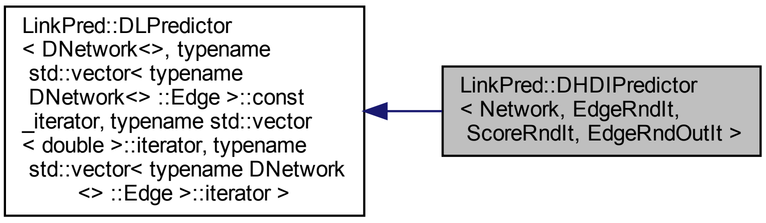
Common neighbor link predictor adapted to directed networks.

`#include <dhdipredictor.hpp>`

Inheritance diagram for LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DHDIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DHDIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- DHDIPredictor (std::shared_ptr< Network const > net)
- DHDIPredictor (DHDIPredictor const &that)=default
- DHDIPredictor & operator= (DHDIPredictor const &that)=default
- DHDIPredictor (DHDIPredictor &&that)=default
- DHDIPredictor & operator= (DHDIPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ∼DHDIPredictor ()=default

Additional Inherited Members

9.15.1 Detailed Description

**template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >**

Common neighbor link predictor adapted to directed networks.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.15.2 Constructor & Destructor Documentation

9.15.2.1 DHDIPredictor() [1/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DHDIPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.15.2.2 DHDIPredictor() [2/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DHDIPredictor (
            DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.15.2.3 DHDIPredictor() [3/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DHDIPredictor (
            DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.15.2.4 ∼DHDIPredictor()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼DHDIPredictor
( )  [virtual], [default]
```

Destructor.

9.15.3 Member Function Documentation

9.15.3.1 init()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.15.3.2 learn()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learn.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.15.3.3 operator=() [1/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DHDIPredictor& LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.15.3.4 operator=() [2/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
DHDIPredictor& LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.15.3.5 predict()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
             EdgeRndIt begin,
             EdgeRndIt end,
             ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

9.15.3.6 score()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
             Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.15.3.7 top()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

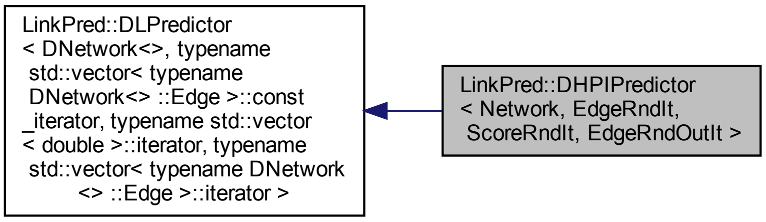
- include/linkpred/predictors/directed/dhdipredictor.hpp

9.16 LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

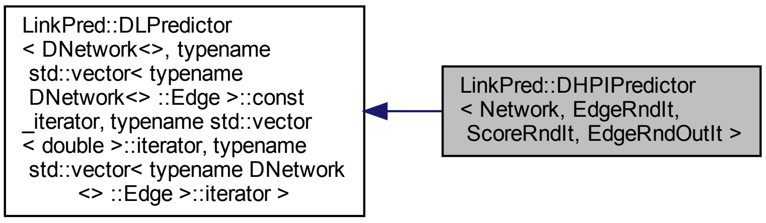
Common neighbor link predictor adapted to directed networks.

```
#include <dhpipredictor.hpp>
```

Inheritance diagram for LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DHPIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DHPIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- DHPIPredictor (std::shared_ptr< Network const > net)
- DHPIPredictor (DHPIPredictor const &that)=default
- DHPIPredictor & operator= (DHPIPredictor const &that)=default
- DHPIPredictor (DHPIPredictor &&that)=default
- DHPIPredictor & operator= (DHPIPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ∼DHPIPredictor ()=default

Additional Inherited Members

9.16.1 Detailed Description

template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Common neighbor link predictor adapted to directed networks.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.16.2 Constructor & Destructor Documentation

9.16.2.1 DHPIPredictor() [1/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DHPIPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.16.2.2 DHPIPredictor() [2/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DHPIPredictor (
            DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.16.2.3 DHPIPredictor() [3/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DHPIPredictor (
            DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.16.2.4 ∼DHPIPredictor()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼DHPIPredictor
( )  [virtual], [default]
```

Destructor.

9.16.3 Member Function Documentation

9.16.3.1 init()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.16.3.2 learn()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [inline], [virtual]
```

Learn.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.16.3.3 operator=() [1/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DHPIPredictor& LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.16.3.4 operator=() [2/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DHPIPredictor& LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.16.3.5 predict()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterato

9.16.3.6 score()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.16.3.7 top()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >←
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterato

The documentation for this class was generated from the following file:

- include/linkpred/predictors/directed/dhpipredictor.hpp

9.17 LinkPred::Dijkstra< Network, DistType, NbHopsType > Class Template Reference

An implementation of Dijkstra's algorithm.

```
#include <dijkstra.hpp>
```

Public Types

- using LengthMapIdType = long int
- using NetworkSP = std::shared_ptr< Network >
- using NodeID = typename Network::NodeID
- using Label = typename Network::Label
- using Edge = typename Network::Edge
- using NodeDistMap = typename Network::template NodeMap< std::pair< DistType, NbHopsType > >
- using NodeDistMapSP = typename Network::template NodeMapSP< std::pair< DistType, NbHopsType > >
- using NodeSDistMapSP = typename Network::template NodeSMapSP< std::pair< DistType, NbHopsType > >
- using EdgeLengthMap = typename Network::template EdgeMap< DistType >
- using EdgeLengthMapSP = typename Network::template EdgeMapSP< DistType >
- using PathType = std::vector< NodeID >
- using PathTypeSP = std::shared_ptr< PathType >

Public Member Functions

- Dijkstra (std::shared_ptr< Network const > net)
- Dijkstra ()=default
- Dijkstra (Dijkstra const &that)=default
- Dijkstra & operator= (Dijkstra const &that)=default
- Dijkstra (Dijkstra &&that)=default
- Dijkstra & operator= (Dijkstra &&that)=default
- std::shared_ptr< Network const > getNet () const
- void setNet (std::shared_ptr< const Network > net)
- LengthMapIdType registerLengthMap (EdgeLengthMapSP length)
- void unregisterLengthMap (LengthMapIdType const &lengthMapId)
- std::pair< DistType, NbHopsType > getIndDist (NodeID const &srcId, NodeID const &dstId, LengthMapIdType lengthMapId, DistType discDist=std::numeric_limits< DistType >::infinity(), NbHopsType discNbHops=std↩ ::numeric_limits< NbHopsType >::max()) const
- NodeDistMapSP getIndDistToAll (NodeID const &srcId, NodeID const &dstId, LengthMapIdType lengthMap↩ Id, DistType discDist=std::numeric_limits< DistType >::infinity(), NbHopsType discNbHops=std::numeric_↩ limits< NbHopsType >::max()) const
- std::pair< PathTypeSP, double > getShortestPath (NodeID const &srcId, NodeID const &dstId, LengthMapIdType lengthMapId, DistType discDist=std::numeric_limits< DistType >::infinity(), NbHops↩ Type discNbHops=std::numeric_limits< NbHopsType >::max()) const
- NodeDistMapSP getDist (NodeID const &srcId, LengthMapIdType lengthMapId, DistType discDist=std↩ ::numeric_limits< DistType >::infinity(), NbHopsType discNbHops=std::numeric_limits< NbHopsType >↩ ::max()) const

- NodeSDistMapSP getDistL (NodeID const &srcId, LengthMapIdType lengthMapId, std::size_t lim, DistType discDist=std::numeric_limits< DistType >::infinity(), NbHopsType discNbHops=std::numeric_limits< Nb↩ HopsType >::max()) const
- template<typename InputIterator , typename OuputIterator >
  void getDist (InputIterator begin, InputIterator end, OuputIterator outit, LengthMapIdType lengthMapId, Dist↩ Type discDist=std::numeric_limits< DistType >::infinity(), NbHopsType discNbHops=std::numeric_limits< NbHopsType >::max()) const
- template<typename InputIterator , typename OuputIterator >
  void getSDist (InputIterator begin, InputIterator end, OuputIterator outit, LengthMapIdType lengthMap↩ Id, DistType discDist=std::numeric_limits< DistType >::infinity(), NbHopsType discNbHops=std::numeric↩ _limits< NbHopsType >::max()) const
- NodeDistMapSP getDsim (NodeID const &srcId, LengthMapIdType lengthMapId, DistType discDist=std↩ ::numeric_limits< DistType >::infinity(), NbHopsType discNbHops=std::numeric_limits< NbHopsType >↩ ::max()) const
- std::pair< DistType, NbHopsType > getIndDsim (NodeID const &srcId, NodeID const &dstId, LengthMapIdType lengthMapId, DistType discDist=std::numeric_limits< DistType >::infinity(), NbHopsType discNbHops=std↩ ::numeric_limits< NbHopsType >::max()) const
- std::map< NodeID, NodeDistMapSP > getDsim (std::set< NodeID > const &srcIds, LengthMapIdType lengthMapId, DistType discDist=std::numeric_limits< DistType >::infinity(), NbHopsType discNbHops=std↩ ::numeric_limits< NbHopsType >::max()) const
- virtual ~Dijkstra ()=default

9.17.1 Detailed Description

template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType = std::size_t>
class LinkPred::Dijkstra< Network, DistType, NbHopsType >

An implementation of Dijkstra's algorithm.

This class currently implements Dijkstra's algorithm using a binary heap, which means that the algorithm runs in O(m + n (log n)^2) instead of O(m + n log n).

Template Parameters

Network	The network type.
DistType	The distance type (can be an integer or floating point type).
NbHopsType	The type of the number of hops (must be an integer type).

9.17.2 Member Typedef Documentation

9.17.2.1 Edge

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::Dijkstra< Network, DistType, NbHopsType >::Edge = typename Network::Edge
```

Edge type.

9.17.2.2 EdgeLengthMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::Dijkstra< Network, DistType, NbHopsType >::EdgeLengthMap = typename Network↩
::template EdgeMap<DistType>
```

Edge length map.

9.17.2.3 EdgeLengthMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::Dijkstra< Network, DistType, NbHopsType >::EdgeLengthMapSP = typename Network↩
::template EdgeMapSP<DistType>
```

Shared pointer to an edge length map.

9.17.2.4 Label

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::Dijkstra< Network, DistType, NbHopsType >::Label = typename Network::Label
```

Nodes label type.

9.17.2.5 LengthMapIdType

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::Dijkstra< Network, DistType, NbHopsType >::LengthMapIdType = long int
```

Length map ID type.

9.17.2.6 NetworkSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::Dijkstra< Network, DistType, NbHopsType >::NetworkSP = std::shared_ptr<Network>
```

Shared pointer to network.

9.17.2.7 NodeDistMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::Dijkstra< Network, DistType, NbHopsType >::NodeDistMap = typename Network↩
::template NodeMap<std::pair<DistType, NbHopsType> >
```

Distance map.

9.17.2.8 NodeDistMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::Dijkstra< Network, DistType, NbHopsType >::NodeDistMapSP = typename Network↩
::template NodeMapSP<std::pair<DistType, NbHopsType> >
```

Shared pointer to a distance map.

9.17.2.9 NodeID

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::Dijkstra< Network, DistType, NbHopsType >::NodeID = typename Network::NodeID
```

Nodes ID type.

9.17.2.10 NodeSDistMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::Dijkstra< Network, DistType, NbHopsType >::NodeSDistMapSP = typename Network↩
::template NodeSMapSP<std::pair<DistType, NbHopsType> >
```

Shared pointer to a sparse distance map.

9.17.2.11 PathType

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::Dijkstra< Network, DistType, NbHopsType >::PathType = std::vector<NodeID>
```

Path.

9.17.2.12 PathTypeSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::Dijkstra< Network, DistType, NbHopsType >::PathTypeSP = std::shared_ptr<PathType>
```

Shared pointer to a path.

9.17.3 Constructor & Destructor Documentation

9.17.3.1 Dijkstra() [1/4]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::Dijkstra< Network, DistType, NbHopsType >::Dijkstra (
             std::shared_ptr< Network const > net )  [inline]
```

Constructor.

9.17.3.2 Dijkstra() [2/4]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::Dijkstra< Network, DistType, NbHopsType >::Dijkstra ( )  [default]
```

Default constructor.

9.17.3.3 Dijkstra() [3/4]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::Dijkstra< Network, DistType, NbHopsType >::Dijkstra (
             Dijkstra< Network, DistType, NbHopsType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.17.3.4 Dijkstra() [4/4]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::Dijkstra< Network, DistType, NbHopsType >::Dijkstra (
             Dijkstra< Network, DistType, NbHopsType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.17.3.5 ∼Dijkstra()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual LinkPred::Dijkstra< Network, DistType, NbHopsType >::∼Dijkstra ( )  [virtual], [default]
```

Destructor.

9.17.4 Member Function Documentation

9.17.4.1 getDist() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
template<typename InputIterator , typename OuputIterator >
void LinkPred::Dijkstra< Network, DistType, NbHopsType >::getDist (
             InputIterator begin,
             InputIterator end,
             OuputIterator outit,
             LengthMapIdType lengthMapId,
             DistType discDist = std::numeric_limits<DistType>::infinity(),
             NbHopsType discNbHops = std::numeric_limits<NbHopsType>::max() ) const  [inline]
```

Computes the distance from a list of nodes to all other nodes.

Parameters

begin	Iterator to the first element in the list of source nodes.
end	Iterator to one past the last element in the list of source nodes.
outit	Output iterator.
length↩ *MapId*	The ID of the map length (as returned by UNetwork::registerLengthMap).
discDist	The value that should be assigned as distance between disconnected nodes.
discNbHops	The value that should be assigned as number of hops between disconnected nodes.

9.17.4.2 getDist() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
NodeDistMapSP LinkPred::Dijkstra< Network, DistType, NbHopsType >::getDist (
             NodeID const & srcId,
             LengthMapIdType lengthMapId,
             DistType discDist = std::numeric_limits< DistType >::infinity(),
             NbHopsType discNbHops = std::numeric_limits< NbHopsType >::max() ) const
```

Computes the distance from a single source node to all other nodes.

Parameters

srcId	The ID of the source node.
length←↩ MapId	The ID of the map length (as returned by UNetwork::registerLengthMap).
discDist	The value that should be assigned as distance between disconnected nodes.
discNbHops	The value that should be assigned as number of hops between disconnected nodes.

Returns

The distance map.

9.17.4.3 getDistL()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
NodeSDistMapSP LinkPred::Dijkstra< Network, DistType, NbHopsType >::getDistL (
             NodeID const & srcId,
             LengthMapIdType lengthMapId,
             std::size_t lim,
             DistType discDist = std::numeric_limits< DistType >::infinity(),
             NbHopsType discNbHops = std::numeric_limits< NbHopsType >::max() ) const
```

Computes the distance with a limit on the number of hops from a single source node to all other nodes.

Parameters

srcId	The ID of the source node.
length←↩ MapId	The ID of the map length (as returned by UNetwork::registerLengthMap).
lim	The limit on the number of hops.
discDist	The value that should be assigned as distance between disconnected nodes.
discNbHops	The value that should be assigned as number of hops between disconnected nodes.

Returns

The distance map.

9.17.4.4 getDsim() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
NodeDistMapSP LinkPred::Dijkstra< Network, DistType, NbHopsType >::getDsim (
             NodeID const & srcId,
             LengthMapIdType lengthMapId,
             DistType discDist = std::numeric_limits< DistType >::infinity(),
             NbHopsType discNbHops = std::numeric_limits< NbHopsType >::max() ) const
```

Computes the dissimilarity of a single source node to all other nodes.

Parameters

srcId	The ID of the source node.
length↩ MapId	The ID of the map length (as returned by UNetwork::registerLengthMap).
discDist	The value that should be assigned as distance between disconnected nodes.
discNbHops	The value that should be assigned as number of hops between disconnected nodes.

Returns

The distance map.

9.17.4.5 getDsim() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::map<NodeID, NodeDistMapSP> LinkPred::Dijkstra< Network, DistType, NbHopsType >::getDsim
(
             std::set< NodeID > const & srcIds,
             LengthMapIdType lengthMapId,
             DistType discDist = std::numeric_limits< DistType >::infinity(),
             NbHopsType discNbHops = std::numeric_limits< NbHopsType >::max() ) const
```

Computes the dissimilarity of a set of nodes to all other nodes.

Parameters

srcIds	The IDs of the source node.
length↩ MapId	The ID of the map length (as returned by UNetwork::registerLengthMap).
discDist	The value that should be assigned as distance between disconnected nodes.
discNbHops	The value that should be assigned as number of hops between disconnected nodes.

Returns

The distance map.

9.17.4.6 getIndDist()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::pair<DistType, NbHopsType> LinkPred::Dijkstra< Network, DistType, NbHopsType >::getInd↩
Dist (
             NodeID const & srcId,
             NodeID const & dstId,
             LengthMapIdType lengthMapId,
             DistType discDist = std::numeric_limits< DistType >::infinity(),
             NbHopsType discNbHops = std::numeric_limits< NbHopsType >::max() ) const
```

Computes the distance between two nodes while ignoring the edge between them.

Parameters

srcId	The ID of the source node.
dstId	The ID of the destination node.
length←↩ MapId	The ID of the map length (as returned by UNetwork::registerLengthMap).
discDist	The value that should be assigned as distance between disconnected nodes.
discNbHops	The value that should be assigned as number of hops between disconnected nodes.

Returns

The distance map.

9.17.4.7 getIndDistToAll()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
NodeDistMapSP LinkPred::Dijkstra< Network, DistType, NbHopsType >::getIndDistToAll (
            NodeID const & srcId,
            NodeID const & dstId,
            LengthMapIdType lengthMapId,
            DistType discDist = std::numeric_limits< DistType >::infinity(),
            NbHopsType discNbHops = std::numeric_limits< NbHopsType >::max() ) const
```

Computes the distance from a single source node to all other nodes while ignoring the edge between the source node and a specific node.

Parameters

srcId	The ID of the source node.
dstId	The ID of the destination node of the edge to be ignored.
length←↩ MapId	The ID of the map length (as returned by UNetwork::registerLengthMap).
discDist	The value that should be assigned as distance between disconnected nodes.
discNbHops	The value that should be assigned as number of hops between disconnected nodes.

Returns

The distance map.

9.17.4.8 getIndDsim()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::pair<DistType, NbHopsType> LinkPred::Dijkstra< Network, DistType, NbHopsType >::getInd←
Dsim (
             NodeID const & srcId,
             NodeID const & dstId,
             LengthMapIdType lengthMapId,
             DistType discDist = std::numeric_limits< DistType >::infinity(),
             NbHopsType discNbHops = std::numeric_limits< NbHopsType >::max() ) const
```

Computes the dissimilarity between two nodes while ignoring the direction edge between them.

Parameters

srcId	The ID of the source node.
dstId	The ID of the destination node.
length←MapId	The ID of the map length (as returned by UNetwork::registerLengthMap).
discDist	The value that should be assigned as distance between disconnected nodes.
discNbHops	The value that should be assigned as number of hops between disconnected nodes.

Returns

The distance map.

9.17.4.9 getNet()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::shared_ptr<Network const> LinkPred::Dijkstra< Network, DistType, NbHopsType >::getNet (
) const [inline]
```

Returns

The network.

9.17.4.10 getSDist()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
template<typename InputIterator , typename OuputIterator >
void LinkPred::Dijkstra< Network, DistType, NbHopsType >::getSDist (
             InputIterator begin,
             InputIterator end,
             OuputIterator outit,
             LengthMapIdType lengthMapId,
             DistType discDist = std::numeric_limits<DistType>::infinity(),
             NbHopsType discNbHops = std::numeric_limits<NbHopsType>::max() ) const [inline]
```

Computes the inverse similarity from a list of nodes to all other nodes.

Parameters

begin	Iterator to the first element in the list of source nodes.
end	Iterator to one past the last element in the list of source nodes.
outit	Output iterator.
length↩ MapId	The ID of the map length (as returned by UNetwork::registerLengthMap).
discDist	The value that should be assigned as distance between disconnected nodes.
discNbHops	The value that should be assigned as number of hops between disconnected nodes.

9.17.4.11 getShortestPath()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::pair<PathTypeSP, double> LinkPred::Dijkstra< Network, DistType, NbHopsType >::get↩
ShortestPath (
            NodeID const & srcId,
            NodeID const & dstId,
            LengthMapIdType lengthMapId,
            DistType discDist = std::numeric_limits< DistType >::infinity(),
            NbHopsType discNbHops = std::numeric_limits< NbHopsType >::max() ) const
```

Finds the shortest path from a node to another.

Parameters

srcId	The ID of the source node.
dstId	The ID of the destination node.
length↩ MapId	The ID of the map length (as returned by UNetwork::registerLengthMap).
discDist	The value that should be assigned as distance between disconnected nodes.
discNbHops	The value that should be assigned as number of hops between disconnected nodes.

Returns

A pair containing a pointer to the path and its length.

9.17.4.12 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
Dijkstra& LinkPred::Dijkstra< Network, DistType, NbHopsType >::operator= (
            Dijkstra< Network, DistType, NbHopsType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.17.4.13 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
Dijkstra& LinkPred::Dijkstra< Network, DistType, NbHopsType >::operator= (
            Dijkstra< Network, DistType, NbHopsType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.17.4.14 registerLengthMap()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LengthMapIdType LinkPred::Dijkstra< Network, DistType, NbHopsType >::registerLengthMap (
            EdgeLengthMapSP length )
```

Register a length map.

Parameters

length	The length map.

Returns

The ID of the length map.

9.17.4.15 setNet()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
void LinkPred::Dijkstra< Network, DistType, NbHopsType >::setNet (
            std::shared_ptr< const Network > net )  [inline]
```

Update the network. Alllength maps are invalidated.

Parameters

net	

9.17.4.16 unregisterLengthMap()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
void LinkPred::Dijkstra< Network, DistType, NbHopsType >::unregisterLengthMap (
            LengthMapIdType const & lengthMapId )
```

Unregister a length map.

Parameters

length↩ MapId	The ID of the length map.

The documentation for this class was generated from the following file:

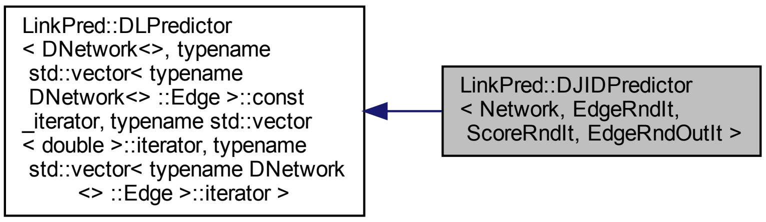
- include/linkpred/graphalg/shortestpaths/dijkstra.hpp

9.18 LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

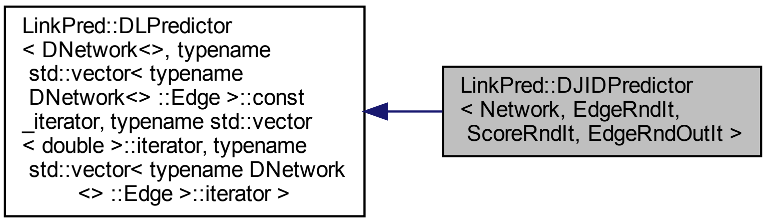
Common neighbor link predictor adapted to directed networks.

```
#include <djidpredictor.hpp>
```

Inheritance diagram for LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DJIDPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DJIDPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- DJIDPredictor (std::shared_ptr< Network const > net)
- DJIDPredictor (DJIDPredictor const &that)=default
- DJIDPredictor & operator= (DJIDPredictor const &that)=default
- DJIDPredictor (DJIDPredictor &&that)=default
- DJIDPredictor & operator= (DJIDPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ∼DJIDPredictor ()=default

Additional Inherited Members

9.18.1 Detailed Description

template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Common neighbor link predictor adapted to directed networks.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.18.2 Constructor & Destructor Documentation

9.18.2.1 DJIDPredictor() [1/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DJIDPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.18.2.2 DJIDPredictor() [2/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DJIDPredictor (
            DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.18.2.3 DJIDPredictor() [3/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DJIDPredictor (
            DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.18.2.4 ∼DJIDPredictor()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼DJIDPredictor
( )  [virtual], [default]
```

Destructor.

9.18.3 Member Function Documentation

9.18.3.1 init()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.18.3.2 learn()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [inline], [virtual]
```

Learn.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.18.3.3 operator=() [1/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DJIDPredictor& LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.18.3.4 operator=() [2/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DJIDPredictor& LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.18.3.5 predict()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
             EdgeRndIt begin,
             EdgeRndIt end,
             ScoreRndIt scores )   [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

9.18.3.6 score()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.18.3.7 top()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

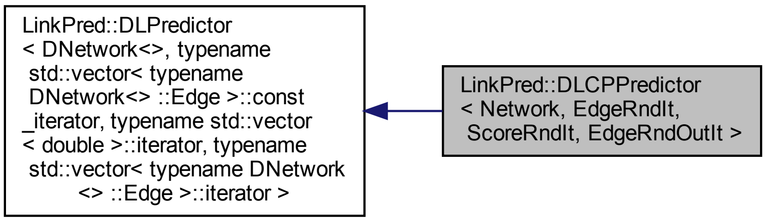
- include/linkpred/predictors/directed/djidpredictor.hpp

9.19 LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

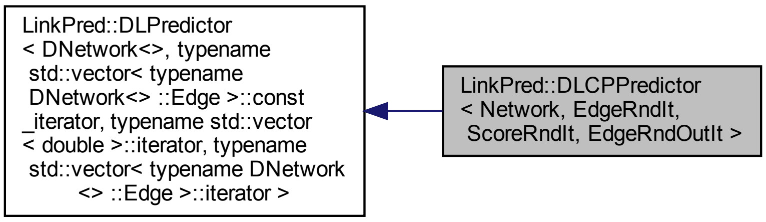
Common neighbor link predictor adapted to directed networks.

```
#include <dlcppredictor.hpp>
```

Inheritance diagram for LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DLCPPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DLCPPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- DLCPPredictor (std::shared_ptr< Network const > net)
- DLCPPredictor (DLCPPredictor const &that)=default
- DLCPPredictor & operator= (DLCPPredictor const &that)=default
- DLCPPredictor (DLCPPredictor &&that)=default
- DLCPPredictor & operator= (DLCPPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- virtual ~DLCPPredictor ()=default

Additional Inherited Members

9.19.1 Detailed Description

template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Common neighbor link predictor adapted to directed networks.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.19.2 Constructor & Destructor Documentation

9.19.2.1 DLCPPredictor() [1/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DLCPPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.19.2.2 DLCPPredictor() [2/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DLCPPredictor (
            DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.19.2.3 DLCPPredictor() [3/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DLCPPredictor (
            DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.19.2.4 ∼DLCPPredictor()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼DLCPPredictor
( )  [virtual], [default]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network. Destructor.

9.19.3 Member Function Documentation

9.19.3.1 init()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.19.3.2 learn()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learn.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.19.3.3 operator=() [1/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DLCPPredictor& LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.19.3.4 operator=() [2/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
DLCPPredictor& LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.19.3.5 predict()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
             EdgeRndIt begin,
             EdgeRndIt end,
             ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

9.19.3.6 score()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
             Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

The documentation for this class was generated from the following file:

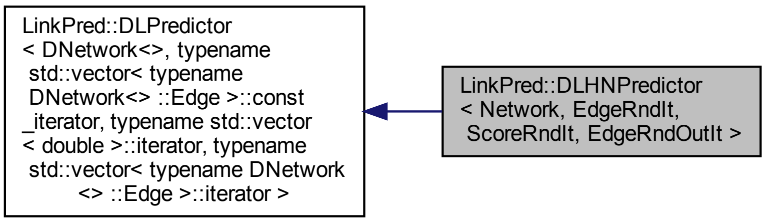
- include/linkpred/predictors/directed/dlcppredictor.hpp

9.20 LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

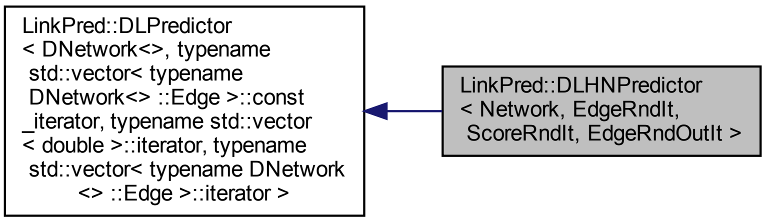
Common neighbor link predictor adapted to directed networks.

```
#include <dlhnpredictor.hpp>
```

Inheritance diagram for LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DLHNPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DLHNPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- DLHNPredictor (std::shared_ptr< Network const > net)
- DLHNPredictor (DLHNPredictor const &that)=default
- DLHNPredictor & operator= (DLHNPredictor const &that)=default
- DLHNPredictor (DLHNPredictor &&that)=default
- DLHNPredictor & operator= (DLHNPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ∼DLHNPredictor ()=default

Additional Inherited Members

9.20.1 Detailed Description

template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Common neighbor link predictor adapted to directed networks.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.20.2 Constructor & Destructor Documentation

9.20.2.1 DLHNPredictor() [1/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DLHNPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.20.2.2 DLHNPredictor() [2/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DLHNPredictor (
            DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.20.2.3 DLHNPredictor() [3/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DLHNPredictor (
            DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.20.2.4 ∼DLHNPredictor()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼DLHNPredictor
( )  [virtual], [default]
```

Destructor.

9.20.3 Member Function Documentation

9.20.3.1 init()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.20.3.2 learn()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learn.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.20.3.3 operator=() [1/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DLHNPredictor& LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.20.3.4 operator=() [2/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
DLHNPredictor& LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.20.3.5 predict()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
             EdgeRndIt begin,
             EdgeRndIt end,
             ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

9.20.3.6 score()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
             Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.20.3.7 top()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

- include/linkpred/predictors/directed/dlhnpredictor.hpp

9.21 LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT > Class Template Reference

The interface of a link predictor in a directed network.

```
#include <dlpredictor.hpp>
```

Public Types

- using Network = NetworkT
- using EdgeRndIt = EdgeRndItT
- using ScoreRndIt = ScoreRndItT
- using EdgeRndOutIt = EdgeRndOutItT
- using NodeID = typename Network::NodeID
- using Edge = typename Network::Edge

Public Member Functions

- DLPredictor (std::shared_ptr< Network const > net)
- DLPredictor (DLPredictor const &that)=default
- DLPredictor & operator= (DLPredictor const &that)=default
- DLPredictor (DLPredictor &&that)=default
- DLPredictor & operator= (DLPredictor &&that)=default
- virtual void init ()=0
- virtual void learn ()=0
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::pair< typename Network::NonEdgeIt, typename Network::NonEdgeIt > predictNeg (ScoreRndIt scores)
- virtual double score (Edge const &e)=0
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- auto getNet () const
- const std::string & getName () const
- void setName (const std::string &name)
- virtual ~DLPredictor ()=default

9.21.1 Detailed Description

template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename NetworkT::Edge>↩ ::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator, typename EdgeRndOutItT = typename std↩ ::vector<typename NetworkT::Edge>::iterator>
class LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >

The interface of a link predictor in a directed network.

Template Parameters

NetworkT	The network type.
EdgeRndItT	A random iterator type used to iterate on edges.
ScoreRndItT	A random iterator type used to iterate on scores.

Parameters

EdgeRndOutItT	A random output iterator to write edges.

9.21.2 Member Typedef Documentation

9.21.2.1 Edge

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
using LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::Edge = typename
Network::Edge
```

The edges type.

9.21.2.2 EdgeRndIt

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
using LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::EdgeRndIt =
EdgeRndItT
```

A random iterator type used to iterate on edges.

9.21.2.3 EdgeRndOutIt

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
using LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::EdgeRndOutIt
= EdgeRndOutItT
```

A random output iterator to write edges.

9.21.2.4 Network

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
using LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::Network =
NetworkT
```

The network type.

9.21.2.5 NodeID

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
using LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::NodeID =
typename Network::NodeID
```

The node IDs type.

9.21.2.6 ScoreRndIt

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
using LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::ScoreRndIt =
ScoreRndItT
```

A random iterator type used to iterate on scores.

9.21.3 Constructor & Destructor Documentation

9.21.3.1 DLPredictor() [1/3]

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::DLPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Constructor.

Parameters

net	The network.

9.21.3.2 DLPredictor() [2/3]

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::DLPredictor (
            DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.21.3.3 DLPredictor() [3/3]

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::DLPredictor (
            DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.21.3.4 ∼DLPredictor()

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::∼DLPredictor
( ) [virtual], [default]
```

Destructor.

9.21.4 Member Function Documentation

9.21.4.1 getName()

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
const std::string& LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >←
::getName ( ) const [inline]
```

Returns

The name of the predictor.

9.21.4.2 getNet()

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
auto LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::getNet ( )
const [inline]
```

Returns

The network.

9.21.4.3 init()

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual void LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::init (
)  [pure virtual]
```

Initialize the solver.

Implemented in LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DADAPredictor< Network
LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DHDIPredictor< Network, EdgeRndIt, Sc
LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DJIDPredictor< Network, EdgeRndIt, Scor
LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DLHNPredictor< Network, EdgeRndIt, Sc
LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DSAIPredictor< Network, EdgeRndIt, Sco
and LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >.

9.21.4.4 learn()

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual void LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::learn
( )  [pure virtual]
```

Learning.

Implemented in LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DADAPredictor< Network
LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DHDIPredictor< Network, EdgeRndIt, Sc
LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DJIDPredictor< Network, EdgeRndIt, Scor
LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DLHNPredictor< Network, EdgeRndIt, Sc
LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DSAIPredictor< Network, EdgeRndIt, Sco
and LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >.

9.21.4.5 operator=() [1/2]

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
DLPredictor& LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::operator=
(
            DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.21.4.6 operator=() [2/2]

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
DLPredictor& LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::operator=
(
            DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.21.4.7 predict()

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual void LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [inline], [virtual]
```

Predict links.

Parameters

begin	Iterator to the first edge to be predicted.
end	end Iterator to one past the last edge to be predicted.
scores	Random output iterator to store the scores.

Reimplemented in LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DCNEPredictor< Netw
LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DHPIPredictor< Network, EdgeRndIt, Sco
LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DLCPPredictor< Network, EdgeRndIt, Sco
LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DPATPredictor< Network, EdgeRndIt, Sc
LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, and LinkPred::DSOIPredictor< Network, EdgeRndIt,

9.21.4.8 predictNeg()

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual std::pair<typename Network::NonEdgeIt, typename Network::NonEdgeIt> LinkPred::DLPredictor<
NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::predictNeg (
            ScoreRndIt scores )  [inline], [virtual]
```

Predict score for all negative (non-existing) links in the network.

Parameters

scores	Random output iterator to store the scores.

Returns

A pair of iterators begin and end to the range of non-existing links predicted by the method.

9.21.4.9 score()

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual double LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >↩
::score (
            Edge const & e )  [pure virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.21.4.10 setName()

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
void LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::setName (
            const std::string & name )  [inline]
```

Set the name of the predictor.

Parameters

name	The new name of the predictor.

9.21.4.11 top()

```
template<typename NetworkT = DNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual std::size_t LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT
>::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [inline], [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented in LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DCNEPredictor< Netw
LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DHPIPredictor< Network, EdgeRndIt, Sco
LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::DLHNPredictor< Network, EdgeRndIt, Sco
LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, and LinkPred::DSOIPredictor< Network, EdgeRndIt,

The documentation for this class was generated from the following file:

- include/linkpred/predictors/directed/dlpredictor.hpp

9.22 LinkPred::DNetwork< LabelT, NodeIDT, EdgeT > Class Template Reference

This class represents a directed network in the sense of graph theory.

```
#include <dnetwork.hpp>
```

Classes

- class EdgeMap

  An edge map.
- class NodeDegIt

  Node-degree iterator. This class can be used to iterate over pairs of node IDs and in and out degrees.
- class NodeMap

  A node map.
- class NodeSMap

  A sparse node map.
- class NonEdgeIt

  Nonedges iterator.
- class RndEdgeIt

  Randomized edges iterator.
- class RndNodeIt

  Randomized Nodes iterator.
- class RndNonEdgeIt

  Randomized nonedges iterator.

Public Types

- using Label = LabelT
- using NodeID = NodeIDT
- using Edge = EdgeT
- using LabelIt = typename Bhmap< Label, NodeID >::k_const_iterator
- using NodeIt = typename Bhmap< Label, NodeID >::p_const_iterator
- using EdgeIt = typename std::vector< Edge >::const_iterator
- template< typename ValueT >
  using NodeMapSP = std::shared_ptr< NodeMap< ValueT > >
- template< typename ValueT >
  using NodeSMapSP = std::shared_ptr< NodeSMap< ValueT > >
- template< typename ValueT >
  using EdgeMapSP = std::shared_ptr< EdgeMap< ValueT > >

Public Member Functions

- DNetwork ()=default
- DNetwork (std::vector< std::pair< Label, Label >> const &edges)
- DNetwork (DNetwork const &that)=default
- DNetwork & operator= (DNetwork const &that)=default
- DNetwork (DNetwork &&that)=default
- DNetwork & operator= (DNetwork &&that)=default
- std::pair< NodeID, bool > addNode (Label const &nodeId)
- NodeID getID (Label const &label) const
- Label getLabel (NodeID const &iid) const
- LabelIt findLabel (Label const &label) const
- NodeIt findNode (NodeID const &iid) const
- void addEdge (NodeID const &i, NodeID const &j)
- std::size_t coupleOrd (Edge const &e) const
- std::size_t coupleAtOrd (std::size_t ord) const
- EdgeIt neighbBegin (NodeID const &iid) const
- EdgeIt neighbEnd (NodeID const &iid) const

- EdgeIt outNeighborsBegin (NodeID const &iid) const
- EdgeIt outNeighborsEnd (NodeID const &iid) const
- EdgeIt inNeighborsBegin (NodeID const &iid) const
- EdgeIt inNeighborsEnd (NodeID const &iid) const
- std::size_t getDeg (NodeID const &iid) const
- std::pair< std::size_t, std::size_t > getInOutDeg (NodeID const &iid) const
- std::size_t getOutDeg (NodeID const &iid) const
- std::size_t getInDeg (NodeID const &iid) const
- bool isEdge (NodeID const &ii, NodeID const &ij) const
- bool isEdge (Edge const &edge) const
- std::size_t getNbNodes () const
- std::size_t getNbCouples () const
- std::size_t getNbEdges () const
- std::size_t getNbNonEdges () const
- double getAvgDeg () const
- std::size_t getMaxDeg () const
- std::size_t getMinDeg () const
- double getAvgOutDeg () const
- std::size_t getMaxOutDeg () const
- std::size_t getMinOutDeg () const
- double getAvgInDeg () const
- std::size_t getMaxInDeg () const
- std::size_t getMinInDeg () const
- void assemble ()
- void shuffle (long int seed)
- LabelIt labelsBegin () const
- LabelIt labelsEnd () const
- NodeIt nodesBegin () const
- NodeIt nodesEnd () const
- NodeDegIt nodesDegBegin () const
- NodeDegIt nodesDegEnd () const
- EdgeIt edgesBegin () const
- EdgeIt edgesEnd () const
- EdgeIt outEdgesBegin () const
- EdgeIt outEdgesEnd () const
- EdgeIt inEdgesBegin () const
- EdgeIt inEdgesEnd () const
- NonEdgeIt nonEdgesBegin () const
- NonEdgeIt nonEdgesEnd () const
- RndNodeIt rndNodesBegin (double ratio, long int seed) const
- RndNodeIt rndNodesEnd () const
- RndNonEdgeIt rndNonEdgesBegin (double ratio, long int seed) const
- RndNonEdgeIt rndNonEdgesEnd () const
- RndEdgeIt rndEdgesBegin (double ratio, long int seed) const
- RndEdgeIt rndEdgesEnd () const
- void getDegStat (std::size_t &minDeg, std::size_t &maxDeg, double &avgDeg) const
- void getOutDegStat (std::size_t &minOutDeg, std::size_t &maxOutDeg, double &avgOutDeg) const
- void getInDegStat (std::size_t &minInDeg, std::size_t &maxInDeg, double &avgInDeg) const
- template<typename ValueT >
  NodeMap< ValueT > createNodeMap () const
- template<typename ValueT >
  NodeMapSP< ValueT > createNodeMapSP () const
- template<typename ValueT >
  NodeSMap< ValueT > createNodeSMap (ValueT const &defVal) const

- template<typename ValueT >
  NodeSMapSP< ValueT > createNodeSMapSP (ValueT const &defVal) const
- template<typename ValueT >
  EdgeMap< ValueT > createEdgeMap () const
- template<typename ValueT >
  EdgeMapSP< ValueT > createEdgeMapSP () const
- std::shared_ptr< std::vector< Edge > > readEdges (std::string fileName) const
- void write (std::string fileName) const
- void print () const
- std::size_t getNbPaths (NodeID const &srcId, NodeID const &endId, std::size_t length) const
- template<typename ForwardIterator >
  void printEdges (ForwardIterator edgesBegin, ForwardIterator edgesEnd) const
- virtual ~DNetwork ()=default

Static Public Member Functions

- static Edge makeEdge (NodeID const &i, NodeID const &j)
- static Edge reverseEdge (Edge const &e)
- static const NodeID start (Edge const &edge)
- static const NodeID end (Edge const &edge)
- static bool compareEdgeEnd (Edge const &e1, Edge const &e2)
- static std::shared_ptr< DNetwork< Label, NodeID, Edge > > read (std::string fileName, bool ignore↩ Repetitions=false, bool ignoreLoops=false)

9.22.1 Detailed Description

**template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >**

This class represents a directed network in the sense of graph theory.

Template Parameters

LabelT	Type of external labels.
NodeIDT	Type of internal node IDs. This must be an unsigned integral type.
EdgeT	Type of edges. This must be an unsigned integral type having at least double the size of `NodeID` DNetwork.

9.22.2 Member Typedef Documentation

9.22.2.1 Edge

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::Edge = EdgeT
```

Internal edge type.

9.22.2.2 EdgeIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeIt = typename std::vector<Edge>↩
::const_iterator
```

Edge iterator.

9.22.2.3 EdgeMapSP

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMapSP = std::shared_ptr<EdgeMap<ValueT>
>
```

Shared pointer to an edge map.

9.22.2.4 Label

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::Label = LabelT
```

External label type.

9.22.2.5 LabelIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::LabelIt = typename Bhmap<Label, NodeID>↩
::k_const_iterator
```

External node iterator that offers the mapping to internal IDs.

9.22.2.6 NodeID

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeID = NodeIDT
```

Internal node ID type.

9.22.2.7 NodeIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeIt = typename Bhmap<Label, NodeID>↩
::p_const_iterator
```

Internal node iterator (random access iterator).

9.22.2.8 NodeMapSP

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMapSP = std::shared_ptr<NodeMap<ValueT>
>
```

Shared pointer to a node map.

9.22.2.9 NodeSMapSP

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMapSP = std::shared_ptr<NodeSMap<ValueT>
>
```

Shared pointer to a node map.

9.22.3 Constructor & Destructor Documentation

9.22.3.1 DNetwork() [1/4]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::DNetwork ( )  [default]
```

Default constructor.

9.22.3.2 DNetwork() [2/4]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::DNetwork (
             std::vector< std::pair< Label, Label >> const & edges )
```

Build the network form a list of edges. The network is assembled within this constructor.

Parameters

edges	List of edges.

9.22.3.3 DNetwork() [3/4]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::DNetwork (
            DNetwork< LabelT, NodeIDT, EdgeT > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.22.3.4 DNetwork() [4/4]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::DNetwork (
            DNetwork< LabelT, NodeIDT, EdgeT > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.22.3.5 ∼DNetwork()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
virtual LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::∼DNetwork ( )  [virtual], [default]
```

Destructor.

9.22.4 Member Function Documentation

9.22.4.1 addEdge()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::addEdge (
            NodeID const & i,
            NodeID const & j )
```

Add an edge.

Parameters

i	The starting node.
j	The end node.

9.22.4.2 addNode()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::pair<NodeID, bool> LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::addNode (
             Label const & nodeId )
```

Add a node.

Parameters

node↵ Id	The ID of the node.

Returns

An std::pair, where first is the internal ID, and second is a boolean which is true if the node is actually added.

9.22.4.3 assemble()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::assemble ( )
```

Assemble the network. No changes to the network are allowed after calling this method.

9.22.4.4 compareEdgeEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::compareEdgeEnd (
             Edge const & e1,
             Edge const & e2 )  [inline], [static]
```

Compare edge ends.

Parameters

e1	First edge.
e2	Second edge.

Returns

True if the end of e1 is smaller than that of e2 (comparison is based on node IDs).

9.22.4.5 coupleAtOrd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::coupleAtOrd (
            std::size_t ord ) const [inline]
```

Parameters

ord	The order of an edge.

Returns

The edge given its order.

9.22.4.6 coupleOrd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::coupleOrd (
            Edge const & e ) const [inline]
```

Parameters

e	An edge.

Returns

The order of the edge

9.22.4.7 createEdgeMap()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
EdgeMap<ValueT> LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::createEdgeMap ( ) const [inline]
```

Template Parameters

ValueT	Value type.

Returns

An edge map.

9.22.4.8 createEdgeMapSP()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
EdgeMapSP<ValueT> LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::createEdgeMapSP ( ) const
[inline]
```

Template Parameters

ValueT	Value type.

Returns

A pointer to an edge map.

9.22.4.9 createNodeMap()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
NodeMap<ValueT> LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::createNodeMap ( ) const  [inline]
```

Template Parameters

ValueT	Value type.

Returns

A node map.

9.22.4.10 createNodeMapSP()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
```

```
template<typename ValueT >
NodeMapSP<ValueT> LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::createNodeMapSP ( ) const
[inline]
```

Template Parameters

ValueT	Value type.

Returns

A pointer to a node map.

9.22.4.11 createNodeSMap()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
NodeSMap<ValueT> LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::createNodeSMap (
             ValueT const & defVal ) const  [inline]
```

Template Parameters

ValueT	Value type.

Returns

A sparse node map.

9.22.4.12 createNodeSMapSP()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
NodeSMapSP<ValueT> LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::createNodeSMapSP (
             ValueT const & defVal ) const  [inline]
```

Template Parameters

ValueT	Value type.

Returns

A pointer to a sparse node map.

9.22.4.13 edgesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::edgesBegin ( ) const  [inline]
```

Returns

A read-only (constant) iterator that points to the first edge (with internal ID). Edges are ordered by source node.

9.22.4.14 edgesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::edgesEnd ( ) const  [inline]
```

Returns

A read-only (constant) iterator that points one past the last edge (with internal ID). Edges are ordered by source node.

9.22.4.15 end()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static const NodeID LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::end (
             Edge const & edge )  [inline], [static]
```

Parameters

edge	An edge.

Returns

The end node of edge.

9.22.4.16 findLabel()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LabelIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::findLabel (
             Label const & label ) const  [inline]
```

Parameters

label	An external node ID.

Returns

Iterator to the external node ID.

9.22.4.17 findNode()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::findNode (
            NodeID const & iid ) const  [inline]
```

Parameters

iid	An internal node ID.

Returns

Iterator to the internal node ID.

9.22.4.18 getAvgDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
double LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getAvgDeg ( ) const  [inline]
```

Returns

Average degree. Can only be called after the network is assembled.

9.22.4.19 getAvgInDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
double LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getAvgInDeg ( ) const  [inline]
```

Returns

Average in-degree. Can only be called after the network is assembled.

9.22.4.20 getAvgOutDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
double LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getAvgOutDeg ( ) const  [inline]
```

Returns

Average out-degree. Can only be called after the network is assembled.

9.22.4.21 getDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getDeg (
             NodeID const & iid ) const  [inline]
```

Parameters

iid	The node internal ID.

Returns

The degree of node iid (sum of in and out-degrees).

9.22.4.22 getDegStat()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getDegStat (
             std::size_t & minDeg,
             std::size_t & maxDeg,
             double & avgDeg ) const  [inline]
```

Compute some degree statistics.

Parameters

minDeg	(output parameter) minimum degree.
maxDeg	(output parameter) maximum degree.
avgDeg	(output parameter) average degree.

9.22.4.23 getID()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeID LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getID (
             Label const & label ) const  [inline]
```

Translates from external label to internal IDs. This method is O(log n), where n is the number of nodes.

Parameters

label	An external node label.

Returns

The internal ID of label;

9.22.4.24 getInDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getInDeg (
             NodeID const & iid ) const  [inline]
```

Parameters

iid	The node internal ID.

Returns

The in-degree of node iid.

9.22.4.25 getInDegStat()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getInDegStat (
             std::size_t & minInDeg,
             std::size_t & maxInDeg,
             double & avgInDeg ) const  [inline]
```

Compute some in-degree statistics.

Parameters

minInDeg	(input parameter) minimum in-degree.
maxInDeg	(input parameter) maximum in-degree.
avgInDeg	(input parameter) average in-degree.

9.22.4.26 getInOutDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::pair<std::size_t, std::size_t> LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getInOutDeg
(
             NodeID const & iid ) const  [inline]
```

Parameters

iid	The node internal ID.

Returns

The in and out-degrees of node iid.

9.22.4.27 getLabel()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
Label LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getLabel (
             NodeID const & iid ) const  [inline]
```

Parameters

iid	An internal node ID.

Returns

The external label of the node iid.

9.22.4.28 getMaxDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getMaxDeg ( ) const  [inline]
```

Returns

Maximum degree. Can only be called after the network is assembled.

9.22.4.29 getMaxInDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getMaxInDeg ( ) const  [inline]
```

Returns

Maximum in-degree. Can only be called after the network is assembled.

9.22.4.30 getMaxOutDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getMaxOutDeg ( ) const  [inline]
```

Returns

Maximum out-degree. Can only be called after the network is assembled.

9.22.4.31 getMinDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getMinDeg ( ) const  [inline]
```

Returns

Minimum degree. Can only be called after the network is assembled.

9.22.4.32 getMinInDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getMinInDeg ( ) const  [inline]
```

Returns

Minimum in-degree. Can only be called after the network is assembled.

9.22.4.33 getMinOutDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getMinOutDeg ( ) const  [inline]
```

Returns

Minimum out-degree. Can only be called after the network is assembled.

9.22.4.34 getNbCouples()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getNbCouples ( ) const  [inline]
```

Returns

The number of couples in the network.

9.22.4.35 getNbEdges()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getNbEdges ( ) const  [inline]
```

Returns

The number of edges in the network.

9.22.4.36 getNbNodes()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getNbNodes ( ) const  [inline]
```

Returns

The number of nodes in the network.

9.22.4.37 getNbNonEdges()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getNbNonEdges ( ) const  [inline]
```

Returns

The number of non-edges in the network.

9.22.4.38 getNbPaths()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getNbPaths (
             NodeID const & srcId,
             NodeID const & endId,
             std::size_t length ) const
```

Parameters

srcId	The source node ID.
endId	The end node ID.
length	Specified length.

Returns

The number of paths of length exactly length joining srcNode and endNode.

9.22.4.39 getOutDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getOutDeg (
             NodeID const & iid ) const  [inline]
```

Parameters

iid	The node internal ID.

Returns

The out-degree of node iid.

9.22.4.40 getOutDegStat()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::getOutDegStat (
             std::size_t & minOutDeg,
             std::size_t & maxOutDeg,
             double & avgOutDeg ) const  [inline]
```

Compute some out-degree statistics.

Parameters

minOutDeg	(output parameter) minimum out-degree.
maxOutDeg	(output parameter) maximum out-degree.
avgOutDeg	(output parameter) average out-degree.

9.22.4.41 inEdgesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::inEdgesBegin ( ) const  [inline]
```

Returns

A read-only (constant) iterator that points to the first edge (with internal ID). Edges are ordered by end node.

9.22.4.42 inEdgesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::inEdgesEnd ( ) const  [inline]
```

Returns

A read-only (constant) iterator that points one past the last edge (with internal ID). Edges are ordered by end node.

9.22.4.43 inNeighborsBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::inNeighborsBegin (
             NodeID const & iid ) const  [inline]
```

Parameters

iid	An internal node ID.

Returns

An iterator to the first in-neighbor of iid.

9.22.4.44 inNeighborsEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::inNeighborsEnd (
             NodeID const & iid ) const  [inline]
```

Parameters

iid	An internal node ID.

Returns

An iterator to one past the last in-neighbor of iid.

9.22.4.45 isEdge() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::isEdge (
             Edge const & edge ) const
```

Check if an edge exists in O(k_max).

Parameters

edge	An edge.

Returns

True if edge exists in the network, false otherwise.

9.22.4.46 isEdge() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::isEdge (
             NodeID const & ii,
             NodeID const & ij ) const  [inline]
```

Check if an edge exists in O(k_max).

Parameters

ii	An internal node ID.
ij	An internal node ID.

Returns

true if the edge (ii, ij) exists, false otherwise.

9.22.4.47 labelsBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LabelIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::labelsBegin ( ) const  [inline]
```

Returns

A read-only (constant) external node ID iterator that points to the first node.

9.22.4.48 labelsEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LabelIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::labelsEnd ( ) const  [inline]
```

Returns

A read-only (constant) external node ID iterator that points one past the last node.

9.22.4.49 makeEdge()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static Edge LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::makeEdge (
             NodeID const & i,
             NodeID const & j )  [inline], [static]
```

Make an edge in internal representation out of two nodes' internal IDs.

Parameters

i	The starting node.
j	The end node.

Returns

The edge (i, j).

9.22.4.50 neighbBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::neighbBegin (
             NodeID const & iid ) const  [inline]
```

Parameters

iid	An internal node ID.

Returns

An iterator to the first out-neighbor of iid.

9.22.4.51 neighbEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::neighbEnd (
             NodeID const & iid ) const  [inline]
```

Parameters

iid	An internal node ID.

Returns

An iterator to one past the last out-neighbor of iid.

9.22.4.52 nodesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::nodesBegin ( ) const  [inline]
```

Returns

A read-only (constant) external node ID iterator that points to the first node.

9.22.4.53 nodesDegBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::nodesDegBegin ( ) const  [inline]
```

Returns

A read-only (constant) external node ID iterator that points to the first node-degree couple.

9.22.4.54 nodesDegEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::nodesDegEnd ( ) const  [inline]
```

Returns

A read-only (constant) external node ID iterator that points one past the last node-degree couple.

9.22.4.55 nodesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::nodesEnd ( ) const  [inline]
```

Returns

A read-only (constant) external node ID iterator that points one past the last node.

9.22.4.56 nonEdgesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::nonEdgesBegin ( ) const  [inline]
```

Returns

A read-only (constant) iterator that points to the first non-edge (with internal ID).

9.22.4.57 nonEdgesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::nonEdgesEnd ( ) const  [inline]
```

Returns

A read-only (constant) iterator that points one past the last non-edge (with internal ID).

9.22.4.58 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
DNetwork& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::operator= (
             DNetwork< LabelT, NodeIDT, EdgeT > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.22.4.59 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
DNetwork& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::operator= (
             DNetwork< LabelT, NodeIDT, EdgeT > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.22.4.60 outEdgesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::outEdgesBegin ( ) const  [inline]
```

Returns

A read-only (constant) iterator that points to the first edge (with internal ID). Edges are ordered by source node.

9.22.4.61 outEdgesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::outEdgesEnd ( ) const  [inline]
```

Returns

A read-only (constant) iterator that points one past the last edge (with internal ID). Edges are ordered by source node.

9.22.4.62 outNeighborsBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::outNeighborsBegin (
             NodeID const & iid ) const  [inline]
```

Parameters

iid	An internal node ID.

Returns

An iterator to the first out-neighbor of iid.

9.22.4.63 outNeighborsEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::outNeighborsEnd (
             NodeID const & iid ) const  [inline]
```

Parameters

iid	An internal node ID.

Returns

An iterator to one past the last out-neighbor of iid.

9.22.4.64 print()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::print ( ) const
```

Print edges to std::cout.

9.22.4.65 printEdges()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ForwardIterator >
void LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::printEdges (
             ForwardIterator edgesBegin,
             ForwardIterator edgesEnd ) const  [inline]
```

Print edges to std::cout.

Parameters

edgesBegin	Iterator to the beginning of the edges.
edgesEnd	Iterator to one past the the end of the edges.

9.22.4.66 read()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static std::shared_ptr<DNetwork<Label, NodeID, Edge> > LinkPred::DNetwork< LabelT, NodeIDT,
EdgeT >::read (
             std::string fileName,
             bool ignoreRepetitions = false,
             bool ignoreLoops = false )  [static]
```

Read network from file.

Parameters

fileName	The file name.
ignoreRepetitions	Whether to ignore repeated edges.
ignoreLoops	Whether to ignore loops.

Returns

The read network.

9.22.4.67 readEdges()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::shared_ptr<std::vector<Edge> > LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::readEdges
(
             std::string fileName ) const
```

Read couples from file.

Parameters

fileName	The file name.

Returns

The edges.

9.22.4.68 reverseEdge()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static Edge LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::reverseEdge (
             Edge const & e )  [inline], [static]
```

Parameters

e	An edge (i,j).

Returns

The edge (j, i).

9.22.4.69 rndEdgesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndEdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::rndEdgesBegin (
             double ratio,
             long int seed ) const  [inline]
```

Parameters

ratio	Ratio of edges that are selected.
seed	The random number gnerator's seed.

Returns

a read-only (constant) randomized iterator that points to the first edge (with internal ID).

9.22.4.70 rndEdgesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndEdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::rndEdgesEnd ( ) const  [inline]
```

Returns

A read-only (constant) randomized iterator that points one past the last edge (with internal ID).

9.22.4.71 rndNodesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNodeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::rndNodesBegin (
             double ratio,
             long int seed ) const  [inline]
```

Parameters

ratio	Ratio of nodes that are selected.
seed	The random number gnerator's seed.

Returns

a read-only (constant) randomized iterator that points to the first node (with internal ID).

9.22.4.72 rndNodesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNodeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::rndNodesEnd ( ) const  [inline]
```

Returns

A read-only (constant) randomized iterator that points one past the last node (with internal ID).

9.22.4.73 rndNonEdgesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNonEdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::rndNonEdgesBegin (
             double ratio,
             long int seed ) const  [inline]
```

Parameters

ratio	Ratio of nonedges that are selected.
seed	The random number gnerator's seed.

Returns

a read-only (constant) randomized iterator that points to the first non-edge (with internal ID).

9.22.4.74 rndNonEdgesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNonEdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::rndNonEdgesEnd ( ) const  [inline]
```

Returns

A read-only (constant) randomized iterator that points one past the last non-edge (with internal ID).

9.22.4.75 shuffle()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::shuffle (
             long int seed )
```

Shuffles the nodes' internal IDs. This is useful to eliminate bias in methods that depend on node/edge order. Upon calling this method, all iterators and maps associated with the network are invalidated.

Parameters

seed	Random number generator's seed.

9.22.4.76 start()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static const NodeID LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::start (
             Edge const & edge )  [inline], [static]
```

Parameters

edge	An edge.

Returns

The starting node of edge.

9.22.4.77 write()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::write (
             std::string fileName ) const
```

Write adjacency matrix in sparse form to file.

Parameters

fileName	the file name.

The documentation for this class was generated from the following file:

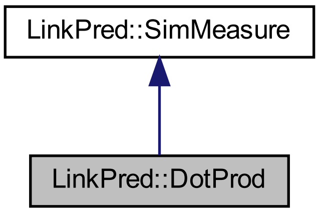
- include/linkpred/core/dnetwork/dnetwork.hpp

9.23 LinkPred::DotProd Class Reference

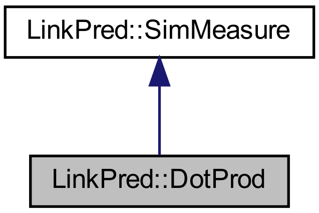
A simple dot product similarity measure.

```
#include <dotprod.hpp>
```

Inheritance diagram for LinkPred::DotProd:



Collaboration diagram for LinkPred::DotProd:



Public Member Functions

- DotProd ()
- DotProd (DotProd const &that)=default
- DotProd & operator= (DotProd const &that)=default
- DotProd (DotProd &&that)=default
- DotProd & operator= (DotProd &&that)=default
- virtual double sim (Vec const &v1, Vec const &v2)
- virtual ∼DotProd ()=default

9.23.1 Detailed Description

A simple dot product similarity measure.

9.23.2 Constructor & Destructor Documentation

9.23.2.1 DotProd() [1/3]

```
LinkPred::DotProd::DotProd ( )  [inline]
```

Constructor.

9.23.2.2 DotProd() [2/3]

```
LinkPred::DotProd::DotProd (
             DotProd const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.23.2.3 DotProd() [3/3]

```
LinkPred::DotProd::DotProd (
             DotProd && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.23.2.4 ∼DotProd()

```
virtual LinkPred::DotProd::∼DotProd ( )  [virtual], [default]
```

Destructor.

9.23.3 Member Function Documentation

9.23.3.1 operator=() [1/2]

```
DotProd& LinkPred::DotProd::operator= (
             DotProd && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.23.3.2 operator=() `[2/2]`

```
DotProd& LinkPred::DotProd::operator= (
            DotProd const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.23.3.3 sim()

```
virtual double LinkPred::DotProd::sim (
            Vec const & v1,
            Vec const & v2 )  [virtual]
```

Compute the similarity between two vectors.

Parameters

v1	First vector.
v2	Second vector. Must be of the same dimension as v1.

Returns

The similarity between v1 and v2.

Implements LinkPred::SimMeasure.

The documentation for this class was generated from the following file:

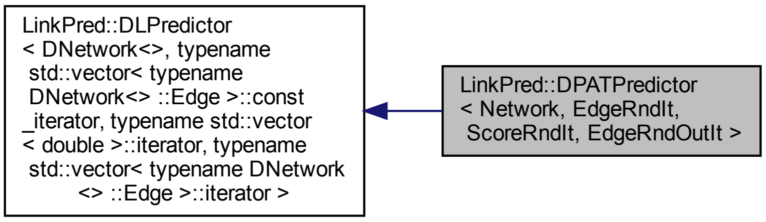
- include/linkpred/ml/simmeasures/dotprod.hpp

9.24 LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

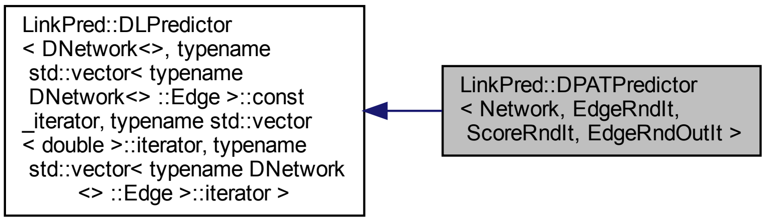
Common neighbor link predictor adapted to directed networks.

```
#include <dpatpredictor.hpp>
```

Inheritance diagram for LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DPATPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DPATPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- DPATPredictor (std::shared_ptr< Network const > net)
- DPATPredictor (DPATPredictor const &that)=default
- DPATPredictor & operator= (DPATPredictor const &that)=default
- DPATPredictor (DPATPredictor &&that)=default
- DPATPredictor & operator= (DPATPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- virtual ∼DPATPredictor ()=default

Additional Inherited Members

9.24.1 Detailed Description

template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Common neighbor link predictor adapted to directed networks.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.24.2 Constructor & Destructor Documentation

9.24.2.1 DPATPredictor() [1/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DPATPredictor (
            std::shared_ptr< Network const > net ) [inline]
```

Parameters

net	The network.

9.24.2.2 DPATPredictor() [2/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DPATPredictor (
            DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.24.2.3 DPATPredictor() [3/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DPATPredictor (
            DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.24.2.4 ∼DPATPredictor()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼DPATPredictor
( )  [virtual], [default]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network. Destructor.

9.24.3 Member Function Documentation

9.24.3.1 init()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.24.3.2 learn()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learn.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.24.3.3 operator=() [1/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DPATPredictor& LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.24.3.4 operator=() [2/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DPATPredictor& LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.24.3.5 predict()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

9.24.3.6 score()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

The documentation for this class was generated from the following file:

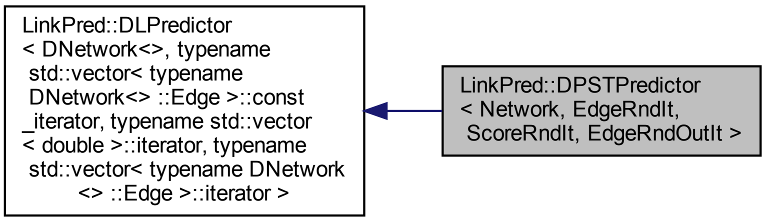
- include/linkpred/predictors/directed/dpatpredictor.hpp

9.25 LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

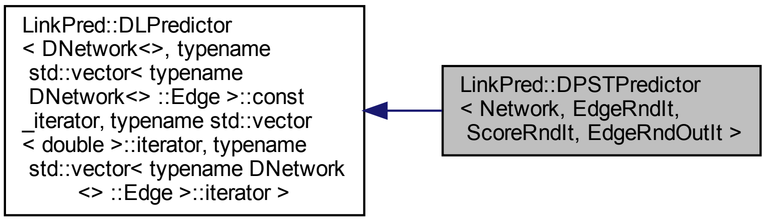
A link predictor that prestores edge scores. This allows to seemingly integrate results from external link prediction algorithms to LinkPred (for example, users may implement their own link prediction algorithm and then use this link predictor to use compare their results to algorithms available in LinkPred).

```
#include <dpstpredictor.hpp>
```

Inheritance diagram for LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DPSTPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DPSTPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- DPSTPredictor (std::shared_ptr< Network const > net)
- DPSTPredictor (DPSTPredictor const &that)=default
- DPSTPredictor & operator= (DPSTPredictor const &that)=default
- DPSTPredictor (DPSTPredictor &&that)=default
- DPSTPredictor & operator= (DPSTPredictor &&that)=default
- void setEdgeScores (typename Network::template EdgeMapSP< double > edgeScores)
- void loadEdgeScores (std::string fileName)
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual ∼DPSTPredictor ()=default

Additional Inherited Members

9.25.1 Detailed Description

template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

A link predictor that prestores edge scores. This allows to seemingly integrate results from external link prediction algorithms to LinkPred (for example, users may implement their own link prediction algorithm and then use this link predictor to use compare their results to algorithms available in LinkPred).

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.25.2 Constructor & Destructor Documentation

9.25.2.1 DPSTPredictor() [1/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DPSTPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.25.2.2 DPSTPredictor() [2/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DPSTPredictor (
            DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.25.2.3 DPSTPredictor() [3/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DPSTPredictor (
            DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.25.2.4 ∼DPSTPredictor()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼DPSTPredictor
( )  [virtual], [default]
```

Destructor.

9.25.3 Member Function Documentation

9.25.3.1 init()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.25.3.2 learn()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learn.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.25.3.3 loadEdgeScores()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::loadEdgeScores (
             std::string fileName )
```

Load edge scores from file. This file should contain the scores of all non-exisitng links of net.

Parameters

fileName	The name of the file containing edge scores. This should be a text file in which each line contains three columns separate by a space character (one or multiple spaces or tabs). The first two columns contain the the labels (not the internal IDs) of two nodes composing the edge. The third column contains the score. For example: A B 0.35 or: 5 8 2.6 All node labels that appear in this file must already exist in the network.

9.25.3.4 operator=() [1/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DPSTPredictor& LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.25.3.5 operator=() [2/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DPSTPredictor& LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.25.3.6 score()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
             Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.25.3.7 setEdgeScores()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setEdgeScores (
             typename Network::template EdgeMapSP< double > edgeScores )  [inline]
```

Set the edge scores. This should contain the scores of all non-exisitng links of net.

Parameters

edgeScores	A map contatining the scores of non-exisitng links of net.

The documentation for this class was generated from the following file:

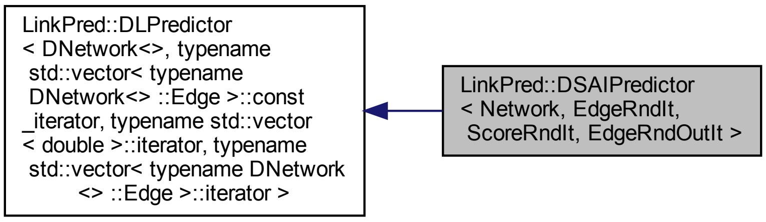
- include/linkpred/predictors/directed/dpstpredictor.hpp

9.26 LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

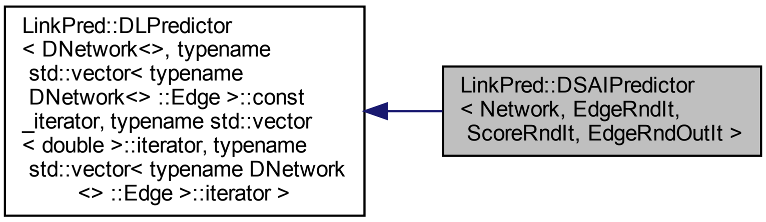
Common neighbor link predictor adapted to directed networks.

```
#include <dsaipredictor.hpp>
```

Inheritance diagram for LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DSAIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DSAIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- DSAIPredictor (std::shared_ptr< Network const > net)
- DSAIPredictor (DSAIPredictor const &that)=default
- DSAIPredictor & operator= (DSAIPredictor const &that)=default
- DSAIPredictor (DSAIPredictor &&that)=default
- DSAIPredictor & operator= (DSAIPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ∼DSAIPredictor ()=default

Additional Inherited Members

9.26.1 Detailed Description

template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Common neighbor link predictor adapted to directed networks.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.26.2 Constructor & Destructor Documentation

9.26.2.1 DSAIPredictor() [1/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DSAIPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.26.2.2 DSAIPredictor() [2/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DSAIPredictor (
            DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.26.2.3 DSAIPredictor() [3/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DSAIPredictor (
            DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.26.2.4 ∼DSAIPredictor()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼DSAIPredictor
( )  [virtual], [default]
```

Destructor.

9.26.3 Member Function Documentation

9.26.3.1 init()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.26.3.2 learn()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learn.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.26.3.3 operator=() [1/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DSAIPredictor& LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.26.3.4 operator=() [2/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
DSAIPredictor& LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.26.3.5 predict()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
             EdgeRndIt begin,
             EdgeRndIt end,
             ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

9.26.3.6 score()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
             Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.26.3.7 top()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

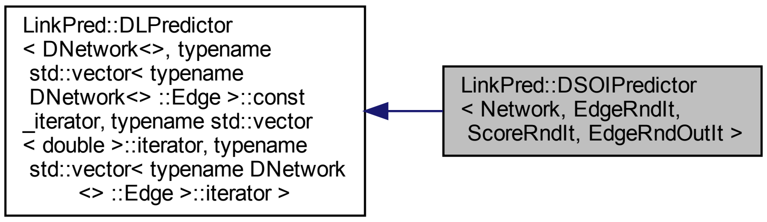
- include/linkpred/predictors/directed/dsaipredictor.hpp

9.27 LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

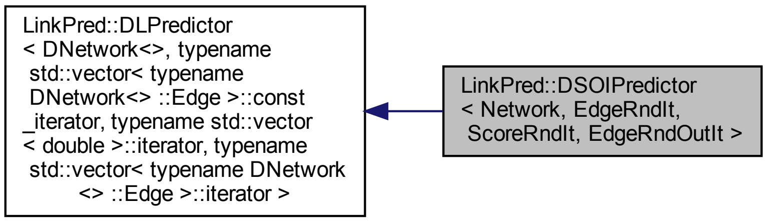
Common neighbor link predictor adapted to directed networks.

```
#include <dsoipredictor.hpp>
```

Inheritance diagram for LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DSOIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::DLPredictor < DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename DNetwork <> ::Edge >::iterator >
LinkPred::DSOIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- DSOIPredictor (std::shared_ptr< Network const > net)
- DSOIPredictor (DSOIPredictor const &that)=default
- DSOIPredictor & operator= (DSOIPredictor const &that)=default
- DSOIPredictor (DSOIPredictor &&that)=default
- DSOIPredictor & operator= (DSOIPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ~DSOIPredictor ()=default

Additional Inherited Members

9.27.1 Detailed Description

template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
class LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Common neighbor link predictor adapted to directed networks.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.27.2 Constructor & Destructor Documentation

9.27.2.1 DSOIPredictor() [1/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DSOIPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.27.2.2 DSOIPredictor() [2/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DSOIPredictor (
            DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.27.2.3 DSOIPredictor() [3/3]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::DSOIPredictor (
            DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.27.2.4 ∼DSOIPredictor()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼DSOIPredictor
( )  [virtual], [default]
```

Destructor.

9.27.3 Member Function Documentation

9.27.3.1 init()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.27.3.2 learn()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [inline], [virtual]
```

Learn.

Implements LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterator, typena

9.27.3.3 operator=() [1/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DSOIPredictor& LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.27.3.4 operator=() [2/2]

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
DSOIPredictor& LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.27.3.5 predict()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

9.27.3.6 score()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.27.3.7 top()

```
template<typename Network = DNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::DLPredictor< DNetwork<>, typename std::vector< typename DNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

- include/linkpred/predictors/directed/dsoipredictor.hpp

9.28 LinkPred::Simp::Evaluator::Factory::ECLParams Struct Reference

Parameters of ECL.

```
#include <evaluator.hpp>
```

Public Attributes

- std::string encoderName = "N2V"
- std::string classifierName = "LGR"
- int dim = 0
- double posRatio = 1.0
- double negRatio = 1.0
- long int seed = 0

9.28.1 Detailed Description

Parameters of ECL.

9.28.2 Member Data Documentation

9.28.2.1 classifierName

```
std::string LinkPred::Simp::Evaluator::Factory::ECLParams::classifierName = "LGR"
```

The name of the classifier. Possible values are: DTP (simple dot poroduct between the features), FFN (feed-forward neural network with default architecture), LSVM (linear SVM), LGR (logistic regression), NVB (naive Bayes). All classifiers except logistic regression requirte compilation with mlpack.

9.28.2.2 dim

```
int LinkPred::Simp::Evaluator::Factory::ECLParams::dim = 0
```

The dimension of the embedding space. If set to zero, the default value is used (the default dimension depends on the encoder).

9.28.2.3 encoderName

```
std::string LinkPred::Simp::Evaluator::Factory::ECLParams::encoderName = "N2V"
```

The name of the encoder. Possible values are: DPW (DeepWalk), HMSM (Hidden Metric Space Model), LVS (LargeVis), LEM (Laplacian Eigenmaps), LIN (LINE), LLE (Locally Linear Embedding), MFC (Matrix Factorization) and N2V (Node2Vec).

9.28.2.4 negRatio

```
double LinkPred::Simp::Evaluator::Factory::ECLParams::negRatio = 1.0
```

Ratio of negative edges used in the training of the classifier.

9.28.2.5 posRatio

```
double LinkPred::Simp::Evaluator::Factory::ECLParams::posRatio = 1.0
```

Ratio of positive edges used in the training of the classifier.

9.28.2.6 seed

```
long int LinkPred::Simp::Evaluator::Factory::ECLParams::seed = 0
```

Seed of the random number generator.

The documentation for this struct was generated from the following file:

- include/linkpred/simp/evaluator.hpp

9.29 LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType > Class Template Reference

An edge map.

```
#include <unetwork.hpp>
```

Public Types

- using EdgeMapIt = typename std::map< Edge, ValueType >::iterator
- using EdgeMapConstIt = typename std::map< Edge, ValueType >::const_iterator

Public Member Functions

- EdgeMap (EdgeMap const &that)=default
- EdgeMap & operator= (EdgeMap const &that)=default
- EdgeMap (EdgeMap &&that)=default
- EdgeMap & operator= (EdgeMap &&that)=default
- ValueType operator[ ] (Edge const &e) const
- ValueType & operator[ ] (Edge const &e)
- ValueType at (Edge const &e) const
- EdgeMapConstIt find (Edge const &e) const
- EdgeMapIt find (Edge const &e)
- EdgeMapIt begin ()
- EdgeMapIt end ()
- EdgeMapConstIt cbegin () const
- EdgeMapConstIt cend () const
- std::size_t size ()
- ∼EdgeMap ()=default

Friends

- class **UNetwork**

9.29.1 Detailed Description

template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
template<typename ValueType>
class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >

An edge map.

This class can be used to assign a value to every edge in the network. Access to values is done in logarithmic time.

Template Parameters

ValueType	Type of mapped values.

9.29.2 Member Typedef Documentation

9.29.2.1 EdgeMapConstIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::EdgeMapConstIt =
typename std::map<Edge,ValueType>::const_iterator
```

A constant iterator on the map values.

9.29.2.2 EdgeMapIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::EdgeMapIt = typename
std::map<Edge, ValueType>::iterator
```

Iterator on the map values.

9.29.3 Constructor & Destructor Documentation

9.29.3.1 EdgeMap() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::EdgeMap (
             EdgeMap< ValueType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.29.3.2 EdgeMap() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::EdgeMap (
             EdgeMap< ValueType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.29.3.3 ∼EdgeMap()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::∼EdgeMap ( )  [default]
```

Destructor.

9.29.4 Member Function Documentation

9.29.4.1 at()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::at (
             Edge const & e ) const  [inline]
```

Parameters

e	An edge.

Returns

The value associated with the edge e.

9.29.4.2 begin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMapIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::begin ( )  [inline]
```

Returns

An iterator to the first element in the map.

9.29.4.3 cbegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMapConstIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::cbegin ( )
const  [inline]
```

Returns

A constant iterator to the first element in the map.

9.29.4.4 cend()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMapConstIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::cend ( )
const  [inline]
```

Returns

A constant iterator to one-past-the-last element in the map.

9.29.4.5 end()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMapIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::end ( )  [inline]
```

Returns

An iterator to one-past-the-last element in the map.

9.29.4.6 find() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMapIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::find (
             Edge const & e )  [inline]
```

Parameters

e	An edge.

Returns

Searches and return an iterator to the edge e and its value.

9.29.4.7 find() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMapConstIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::find (
             Edge const & e ) const  [inline]
```

Parameters

e	An edge.

Returns

Searches and return a const iterator to the edge e and its value.

9.29.4.8 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMap& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::operator= (
             EdgeMap< ValueType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.29.4.9 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMap& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::operator= (
             EdgeMap< ValueType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.29.4.10 operator[]() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::operator[] (
             Edge const & e )  [inline]
```

Parameters

e	An edge.

Returns

A reference to the value associated with the edge e.

9.29.4.11 operator[]() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::operator[] (
            Edge const & e ) const [inline]
```

Parameters

e	An edge.

Returns

The value associated with the edge e.

9.29.4.12 size()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::size ( )
[inline]
```

Returns

The size of the map.

The documentation for this class was generated from the following file:

- include/linkpred/core/unetwork/unetwork.hpp

9.30 LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType > Class Template Reference

An edge map.

```
#include <dnetwork.hpp>
```

Public Types

- using EdgeMapIt = typename std::map< Edge, ValueType >::iterator
- using EdgeMapConstIt = typename std::map< Edge, ValueType >::const_iterator

Public Member Functions

- EdgeMap (EdgeMap const &that)=default
- EdgeMap & operator= (EdgeMap const &that)=default
- EdgeMap (EdgeMap &&that)=default
- EdgeMap & operator= (EdgeMap &&that)=default
- ValueType operator[ ] (Edge const &e) const
- ValueType & operator[ ] (Edge const &e)
- ValueType at (Edge const &e) const
- EdgeMapConstIt find (Edge const &e) const
- EdgeMapIt find (Edge const &e)
- EdgeMapIt begin ()
- EdgeMapIt end ()
- EdgeMapConstIt cbegin () const
- EdgeMapConstIt cend () const
- std::size_t size ()
- ∼EdgeMap ()=default

Friends

- class **DNetwork**

9.30.1 Detailed Description

template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
template<typename ValueType>
class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >

An edge map.

This class can be used to assign a value to every edge in the network. Access to values is done in logarithmic time.

Template Parameters

ValueType	Type of mapped values.

9.30.2 Member Typedef Documentation

9.30.2.1 EdgeMapConstIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::EdgeMapConstIt =
typename std::map<Edge,ValueType>::const_iterator
```

A constant iterator on the map values.

9.30.2.2 EdgeMapIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::EdgeMapIt = typename
std::map<Edge, ValueType>::iterator
```

Iterator on the map values.

9.30.3 Constructor & Destructor Documentation

9.30.3.1 EdgeMap() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::EdgeMap (
             EdgeMap< ValueType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.30.3.2 EdgeMap() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::EdgeMap (
             EdgeMap< ValueType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.30.3.3 ∼EdgeMap()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::~EdgeMap ( )  [default]
```

Destructor.

9.30.4 Member Function Documentation

9.30.4.1 at()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::at (
            Edge const & e ) const  [inline]
```

Parameters

e	An edge.

Returns

The value associated with the edge e.

9.30.4.2 begin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMapIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::begin ( )  [inline]
```

Returns

An iterator to the first element in the map.

9.30.4.3 cbegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMapConstIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::cbegin ( )
const  [inline]
```

Returns

A constant iterator to the first element in the map.

9.30.4.4 cend()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMapConstIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::cend ( )
const  [inline]
```

Returns

A constant iterator to one-past-the-last element in the map.

9.30.4.5 end()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMapIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::end ( )  [inline]
```

Returns

An iterator to one-past-the-last element in the map.

9.30.4.6 find() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMapIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::find (
             Edge const & e )  [inline]
```

Parameters

e	An edge.

Returns

Searches and return an iterator to the edge e and its value.

9.30.4.7 find() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
```

```
template<typename ValueType >
EdgeMapConstIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::find (
            Edge const & e ) const [inline]
```

Parameters

e	An edge.

Returns

Searches and return a const iterator to the edge e and its value.

9.30.4.8 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMap& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::operator= (
            EdgeMap< ValueType > && that ) [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.30.4.9 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
EdgeMap& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::operator= (
            EdgeMap< ValueType > const & that ) [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.30.4.10 operator[]() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::operator[] (
             Edge const & e )  [inline]
```

Parameters

e	An edge.

Returns

A reference to the value associated with the edge e.

9.30.4.11 operator[]() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::operator[] (
             Edge const & e ) const  [inline]
```

Parameters

e	An edge.

Returns

The value associated with the edge e.

9.30.4.12 size()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >::size ( )
[inline]
```

Returns

The size of the map.

The documentation for this class was generated from the following file:

- include/linkpred/core/dnetwork/dnetwork.hpp

9.31 LinkPred::Utils::EdgeScore< Label > Struct Template Reference

A structure to store the score of an edge.

```
#include <miscutils.hpp>
```

Public Attributes

- Label i
- Label j
- double score

9.31.1 Detailed Description

template<typename Label = std::string>
struct LinkPred::Utils::EdgeScore< Label >

A structure to store the score of an edge.

Template Parameters

Label	The label type.

9.31.2 Member Data Documentation

9.31.2.1 i

```
template<typename Label = std::string>
Label LinkPred::Utils::EdgeScore< Label >::i
```

The start node.

9.31.2.2 j

```
template<typename Label = std::string>
Label LinkPred::Utils::EdgeScore< Label >::j
```

The end node.

9.31.2.3 score

```
template<typename Label = std::string>
double LinkPred::Utils::EdgeScore< Label >::score
```

The score.

The documentation for this struct was generated from the following file:

- include/linkpred/utils/miscutils.hpp

9.32 LinkPred::Simp::EdgeScore Struct Reference

A structure to store the score of an edge.

```
#include <edgescore.hpp>
```

Public Attributes

- std::string i
- std::string j
- double score

9.32.1 Detailed Description

A structure to store the score of an edge.

9.32.2 Member Data Documentation

9.32.2.1 i

```
std::string LinkPred::Simp::EdgeScore::i
```

The label of the start node.

9.32.2.2 j

```
std::string LinkPred::Simp::EdgeScore::j
```

The label of the end node.

9.32.2.3 score

```
double LinkPred::Simp::EdgeScore::score
```

The score.

The documentation for this struct was generated from the following file:

- include/linkpred/simp/edgescore.hpp

9.33 LinkPred::Simp::EdgeScoreByID Struct Reference

A structure to store the score of an edge. The node IDs are used instead of labels.

```
#include <edgescore.hpp>
```

Public Attributes

- int i
- int j
- double score

9.33.1 Detailed Description

A structure to store the score of an edge. The node IDs are used instead of labels.

This is useful for reducing memory consumption for large networks.

9.33.2 Member Data Documentation

9.33.2.1 i

```
int LinkPred::Simp::EdgeScoreByID::i
```

The ID of the start node.

9.33.2.2 j

```
int LinkPred::Simp::EdgeScoreByID::j
```

The ID of the end node.

9.33.2.3 score

```
double LinkPred::Simp::EdgeScoreByID::score
```

The score.

The documentation for this struct was generated from the following file:

- include/linkpred/simp/edgescore.hpp

9.34 LinkPred::Encoder< Network > Class Template Reference

The interface of a network encoder.

```
#include <encoder.hpp>
```

Public Types

- using NodeID = typename Network::NodeID
- using Edge = typename Network::Edge
- using CodeMap = typename Network::template NodeMap< Vec >
- using CodeMapSP = typename Network::template NodeMapSP< Vec >
- using WeightMap = typename Network::template EdgeMap< double >
- using WeightMapSP = typename Network::template EdgeMapSP< double >

Public Member Functions

- Encoder (std::shared_ptr< Network const > net)
- Encoder (Encoder const &that)=default
- Encoder & operator= (Encoder const &that)=default
- Encoder (Encoder &&that)=default
- Encoder & operator= (Encoder &&that)=default
- virtual void init ()=0
- virtual void encode ()=0
- CodeMapSP getNodeCodeMap ()
- Vec getNodeCode (NodeID const &i)
- virtual Vec getEdgeCode (NodeID const &i, NodeID const &j)
- Vec getEdgeCode (Edge const &e)
- virtual int getEdgeCodeDim () const
- int getDim () const
- void setDim (int dim)
- const std::string & getName () const
- void setName (const std::string &name)
- const WeightMapSP & getWeightMap () const
- virtual void setWeightMap (const WeightMapSP &weightMap)
- virtual ∼Encoder ()=default

9.34.1 Detailed Description

template<typename Network = UNetwork<>>
class LinkPred::Encoder< Network >

The interface of a network encoder.

Template Parameters

Network	The network type.

9.34.2 Member Typedef Documentation

9.34.2.1 CodeMap

```
template<typename Network = UNetwork<>>
using LinkPred::Encoder< Network >::CodeMap = typename Network::template NodeMap<Vec>
```

Code map type.

9.34.2.2 CodeMapSP

```
template<typename Network = UNetwork<>>
using LinkPred::Encoder< Network >::CodeMapSP = typename Network::template NodeMapSP<Vec>
```

Shared pointer to a code map.

9.34.2.3 Edge

```
template<typename Network = UNetwork<>>
using LinkPred::Encoder< Network >::Edge = typename Network::Edge
```

Edge type.

9.34.2.4 NodeID

```
template<typename Network = UNetwork<>>
using LinkPred::Encoder< Network >::NodeID = typename Network::NodeID
```

Node ID type.

9.34.2.5 WeightMap

```
template<typename Network = UNetwork<>>
using LinkPred::Encoder< Network >::WeightMap = typename Network::template EdgeMap<double>
```

Edge weight map type.

9.34.2.6 WeightMapSP

```
template<typename Network = UNetwork<>>
using LinkPred::Encoder< Network >::WeightMapSP = typename Network::template EdgeMapSP<double>
```

Shared pointer to an edge weight map.

9.34.3 Constructor & Destructor Documentation

9.34.3.1 Encoder() [1/3]

```
template<typename Network = UNetwork<>>
LinkPred::Encoder< Network >::Encoder (
            std::shared_ptr< Network const > net )  [inline]
```

Constructor.

Parameters

net	The network.

9.34.3.2 Encoder() [2/3]

```
template<typename Network = UNetwork<>>
LinkPred::Encoder< Network >::Encoder (
            Encoder< Network > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.34.3.3 Encoder() [3/3]

```
template<typename Network = UNetwork<>>
LinkPred::Encoder< Network >::Encoder (
            Encoder< Network > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.34.3.4 ∼Encoder()

```
template<typename Network = UNetwork<>>
virtual LinkPred::Encoder< Network >::∼Encoder ( )  [virtual], [default]
```

Destructor.

9.34.4 Member Function Documentation

9.34.4.1 encode()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::Encoder< Network >::encode ( )  [pure virtual]
```

Encode the network.

Implemented in LinkPred::LINE< Network >, LinkPred::Node2Vec< Network >, LinkPred::DeepWalk< Network >, LinkPred::LargeVis< Network >, LinkPred::MatFact< Network >, and LinkPred::HMSM< Network >.

9.34.4.2 getDim()

```
template<typename Network = UNetwork<>>
int LinkPred::Encoder< Network >::getDim ( ) const  [inline]
```

Returns

The dimension of the embedding (node embedding).

9.34.4.3 getEdgeCode() [1/2]

```
template<typename Network = UNetwork<>>
Vec LinkPred::Encoder< Network >::getEdgeCode (
             Edge const & e )  [inline]
```

Shortcut for the previous method.

Parameters

e	The edge.

Returns

The encoding of e.

9.34.4.4 getEdgeCode() [2/2]

```
template<typename Network = UNetwork<>>
virtual Vec LinkPred::Encoder< Network >::getEdgeCode (
            NodeID const & i,
            NodeID const & j )  [inline], [virtual]
```

Return the code of given edge. This is a default implementation that simply concatenates the two node codes. Sub-classes can override this implementation and provide a more complex one.

Parameters

i	The start node ID.
j	The end node ID.

Returns

The encoding of edge (i,j).

9.34.4.5 getEdgeCodeDim()

```
template<typename Network = UNetwork<>>
virtual int LinkPred::Encoder< Network >::getEdgeCodeDim ( ) const  [inline], [virtual]
```

This corresponds to the default edge encoding (see the method getEdgeCode).

Returns

The dimension of the edge codes.

9.34.4.6 getName()

```
template<typename Network = UNetwork<>>
const std::string& LinkPred::Encoder< Network >::getName ( ) const  [inline]
```

Returns

The name of the encoder.

9.34.4.7 getNodeCode()

```
template<typename Network = UNetwork<>>
Vec LinkPred::Encoder< Network >::getNodeCode (
            NodeID const & i )  [inline]
```

Return the code of given node.

Parameters

i	The node ID.

Returns

The encoding of node i.

9.34.4.8 getNodeCodeMap()

```
template<typename Network = UNetwork<>>
CodeMapSP LinkPred::Encoder< Network >::getNodeCodeMap ( )  [inline]
```

Return the encoding of all nodes in the network.

Returns

The network encoding in the form of a node map.

9.34.4.9 getWeightMap()

```
template<typename Network = UNetwork<>>
const WeightMapSP& LinkPred::Encoder< Network >::getWeightMap ( ) const  [inline]
```

Returns

The edge weight map.

9.34.4.10 init()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::Encoder< Network >::init ( )  [pure virtual]
```

Initialize encoder.

Implemented in LinkPred::LINE< Network >, LinkPred::Node2Vec< Network >, LinkPred::DeepWalk< Network >, LinkPred::LargeVis< Network >, LinkPred::MatFact< Network >, and LinkPred::HMSM< Network >.

9.34.4.11 operator=() [1/2]

```
template<typename Network = UNetwork<>>
Encoder& LinkPred::Encoder< Network >::operator= (
            Encoder< Network > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.34.4.12 operator=() [2/2]

```
template<typename Network = UNetwork<>>
Encoder& LinkPred::Encoder< Network >::operator= (
             Encoder< Network > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.34.4.13 setDim()

```
template<typename Network = UNetwork<>>
void LinkPred::Encoder< Network >::setDim (
             int dim )  [inline]
```

Set the dimension of the embedding (node embedding).

Parameters

dim	The dimension of the embedding (node embedding).

9.34.4.14 setName()

```
template<typename Network = UNetwork<>>
void LinkPred::Encoder< Network >::setName (
             const std::string & name )  [inline]
```

Set the name of the encoder.

Parameters

name	The new name of the encoder.

9.34.4.15 setWeightMap()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::Encoder< Network >::setWeightMap (
             const WeightMapSP & weightMap )  [inline], [virtual]
```

Set The edge weight map.

Parameters

weightMap	The edge weight map.

Reimplemented in LinkPred::Node2Vec< Network >, LinkPred::DeepWalk< Network >, LinkPred::MatFact< Network >, and LinkPred::HMSM< Network >.

The documentation for this class was generated from the following file:

- include/linkpred/graphalg/encoders/encoder.hpp

9.35 LinkPred::Simp::Evaluator::Factory::ESMParams Struct Reference

Parameters of ESM.

```
#include <evaluator.hpp>
```

Public Attributes

- std::string encoderName = "N2V"
- std::string simMeasureName = "L2"
- int dim = 0
- long int seed = 0

9.35.1 Detailed Description

Parameters of ESM.

9.35.2 Member Data Documentation

9.35.2.1 dim

```
int LinkPred::Simp::Evaluator::Factory::ESMParams::dim = 0
```

The dimension of the embedding space. If set to zero, the default value is used (the default dimension depends on the encoder).

9.35.2.2 encoderName

```
std::string LinkPred::Simp::Evaluator::Factory::ESMParams::encoderName = "N2V"
```

The name of the encoder. Possible values are: DPW (DeepWalk), HMSM (Hidden Metric Space Model), LVS (LargeVis), LEM (Laplacian Eigenmaps), LIN (LINE), LLE (Locally Linear Embedding), MFC (Matrix Factorization) and N2V (Node2Vec).

9.35.2.3 seed

```
long int LinkPred::Simp::Evaluator::Factory::ESMParams::seed = 0
```

Seed of the random number generator.

9.35.2.4 simMeasureName

```
std::string LinkPred::Simp::Evaluator::Factory::ESMParams::simMeasureName = "L2"
```

The name of the similarity measure. Possible values are: CSM (cosine similarity), DTP (dot product), L1 (L1 similarity), L2 (L2 similarity), PRS (Pearson similarity).

The documentation for this struct was generated from the following file:

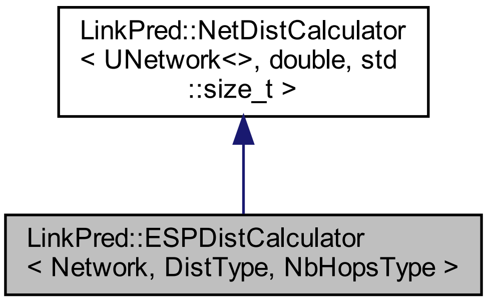
- include/linkpred/simp/evaluator.hpp

9.36 LinkPred::ESPDistCalculator< Network, DistType, NbHopsType > Class Template Reference

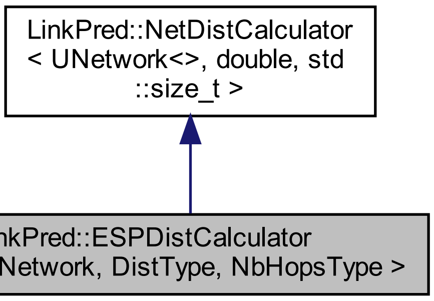
Exact shortest path distance calculator.

```
#include <netdistcalculator.hpp>
```

Inheritance diagram for LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >:


LinkPred::NetDistCalculator < UNetwork<>, double, std ::size_t >
LinkPred::ESPDistCalculator < Network, DistType, NbHopsType >

Collaboration diagram for LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >:


LinkPred::NetDistCalculator < UNetwork<>, double, std ::size_t >
LinkPred::ESPDistCalculator < Network, DistType, NbHopsType >

Public Types

- using LengthMapIdType = typename NetDistCalculator< Network, DistType, NbHopsType >↩ ::LengthMapIdType
- using NetworkSP = typename NetDistCalculator< Network, DistType, NbHopsType >::NetworkSP
- using NodeID = typename NetDistCalculator< Network, DistType, NbHopsType >::NodeID
- using Label = typename NetDistCalculator< Network, DistType, NbHopsType >::Label
- using Edge = typename NetDistCalculator< Network, DistType, NbHopsType >::Edge
- using NodeDistMap = typename NetDistCalculator< Network, DistType, NbHopsType >::NodeDistMap
- using NodeDistMapSP = typename NetDistCalculator< Network, DistType, NbHopsType >::NodeDistMapSP
- using EdgeLengthMap = typename NetDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMap
- using EdgeLengthMapSP = typename NetDistCalculator< Network, DistType, NbHopsType >↩ ::EdgeLengthMapSP

Public Member Functions

- ESPDistCalculator (Dijkstra< Network, DistType, NbHopsType > &dijkstra, EdgeLengthMapSP length, CacheLevel cacheLevel=CacheLevel::NetworkCache)
- ESPDistCalculator (ESPDistCalculator const &that)=default
- ESPDistCalculator & operator= (ESPDistCalculator const &that)=default
- ESPDistCalculator (ESPDistCalculator &&that)=default
- ESPDistCalculator & operator= (ESPDistCalculator &&that)=default
- virtual std::pair< DistType, NbHopsType > getDist (NodeID const &i, NodeID const &j)
- virtual NodeDistMapSP getDist (NodeID const &i)
- virtual std::pair< DistType, NbHopsType > getIndDist (NodeID const &i, NodeID const &j)
- std::size_t getCacheHits () const
- std::size_t getCacheMiss () const
- virtual ∼ESPDistCalculator ()

9.36.1 Detailed Description

template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType = std::size_t>
class LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >

Exact shortest path distance calculator.

This class offers an additional layer over Dijkstra which provides memory management functionalities by caching computed distances.

Template Parameters

Network	The network type.
DistType	The distance type (can be an integer or floating point type).
NbHopsType	The type of the number of hops (must be an integer type).

9.36.2 Member Typedef Documentation

9.36.2.1 Edge

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::Edge = typename NetDistCalculator<Network
DistType, NbHopsType>::Edge
```

Edge type.

9.36.2.2 EdgeLengthMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMap = typename
NetDistCalculator<Network, DistType, NbHopsType>::EdgeLengthMap
```

Edge length map.

9.36.2.3 EdgeLengthMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMapSP = typename
NetDistCalculator<Network, DistType, NbHopsType>::EdgeLengthMapSP
```

Shared pointer to an edge length map.

9.36.2.4 Label

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::Label = typename NetDistCalculator<Netwo
DistType, NbHopsType>::Label
```

Nodes label type.

9.36.2.5 LengthMapIdType

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::LengthMapIdType = typename
NetDistCalculator<Network, DistType, NbHopsType>::LengthMapIdType
```

Length map ID type.

9.36.2.6 NetworkSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::NetworkSP = typename
NetDistCalculator<Network, DistType, NbHopsType>::NetworkSP
```

Shared pointer to network.

9.36.2.7 NodeDistMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::NodeDistMap = typename
NetDistCalculator<Network, DistType, NbHopsType>::NodeDistMap
```

Distance map.

9.36.2.8 NodeDistMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::NodeDistMapSP = typename
NetDistCalculator<Network, DistType, NbHopsType>::NodeDistMapSP
```

Shared pointer to a distance map.

9.36.2.9 NodeID

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::NodeID = typename NetDistCalculator<Netwo
DistType, NbHopsType>::NodeID
```

Nodes ID type.

9.36.3 Constructor & Destructor Documentation

9.36.3.1 ESPDistCalculator() [1/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::ESPDistCalculator (
            Dijkstra< Network, DistType, NbHopsType > & dijkstra,
            EdgeLengthMapSP length,
            CacheLevel cacheLevel = CacheLevel::NetworkCache )  [inline]
```

Constructor.

Parameters

dijkstra	A Dijkstra algorithm object.
length	The length map.
cacheLevel	The cache level.

9.36.3.2 ESPDistCalculator() [2/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::ESPDistCalculator (
            ESPDistCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.36.3.3 ESPDistCalculator() [3/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::ESPDistCalculator (
            ESPDistCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.36.3.4 ∼ESPDistCalculator()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::∼ESPDistCalculator ( )
[inline], [virtual]
```

Destructor.

9.36.4 Member Function Documentation

9.36.4.1 getCacheHits()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::size_t LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::getCacheHits ( )
const  [inline]
```

Returns

The number of cache hits.

9.36.4.2 getCacheMiss()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::size_t LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::getCacheMiss ( )
const  [inline]
```

Returns

The number of cache misses.

9.36.4.3 getDist() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual NodeDistMapSP LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::getDist (
            NodeID const & i )  [virtual]
```

Parameters

i	Source node.

Returns

The distance from i to all other nodes.

9.36.4.4 getDist() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DistType, NbHopsType> LinkPred::ESPDistCalculator< Network, DistType, Nb↩
HopsType >::getDist (
            NodeID const & i,
            NodeID const & j )  [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j.

9.36.4.5 getIndDist()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DistType, NbHopsType> LinkPred::ESPDistCalculator< Network, DistType, Nb↩
HopsType >::getIndDist (
            NodeID const & i,
            NodeID const & j )  [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j ignoring the edge between i and j.

9.36.4.6 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
ESPDistCalculator& LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::operator= (
            ESPDistCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.36.4.7 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
ESPDistCalculator& LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >::operator= (
            ESPDistCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

The documentation for this class was generated from the following file:

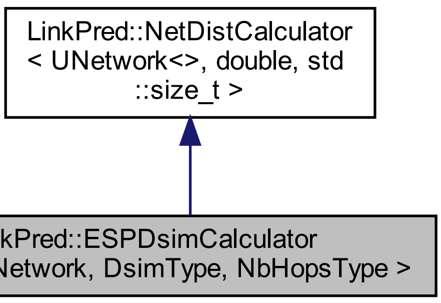
- include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp

9.37 LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType > Class Template Reference

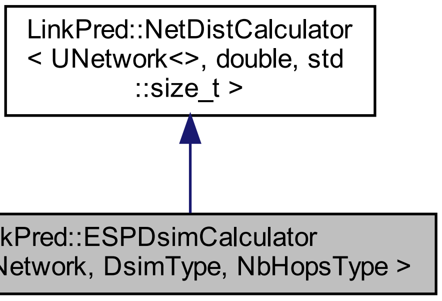
Exact shortest path dissimilarity calculator.

```
#include <netdistcalculator.hpp>
```

Inheritance diagram for LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >:


LinkPred::NetDistCalculator
< UNetwork<>, double, std
::size_t >
LinkPred::ESPDsimCalculator
< Network, DsimType, NbHopsType >

Collaboration diagram for LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >:


LinkPred::NetDistCalculator
< UNetwork<>, double, std
::size_t >
LinkPred::ESPDsimCalculator
< Network, DsimType, NbHopsType >

Public Types

- using LengthMapIdType = typename NetDistCalculator< Network, DsimType, NbHopsType >↩ ::LengthMapIdType
- using NetworkSP = typename NetDistCalculator< Network, DsimType, NbHopsType >::NetworkSP
- using NodeID = typename NetDistCalculator< Network, DsimType, NbHopsType >::NodeID
- using Label = typename NetDistCalculator< Network, DsimType, NbHopsType >::Label
- using Edge = typename NetDistCalculator< Network, DsimType, NbHopsType >::Edge
- using NodeDsimMap = typename NetDistCalculator< Network, DsimType, NbHopsType >::NodeDistMap
- using NodeDsimMapSP = typename NetDistCalculator< Network, DsimType, NbHopsType >↩ ::NodeDistMapSP
- using EdgeLengthMap = typename NetDistCalculator< Network, DsimType, NbHopsType >::EdgeLengthMap
- using EdgeLengthMapSP = typename NetDistCalculator< Network, DsimType, NbHopsType >↩ ::EdgeLengthMapSP

Public Member Functions

- ESPDsimCalculator (Dijkstra< Network, DsimType, NbHopsType > &dijkstra, EdgeLengthMapSP length, CacheLevel cacheLevel=CacheLevel::NodeCache)
- ESPDsimCalculator (ESPDsimCalculator const &that)=default
- ESPDsimCalculator & operator= (ESPDsimCalculator const &that)=default
- ESPDsimCalculator (ESPDsimCalculator &&that)=default
- ESPDsimCalculator & operator= (ESPDsimCalculator &&that)=default
- virtual std::pair< DsimType, NbHopsType > getDist (NodeID const &i, NodeID const &j)
- virtual std::pair< DsimType, NbHopsType > getIndDist (NodeID const &i, NodeID const &j)
- virtual NodeDsimMapSP getDist (NodeID const &i)
- virtual ∼ESPDsimCalculator ()

9.37.1 Detailed Description

template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType = std::size_t>
class LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >

Exact shortest path dissimilarity calculator.

Template Parameters

Network	The network type.
DistType	The distance type (can be an integer or floating point type).
NbHopsType	The type of the number of hops (must be an integer type).

9.37.2 Member Typedef Documentation

9.37.2.1 Edge

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::Edge = typename NetDistCalculator<Network
DsimType, NbHopsType>::Edge
```

Edge type.

9.37.2.2 EdgeLengthMap

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::EdgeLengthMap = typename
NetDistCalculator<Network, DsimType, NbHopsType>::EdgeLengthMap
```

Edge length map.

9.37.2.3 EdgeLengthMapSP

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::EdgeLengthMapSP = typename
NetDistCalculator<Network, DsimType, NbHopsType>::EdgeLengthMapSP
```

Shared pointer to an edge length map.

9.37.2.4 Label

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::Label = typename NetDistCalculator<Netwo
DsimType, NbHopsType>::Label
```

Nodes label type.

9.37.2.5 LengthMapIdType

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::LengthMapIdType = typename
NetDistCalculator<Network, DsimType, NbHopsType>::LengthMapIdType
```

Length map ID type.

9.37.2.6 NetworkSP

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::NetworkSP = typename
NetDistCalculator<Network, DsimType, NbHopsType>::NetworkSP
```

Shared pointer to network.

9.37.2.7 NodeDsimMap

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::NodeDsimMap = typename
NetDistCalculator<Network, DsimType, NbHopsType>::NodeDistMap
```

Dissimilarity map.

9.37.2.8 NodeDsimMapSP

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::NodeDsimMapSP = typename
NetDistCalculator<Network, DsimType, NbHopsType>::NodeDistMapSP
```

Shared pointer to a Dissimilarity map.

9.37.2.9 NodeID

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::NodeID = typename NetDistCalculator<Netwo
DsimType, NbHopsType>::NodeID
```

Nodes ID type.

9.37.3 Constructor & Destructor Documentation

9.37.3.1 ESPDsimCalculator() [1/3]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::ESPDsimCalculator (
            Dijkstra< Network, DsimType, NbHopsType > & dijkstra,
            EdgeLengthMapSP length,
            CacheLevel cacheLevel = CacheLevel::NodeCache )  [inline]
```

Constructor.

Parameters

dijkstra	A Dijkstra algorithm object.
length	The length map.
cacheLevel	The cache level.

9.37.3.2 ESPDsimCalculator() [2/3]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::ESPDsimCalculator (
            ESPDsimCalculator< Network, DsimType, NbHopsType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.37.3.3 ESPDsimCalculator() [3/3]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::ESPDsimCalculator (
            ESPDsimCalculator< Network, DsimType, NbHopsType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.37.3.4 ∼ESPDsimCalculator()

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
virtual LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::∼ESPDsimCalculator ( )
[inline], [virtual]
```

Destructor.

9.37.4 Member Function Documentation

9.37.4.1 getDist() [1/2]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
virtual NodeDsimMapSP LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::getDist (
            NodeID const & i )  [virtual]
```

Parameters

i	Source node.

Returns

The distance from i to all other nodes.

9.37.4.2 getDist() [2/2]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DsimType, NbHopsType> LinkPred::ESPDsimCalculator< Network, DsimType, Nb←↩
HopsType >::getDist (
            NodeID const & i,
            NodeID const & j )  [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j.

9.37.4.3 getIndDist()

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DsimType, NbHopsType> LinkPred::ESPDsimCalculator< Network, DsimType, Nb←↩
HopsType >::getIndDist (
            NodeID const & i,
            NodeID const & j )  [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j ignoring the edge between i and j.

9.37.4.4 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
ESPDsimCalculator& LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::operator= (
            ESPDsimCalculator< Network, DsimType, NbHopsType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.37.4.5 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename DsimType = double, typename NbHopsType =
std::size_t>
ESPDsimCalculator& LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >::operator= (
            ESPDsimCalculator< Network, DsimType, NbHopsType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

The documentation for this class was generated from the following file:

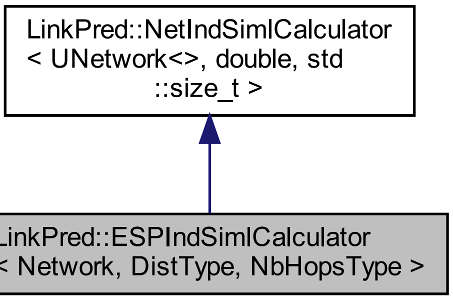
- include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp

9.38 LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType > Class Template Reference

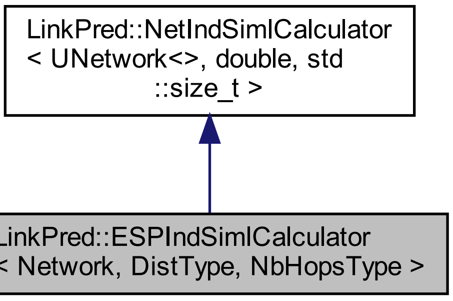
Exact shortest path distance calculator.

```
#include <netdistcalculator.hpp>
```

Inheritance diagram for LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >:


LinkPred::NetIndSimlCalculator
< UNetwork<>, double, std
::size_t >
LinkPred::ESPIndSimlCalculator
< Network, DistType, NbHopsType >

Collaboration diagram for LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >:


LinkPred::NetIndSimlCalculator
< UNetwork<>, double, std
::size_t >
LinkPred::ESPIndSimlCalculator
< Network, DistType, NbHopsType >

Public Types

- using LengthMapIdType = typename NetIndSimlCalculator< Network, DistType, NbHopsType >↩ ::LengthMapIdType
- using NetworkSP = typename NetIndSimlCalculator< Network, DistType, NbHopsType >::NetworkSP
- using NodeID = typename NetIndSimlCalculator< Network, DistType, NbHopsType >::NodeID
- using Label = typename NetIndSimlCalculator< Network, DistType, NbHopsType >::Label
- using Edge = typename NetIndSimlCalculator< Network, DistType, NbHopsType >::Edge
- using NodeDistMap = typename Network::template NodeMap< std::pair< DistType, NbHopsType > >
- using NodeDistMapSP = typename Network::template NodeMapSP< std::pair< DistType, NbHopsType > >
- using EdgeLengthMap = typename NetIndSimlCalculator< Network, DistType, NbHopsType >↩ ::EdgeLengthMap
- using EdgeLengthMapSP = typename NetIndSimlCalculator< Network, DistType, NbHopsType >↩ ::EdgeLengthMapSP

Public Member Functions

- ESPIndSimlCalculator (Dijkstra< Network, DistType, NbHopsType > &dijkstra, EdgeLengthMapSP length)
- ESPIndSimlCalculator (ESPIndSimlCalculator const &that)=default
- ESPIndSimlCalculator & operator= (ESPIndSimlCalculator const &that)=default
- ESPIndSimlCalculator (ESPIndSimlCalculator &&that)=default
- ESPIndSimlCalculator & operator= (ESPIndSimlCalculator &&that)=default
- virtual std::tuple< DistType, DistType, NbHopsType > getIndSiml (NodeID const &i, NodeID const &j)
- virtual std::tuple< DistType, DistType, NbHopsType > getDirIndSiml (NodeID const &i, NodeID const &j)
- virtual ∼ESPIndSimlCalculator ()

9.38.1 Detailed Description

template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType = std::size_t>
class LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >

Exact shortest path distance calculator.

This class offers an additional layer over Dijkstra which provides memory management functionalities by caching computed distances.

Template Parameters

Network	The network type.
DistType	The distance type (can be an integer or floating point type).
NbHopsType	The type of the number of hops (must be an integer type).

9.38.2 Member Typedef Documentation

9.38.2.1 Edge

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::Edge = typename NetIndSimlCalculator<N
DistType, NbHopsType>::Edge
```

Edge type.

9.38.2.2 EdgeLengthMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::EdgeLengthMap = typename
NetIndSimlCalculator<Network, DistType, NbHopsType>::EdgeLengthMap
```

Edge length map.

9.38.2.3 EdgeLengthMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::EdgeLengthMapSP =
typename NetIndSimlCalculator<Network, DistType, NbHopsType>::EdgeLengthMapSP
```

Shared pointer to an edge length map.

9.38.2.4 Label

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::Label = typename NetIndSimlCalculator<
DistType, NbHopsType>::Label
```

Nodes label type.

9.38.2.5 LengthMapIdType

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::LengthMapIdType =
typename NetIndSimlCalculator<Network, DistType, NbHopsType>::LengthMapIdType
```

Length map ID type.

9.38.2.6 NetworkSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::NetworkSP = typename
NetIndSimlCalculator<Network, DistType, NbHopsType>::NetworkSP
```

Shared pointer to network.

9.38.2.7 NodeDistMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::NodeDistMap = typename
Network::template NodeMap<std::pair<DistType, NbHopsType> >
```

Distance map.

9.38.2.8 NodeDistMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::NodeDistMapSP = typename
Network::template NodeMapSP<std::pair<DistType, NbHopsType> >
```

Shared pointer to a distance map.

9.38.2.9 NodeID

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::NodeID = typename
NetIndSimlCalculator<Network, DistType, NbHopsType>::NodeID
```

Nodes ID type.

9.38.3 Constructor & Destructor Documentation

9.38.3.1 ESPIndSimlCalculator() [1/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::ESPIndSimlCalculator (
             Dijkstra< Network, DistType, NbHopsType > & dijkstra,
             EdgeLengthMapSP length )  [inline]
```

Constructor.

Parameters

dijkstra	A Dijkstra algorithm object.
length	The length map.

9.38.3.2 ESPIndSimlCalculator() [2/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::ESPIndSimlCalculator (
             ESPIndSimlCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.38.3.3 ESPIndSimlCalculator() [3/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
```

```
LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::ESPIndSimlCalculator (
            ESPIndSimlCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.38.3.4 ∼ESPIndSimlCalculator()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::∼ESPIndSimlCalculator
( )  [inline], [virtual]
```

Destructor.

9.38.4 Member Function Documentation

9.38.4.1 getDirIndSiml()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::ESPIndSimlCalculator< Network,
DistType, NbHopsType >::getDirIndSiml (
            NodeID const & i,
            NodeID const & j )  [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The directed similarity between i and j ignoring the edge between i and j.

9.38.4.2 getIndSiml()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
```

```
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::ESPIndSimlCalculator< Network,
DistType, NbHopsType >::getIndSiml (
            NodeID const & i,
            NodeID const & j )  [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The similarity between i and j ignoring the edge between i and j.

9.38.4.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
ESPIndSimlCalculator& LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::operator=
(
            ESPIndSimlCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.38.4.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
ESPIndSimlCalculator& LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >::operator=
(
            ESPIndSimlCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

The documentation for this class was generated from the following file:

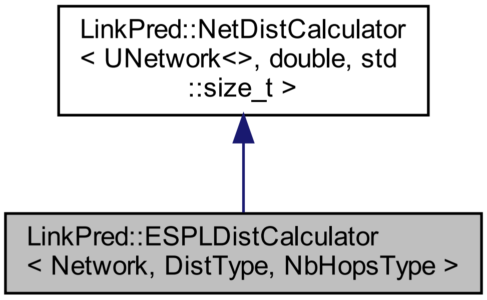
- include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp

9.39 LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType > Class Template Reference

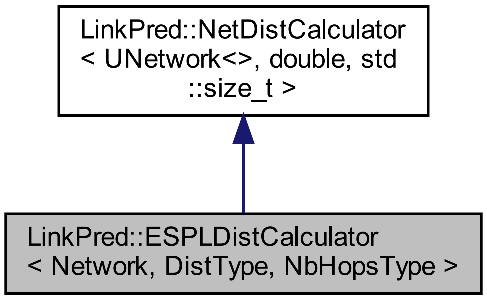
Exact shortest path distance calculator with limits on the number of hops.

```
#include <netdistcalculator.hpp>
```

Inheritance diagram for LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >:


LinkPred::NetDistCalculator
< UNetwork<>, double, std
::size_t >
LinkPred::ESPLDistCalculator
< Network, DistType, NbHopsType >

Collaboration diagram for LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >:


LinkPred::NetDistCalculator
< UNetwork<>, double, std
::size_t >
LinkPred::ESPLDistCalculator
< Network, DistType, NbHopsType >

Public Types

- using LengthMapIdType = typename NetDistCalculator< Network, DistType, NbHopsType >↩ ::LengthMapIdType
- using NetworkSP = typename NetDistCalculator< Network, DistType, NbHopsType >::NetworkSP
- using NodeID = typename NetDistCalculator< Network, DistType, NbHopsType >::NodeID
- using Label = typename NetDistCalculator< Network, DistType, NbHopsType >::Label
- using Edge = typename NetDistCalculator< Network, DistType, NbHopsType >::Edge

- using NodeDistMap = typename NetDistCalculator< Network, DistType, NbHopsType >::NodeDistMap
- using NodeDistMapSP = typename NetDistCalculator< Network, DistType, NbHopsType >::NodeDistMapSP
- using NodeSDistMap = typename Network::template NodeSMap< std::pair< DistType, NbHopsType > >
- using NodeSDistMapSP = typename Network::template NodeSMapSP< std::pair< DistType, NbHopsType > >
- using EdgeLengthMap = typename NetDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMap
- using EdgeLengthMapSP = typename NetDistCalculator< Network, DistType, NbHopsType >↩
::EdgeLengthMapSP

Public Member Functions

- ESPLDistCalculator (Dijkstra< Network, DistType, NbHopsType > &dijkstra, EdgeLengthMapSP length, std::size_t lim, CacheLevel cacheLevel=CacheLevel::NetworkCache)
- ESPLDistCalculator (ESPLDistCalculator const &that)=default
- ESPLDistCalculator & operator= (ESPLDistCalculator const &that)=default
- ESPLDistCalculator (ESPLDistCalculator &&that)=default
- ESPLDistCalculator & operator= (ESPLDistCalculator &&that)=default
- virtual std::pair< DistType, NbHopsType > getDist (NodeID const &i, NodeID const &j)
- virtual std::pair< DistType, NbHopsType > getIndDist (NodeID const &i, NodeID const &j)
- virtual NodeDistMapSP getDist (NodeID const &i)
- virtual NodeSDistMapSP getSDistMap (NodeID const &i)
- virtual NodeSDistMapSP getFinDistMapNoNeighb (NodeID const &srcNode)
- virtual std::pair< DistType, NbHopsType > getDist (Edge const &e)
- std::size_t getMaxNbNodesInCache () const
- void setMaxNbNodesInCache (std::size_t maxNbNodesInCache)
- std::size_t getLim () const
- virtual ∼ ESPLDistCalculator ()

9.39.1 Detailed Description

**template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType = std::size_t>
class LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >**

Exact shortest path distance calculator with limits on the number of hops.

This class offers an additional layer over Dijkstra which provides memory management functionalities by caching computed distances.

Template Parameters

Network	The network type.
DistType	The distance type (can be an integer or floating point type).
NbHopsType	The type of the number of hops (must be an integer type).

9.39.2 Member Typedef Documentation

9.39.2.1 Edge

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::Edge = typename NetDistCalculator<Networ
DistType, NbHopsType>::Edge
```

Edge type.

9.39.2.2 EdgeLengthMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMap = typename
NetDistCalculator<Network, DistType, NbHopsType>::EdgeLengthMap
```

Edge length map.

9.39.2.3 EdgeLengthMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMapSP = typename
NetDistCalculator<Network, DistType, NbHopsType>::EdgeLengthMapSP
```

Shared pointer to an edge length map.

9.39.2.4 Label

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::Label = typename NetDistCalculator<Netwo
DistType, NbHopsType>::Label
```

Nodes label type.

9.39.2.5 LengthMapIdType

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::LengthMapIdType = typename
NetDistCalculator<Network, DistType, NbHopsType>::LengthMapIdType
```

Length map ID type.

9.39.2.6 NetworkSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::NetworkSP = typename
NetDistCalculator<Network, DistType, NbHopsType>::NetworkSP
```

Shared pointer to network.

9.39.2.7 NodeDistMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::NodeDistMap = typename
NetDistCalculator<Network, DistType, NbHopsType>::NodeDistMap
```

Distance map.

9.39.2.8 NodeDistMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::NodeDistMapSP = typename
NetDistCalculator<Network, DistType, NbHopsType>::NodeDistMapSP
```

Shared pointer to a distance map.

9.39.2.9 NodeID

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::NodeID = typename NetDistCalculator<Netw
DistType, NbHopsType>::NodeID
```

Nodes ID type.

9.39.2.10 NodeSDistMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::NodeSDistMap = typename
Network::template NodeSMap<std::pair<DistType, NbHopsType> >
```

Distance map.

9.39.2.11 NodeSDistMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::NodeSDistMapSP = typename
Network::template NodeSMapSP<std::pair<DistType, NbHopsType> >
```

Shared pointer to a distance map.

9.39.3 Constructor & Destructor Documentation

9.39.3.1 ESPLDistCalculator() [1/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::ESPLDistCalculator (
            Dijkstra< Network, DistType, NbHopsType > & dijkstra,
            EdgeLengthMapSP length,
            std::size_t lim,
            CacheLevel cacheLevel = CacheLevel::NetworkCache )  [inline]
```

Constructor.

Parameters

dijkstra	A Dijkstra algorithm object.
length	The length map.
lim	Horizon limit.
cacheLevel	The cache level.

9.39.3.2 ESPLDistCalculator() [2/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::ESPLDistCalculator (
            ESPLDistCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.39.3.3 ESPLDistCalculator() [3/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::ESPLDistCalculator (
            ESPLDistCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.39.3.4 ∼ ESPLDistCalculator()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::∼ ESPLDistCalculator (
)  [inline], [virtual]
```

Destructor.

9.39.4 Member Function Documentation

9.39.4.1 getDist() [1/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DistType, NbHopsType> LinkPred::ESPLDistCalculator< Network, DistType, Nb↩
HopsType >::getDist (
            Edge const & e )  [inline], [virtual]
```

Parameters

e	An input edge.

Returns

The distance between start and end of e.

9.39.4.2 getDist() [2/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual NodeDistMapSP LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::getDist (
            NodeID const & i )  [virtual]
```

Returns

The distance from srcNode.

Parameters

i	The source node.

9.39.4.3 getDist() [3/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DistType, NbHopsType> LinkPred::ESPLDistCalculator< Network, DistType, Nb←
HopsType >::getDist (
            NodeID const & i,
            NodeID const & j )  [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j.

9.39.4.4 getFinDistMapNoNeighb()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual NodeSDistMapSP LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::getFin←
DistMapNoNeighb (
            NodeID const & srcNode )  [virtual]
```

Returns

A sparse distance map of nodes having finite distance to a given source node. Only nodes not connected to srcNode are considered. The node srcNode itself is also excluded.

Parameters

srcNode	The source node.

9.39.4.5 getIndDist()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::pair<DistType, NbHopsType> LinkPred::ESPLDistCalculator< Network, DistType, Nb←
HopsType >::getIndDist (
            NodeID const & i,
            NodeID const & j )  [inline], [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j ignoring the edge between i and j.

9.39.4.6 getLim()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::size_t LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::getLim ( ) const
[inline]
```

Returns

The limit on the number of hops.

9.39.4.7 getMaxNbNodesInCache()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::size_t LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::getMaxNbNodesIn↩
Cache ( ) const  [inline]
```

Returns

The maximum number of nodes allowed in cache.

9.39.4.8 getSDistMap()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual NodeSDistMapSP LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::getS↩
DistMap (
             NodeID const & i )  [virtual]
```

Returns

The sparse distance from srcNode.

Parameters

i	The source node.

9.39.4.9 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
ESPLDistCalculator& LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::operator= (
            ESPLDistCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.39.4.10 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
ESPLDistCalculator& LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::operator= (
            ESPLDistCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.39.4.11 setMaxNbNodesInCache()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
void LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >::setMaxNbNodesInCache (
            std::size_t maxNbNodesInCache )  [inline]
```

Set the maximum number of nodes in cache (for each node a map of distance to all other nodes is kept in memory).

Parameters

maxNbNodesInCache	New value for the maximum number of nodes in cache.

The documentation for this class was generated from the following file:

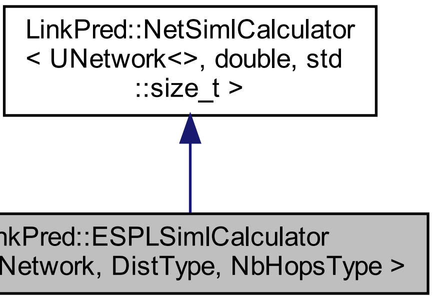
- include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp

9.40 LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType > Class Template Reference

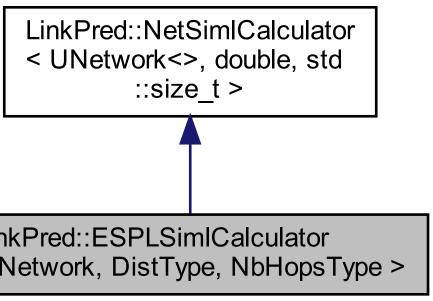
Exact shortest path distance calculator.

```
#include <netdistcalculator.hpp>
```

Inheritance diagram for LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >:


LinkPred::NetSimlCalculator < UNetwork<>, double, std ::size_t >
LinkPred::ESPLSimlCalculator < Network, DistType, NbHopsType >

Collaboration diagram for LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >:


LinkPred::NetSimlCalculator < UNetwork<>, double, std ::size_t >
LinkPred::ESPLSimlCalculator < Network, DistType, NbHopsType >

Public Types

- using LengthMapIdType = typename NetSimlCalculator< Network, DistType, NbHopsType >↩ ::LengthMapIdType
- using NetworkSP = typename NetSimlCalculator< Network, DistType, NbHopsType >::NetworkSP
- using NodeID = typename NetSimlCalculator< Network, DistType, NbHopsType >::NodeID
- using Label = typename NetSimlCalculator< Network, DistType, NbHopsType >::Label
- using Edge = typename NetSimlCalculator< Network, DistType, NbHopsType >::Edge
- using NodeSDistMap = typename Network::template NodeSMap< std::pair< DistType, NbHopsType > >
- using NodeSDistMapSP = typename Network::template NodeSMapSP< std::pair< DistType, NbHopsType > >
- using EdgeLengthMap = typename NetSimlCalculator< Network, DistType, NbHopsType >::EdgeLengthMap
- using EdgeLengthMapSP = typename NetSimlCalculator< Network, DistType, NbHopsType >↩ ::EdgeLengthMapSP

Public Member Functions

- ESPLSimlCalculator (Dijkstra< Network, DistType, NbHopsType > &dijkstra, EdgeLengthMapSP length, std::size_t lim, CacheLevel cacheLevel=CacheLevel::NetworkCache)
- ESPLSimlCalculator (ESPLSimlCalculator const &that)=default
- ESPLSimlCalculator & operator= (ESPLSimlCalculator const &that)=default
- ESPLSimlCalculator (ESPLSimlCalculator &&that)=default
- ESPLSimlCalculator & operator= (ESPLSimlCalculator &&that)=default
- virtual std::tuple< DistType, DistType, NbHopsType > getSiml (NodeID const &i, NodeID const &j)
- virtual std::tuple< DistType, DistType, NbHopsType > getDirSiml (NodeID const &i, NodeID const &j)
- virtual NodeSDistMapSP getNnzSimlMap (NodeID const &srcNode)
- virtual NodeSDistMapSP getNnzSimlMapNoNeighb (NodeID const &srcNode)
- virtual std::tuple< DistType, DistType, NbHopsType > getSiml (Edge const &e)
- virtual std::tuple< DistType, DistType, NbHopsType > getDirSiml (Edge const &e)
- std::size_t getMaxNbNodesInCache () const
- void setMaxNbNodesInCache (std::size_t maxNbNodesInCache)
- std::size_t getLim () const
- bool isUseHops () const
- void setUseHops (bool useHops)
- virtual ∼ ESPLSimlCalculator ()

9.40.1 Detailed Description

template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType = std::size_t>
class LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >

Exact shortest path distance calculator.

This class offers an additional layer over Dijkstra which provides memory management functionalities by caching computed distances.

Template Parameters

Network	The network type.
DistType	The distance type (can be an integer or floating point type).
NbHopsType	The type of the number of hops (must be an integer type).

9.40.2 Member Typedef Documentation

9.40.2.1 Edge

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::Edge = typename NetSimlCalculator<Networ
DistType, NbHopsType>::Edge
```

Edge type.

9.40.2.2 EdgeLengthMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::EdgeLengthMap = typename
NetSimlCalculator<Network, DistType, NbHopsType>::EdgeLengthMap
```

Edge length map.

9.40.2.3 EdgeLengthMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::EdgeLengthMapSP = typename
NetSimlCalculator<Network, DistType, NbHopsType>::EdgeLengthMapSP
```

Shared pointer to an edge length map.

9.40.2.4 Label

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::Label = typename NetSimlCalculator<Netwo
DistType, NbHopsType>::Label
```

Nodes label type.

9.40.2.5 LengthMapIdType

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::LengthMapIdType = typename
NetSimlCalculator<Network, DistType, NbHopsType>::LengthMapIdType
```

Length map ID type.

9.40.2.6 NetworkSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::NetworkSP = typename
NetSimlCalculator<Network, DistType, NbHopsType>::NetworkSP
```

Shared pointer to network.

9.40.2.7 NodeID

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::NodeID = typename NetSimlCalculator<Netw
DistType, NbHopsType>::NodeID
```

Nodes ID type.

9.40.2.8 NodeSDistMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::NodeSDistMap = typename
Network::template NodeSMap<std::pair<DistType, NbHopsType> >
```

Distance map.

9.40.2.9 NodeSDistMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::NodeSDistMapSP = typename
Network::template NodeSMapSP<std::pair<DistType, NbHopsType> >
```

Shared pointer to a distance map.

9.40.3 Constructor & Destructor Documentation

9.40.3.1 ESPLSimlCalculator() [1/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::ESPLSimlCalculator (
            Dijkstra< Network, DistType, NbHopsType > & dijkstra,
            EdgeLengthMapSP length,
            std::size_t lim,
            CacheLevel cacheLevel = CacheLevel::NetworkCache ) [inline]
```

Constructor.

Parameters

dijkstra	A Dijkstra algorithm object.
length	The length map.
lim	Horizon limit.
cacheLevel	The cache level.

9.40.3.2 ESPLSimlCalculator() [2/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::ESPLSimlCalculator (
             ESPLSimlCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.40.3.3 ESPLSimlCalculator() [3/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::ESPLSimlCalculator (
             ESPLSimlCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.40.3.4 ∼ ESPLSimlCalculator()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::∼ ESPLSimlCalculator (
)  [inline], [virtual]
```

Destructor.

9.40.4 Member Function Documentation

9.40.4.1 getDirSiml() `[1/2]`

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::ESPLSimlCalculator< Network,
DistType, NbHopsType >::getDirSiml (
            Edge const & e )  [inline], [virtual]
```

Parameters

e	An input edge.

Returns

The directed similarity between start and end of e.

9.40.4.2 getDirSiml() `[2/2]`

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::ESPLSimlCalculator< Network,
DistType, NbHopsType >::getDirSiml (
            NodeID const & i,
            NodeID const & j )  [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The directed similarity between i and j.

9.40.4.3 getLim()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::size_t LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::getLim ( ) const
[inline]
```

Returns

The limit on the number of hops.

9.40.4.4 getMaxNbNodesInCache()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::size_t LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::getMaxNbNodesIn↩
Cache ( ) const  [inline]
```

Returns

The maximum number of nodes allowed in cache.

9.40.4.5 getNnzSimlMap()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual NodeSDistMapSP LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::getNnz↩
SimlMap (
             NodeID const & srcNode )  [virtual]
```

Returns

A sparse similarity map of nodes having non-zero similarity to a given source node.

Parameters

srcNode	The source node.

9.40.4.6 getNnzSimlMapNoNeighb()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual NodeSDistMapSP LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::getNnz↩
SimlMapNoNeighb (
             NodeID const & srcNode )  [virtual]
```

Returns

A sparse similarity map of nodes having non-zero similarity to a given source node. Only nodes not connected to srcNode are considered. The node srcNode itself is also excluded.

Parameters

srcNode	The source node.

9.40.4.7 getSiml() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::ESPLSimlCalculator< Network,
DistType, NbHopsType >::getSiml (
             Edge const & e )  [inline], [virtual]
```

Parameters

e	An input edge.

Returns

The similarity between start and end of e.

9.40.4.8 getSiml() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::ESPLSimlCalculator< Network,
DistType, NbHopsType >::getSiml (
             NodeID const & i,
             NodeID const & j )  [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The similarity between i and j.

9.40.4.9 isUseHops()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
bool LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::isUseHops ( ) const  [inline]
```

Returns

True if the number of hops is used to compute similarity.

9.40.4.10 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
ESPLSimlCalculator& LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::operator= (
            ESPLSimlCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.40.4.11 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
ESPLSimlCalculator& LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::operator= (
            ESPLSimlCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.40.4.12 setMaxNbNodesInCache()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
void LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::setMaxNbNodesInCache (
            std::size_t maxNbNodesInCache )  [inline]
```

Set the maximum number of nodes in cache (for each node a map of similarity to all other nodes is kept in memory).

Parameters

maxNbNodesInCache	New value for the maximum number of nodes in cache.

9.40.4.13 setUseHops()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
void LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >::setUseHops (
            bool useHops ) [inline]
```

Parameters

useHops	Set whether the number of hops is used to compute similarity.

The documentation for this class was generated from the following file:

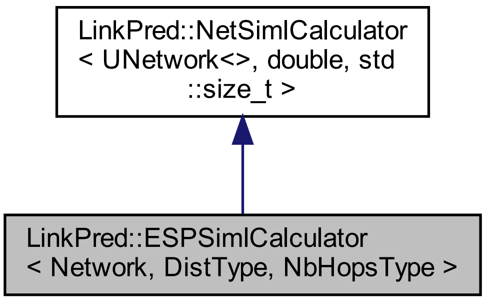
- include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp

9.41 LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType > Class Template Reference

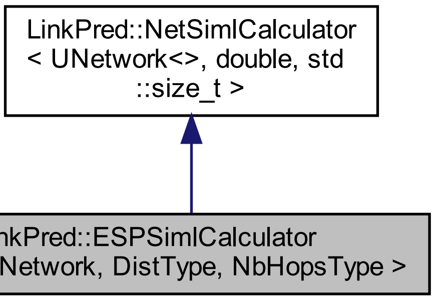
Exact shortest path distance calculator.

```
#include <netdistcalculator.hpp>
```

Inheritance diagram for LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >:


LinkPred::NetSimlCalculator < UNetwork<>, double, std ::size_t >
LinkPred::ESPSimlCalculator < Network, DistType, NbHopsType >

Collaboration diagram for LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >:


LinkPred::NetSimlCalculator < UNetwork<>, double, std ::size_t >
LinkPred::ESPSimlCalculator < Network, DistType, NbHopsType >

Public Types

- using LengthMapIdType = typename NetSimlCalculator< Network, DistType, NbHopsType >↩ ::LengthMapIdType
- using NetworkSP = typename NetSimlCalculator< Network, DistType, NbHopsType >::NetworkSP
- using NodeID = typename NetSimlCalculator< Network, DistType, NbHopsType >::NodeID
- using Label = typename NetSimlCalculator< Network, DistType, NbHopsType >::Label
- using Edge = typename NetSimlCalculator< Network, DistType, NbHopsType >::Edge
- using NodeDistMap = typename Network::template NodeMap< std::pair< DistType, NbHopsType > >
- using NodeDistMapSP = typename Network::template NodeMapSP< std::pair< DistType, NbHopsType > >
- using EdgeLengthMap = typename NetSimlCalculator< Network, DistType, NbHopsType >::EdgeLengthMap
- using EdgeLengthMapSP = typename NetSimlCalculator< Network, DistType, NbHopsType >↩ ::EdgeLengthMapSP

Public Member Functions

- ESPSimlCalculator (Dijkstra< Network, DistType, NbHopsType > &dijkstra, EdgeLengthMapSP length, CacheLevel cacheLevel=CacheLevel::NetworkCache)
- ESPSimlCalculator (ESPSimlCalculator const &that)=default
- ESPSimlCalculator & operator= (ESPSimlCalculator const &that)=default
- ESPSimlCalculator (ESPSimlCalculator &&that)=default
- ESPSimlCalculator & operator= (ESPSimlCalculator &&that)=default
- virtual std::tuple< DistType, DistType, NbHopsType > getSiml (NodeID const &i, NodeID const &j)
- virtual std::tuple< DistType, DistType, NbHopsType > getDirSiml (NodeID const &i, NodeID const &j)
- virtual std::tuple< DistType, DistType, NbHopsType > getSiml (Edge const &e)
- virtual std::tuple< DistType, DistType, NbHopsType > getDirSiml (Edge const &e)
- std::size_t getMaxNbNodesInCache () const
- void setMaxNbNodesInCache (std::size_t maxNbNodesInCache)
- virtual ∼ESPSimlCalculator ()

9.41.1 Detailed Description

**template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType = std::size_t>
class LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >**

Exact shortest path distance calculator.

This class offers an additional layer over Dijkstra which provides memory management functionalities by caching computed distances.

Template Parameters

Network	The network type.
DistType	The distance type (can be an integer or floating point type).
NbHopsType	The type of the number of hops (must be an integer type).

9.41.2 Member Typedef Documentation

9.41.2.1 Edge

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::Edge = typename NetSimlCalculator<Network
DistType, NbHopsType>::Edge
```

Edge type.

9.41.2.2 EdgeLengthMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::EdgeLengthMap = typename
NetSimlCalculator<Network, DistType, NbHopsType>::EdgeLengthMap
```

Edge length map.

9.41.2.3 EdgeLengthMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::EdgeLengthMapSP = typename
NetSimlCalculator<Network, DistType, NbHopsType>::EdgeLengthMapSP
```

Shared pointer to an edge length map.

9.41.2.4 Label

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::Label = typename NetSimlCalculator<Networ
DistType, NbHopsType>::Label
```

Nodes label type.

9.41.2.5 LengthMapIdType

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::LengthMapIdType = typename
NetSimlCalculator<Network, DistType, NbHopsType>::LengthMapIdType
```

Length map ID type.

9.41.2.6 NetworkSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::NetworkSP = typename
NetSimlCalculator<Network, DistType, NbHopsType>::NetworkSP
```

Shared pointer to network.

9.41.2.7 NodeDistMap

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::NodeDistMap = typename
Network::template NodeMap<std::pair<DistType, NbHopsType> >
```

Distance map.

9.41.2.8 NodeDistMapSP

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::NodeDistMapSP = typename
Network::template NodeMapSP<std::pair<DistType, NbHopsType> >
```

Shared pointer to a distance map.

9.41.2.9 NodeID

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
using LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::NodeID = typename NetSimlCalculator<Netwo
DistType, NbHopsType>::NodeID
```

Nodes ID type.

9.41.3 Constructor & Destructor Documentation

9.41.3.1 ESPSimlCalculator() [1/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::ESPSimlCalculator (
            Dijkstra< Network, DistType, NbHopsType > & dijkstra,
            EdgeLengthMapSP length,
            CacheLevel cacheLevel = CacheLevel::NetworkCache )  [inline]
```

Constructor.

Parameters

dijkstra	A Dijkstra algorithm object.
length	The length map.
cacheLevel	The cache level.

9.41.3.2 ESPSimlCalculator() [2/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::ESPSimlCalculator (
            ESPSimlCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.41.3.3 ESPSimlCalculator() [3/3]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::ESPSimlCalculator (
            ESPSimlCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.41.3.4 ∼ESPSimlCalculator()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::∼ESPSimlCalculator ( )
[inline], [virtual]
```

Destructor.

9.41.4 Member Function Documentation

9.41.4.1 getDirSiml() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::ESPSimlCalculator< Network,
DistType, NbHopsType >::getDirSiml (
             Edge const & e )  [inline], [virtual]
```

Parameters

e	An input edge.

Returns

The directed similarity between start and end of e.

9.41.4.2 getDirSiml() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::ESPSimlCalculator< Network,
DistType, NbHopsType >::getDirSiml (
             NodeID const & i,
             NodeID const & j )  [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The directed similarity between i and j.

9.41.4.3 getMaxNbNodesInCache()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
std::size_t LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::getMaxNbNodesInCache
( ) const [inline]
```

Returns

The maximum number of nodes allowed in cache.

9.41.4.4 getSiml() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::ESPSimlCalculator< Network,
DistType, NbHopsType >::getSiml (
             Edge const & e ) [inline], [virtual]
```

Parameters

e	Edge.

Returns

The similarity between the two ends of the edge.

9.41.4.5 getSiml() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::ESPSimlCalculator< Network,
DistType, NbHopsType >::getSiml (
             NodeID const & i,
             NodeID const & j ) [virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The similarity between i and j.

9.41.4.6 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
ESPSimlCalculator& LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::operator= (
            ESPSimlCalculator< Network, DistType, NbHopsType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.41.4.7 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
ESPSimlCalculator& LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::operator= (
            ESPSimlCalculator< Network, DistType, NbHopsType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.41.4.8 setMaxNbNodesInCache()

```
template<typename Network = UNetwork<>, typename DistType = double, typename NbHopsType =
std::size_t>
void LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >::setMaxNbNodesInCache (
            std::size_t maxNbNodesInCache )  [inline]
```

Set the maximum number of nodes in cache (for each node a map of similarity to all other nodes is kept in memory).

Parameters

maxNbNodesInCache	New value for the maximum number of nodes in cache.

The documentation for this class was generated from the following file:

- include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp

9.42 LinkPred::Simp::Evaluator Class Reference

A class that simplifies the evaluation of link prediction algorithms.

```
#include <evaluator.hpp>
```

Public Member Functions

- Evaluator ()
- Evaluator (Evaluator const &that)=default
- virtual ∼Evaluator ()=default
- void addADA (std::string const &name="ADA")
- void addCNE (std::string const &name="CNE")
- void addCRA (std::string const &name="CRA")
- void addECL (std::string const &name="ECL-N2V-LGR", std::string encoderName="N2V", std::string classifierName="LGR", int dim=0, double posRatio=1.0, double negRatio=1.0, long int seed=0)
- void addESM (std::string const &name="ESM-N2V-L2", std::string encoderName="N2V", std::string sim↩MeasureName="L2", int dim=0, long int seed=0)
- void addFBM (std::string const &name="FBM", int maxIter=50, long int seed=0)
- void addHDI (std::string const &name="HDI")
- void addHPI (std::string const &name="HPI")
- void addHRG (std::string const &name="HRG", int nbBeans=25, int nbSamples=10000, long int seed=0)
- void addHYP (std::string const &name="HYP", double m=1.5, double L=1, double gamma=2.1, double zeta=1, double T=0.8, long int seed=0)
- void addJID (std::string const &name="JID")
- void addKAB (std::string const &name="KAB", int horizLim=2)
- void addLCP (std::string const &name="LCP", double epsilon=0.001)
- void addLHN (std::string const &name="LHN")
- void addPAT (std::string const &name="PAT")
- void addPST (std::string const &name="PST", std::string fileName="pst.csv")
- void addRAL (std::string const &name="RAL")
- void addRND (std::string const &name="RND", long int seed=0)
- void addSAI (std::string const &name="SAI")
- void addSBM (std::string const &name="SBM", int maxIter=1000, long int seed=0)
- void addSHP (std::string const &name="SHP", long int seed=0)
- void addSOI (std::string const &name="SOI")
- void addROC ()
- void addPR ()
- void addTPR ()
- void genTestData (std::string const &fullNetFileName, std::string const &obsEdgesFileName, std::string const &remEdgesFileName, double remRatio=0.1, bool keepConnected=false, long int seed=0)
- void run (std::string const &fullNetFileName, int nbRuns=10, double remRatio=0.1, bool keep↩Connected=false, long int seed=0)
- void run (std::string const &obsEdgesFileName, std::string const &remEdgesFileName)
- std::vector< PerfRes > getPerfRes (int iter)

9.42.1 Detailed Description

A class that simplifies the evaluation of link prediction algorithms.

9.42.2 Constructor & Destructor Documentation

9.42.2.1 Evaluator() [1/2]

```
LinkPred::Simp::Evaluator::Evaluator ( )
```

Parameters

net	The network.

9.42.2.2 Evaluator() [2/2]

```
LinkPred::Simp::Evaluator::Evaluator (
            Evaluator const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.42.2.3 ∼Evaluator()

```
virtual LinkPred::Simp::Evaluator::∼Evaluator ( )  [virtual], [default]
```

Destructor.

9.42.3 Member Function Documentation

9.42.3.1 addADA()

```
void LinkPred::Simp::Evaluator::addADA (
            std::string const & name = "ADA" )
```

Add Adamic Adar predictor.

Parameters

name	A unique identifier for the predictor.

9.42.3.2 addCNE()

```
void LinkPred::Simp::Evaluator::addCNE (
            std::string const & name = "CNE" )
```

Add common neighbors.

Parameters

name	A unique identifier for the predictor.

9.42.3.3 addCRA()

```
void LinkPred::Simp::Evaluator::addCRA (
            std::string const & name = "CRA" )
```

Add Cannistraci resource allocation.

Parameters

name	A unique identifier for the predictor.

9.42.3.4 addECL()

```
void LinkPred::Simp::Evaluator::addECL (
            std::string const & name = "ECL-N2V-LGR",
            std::string encoderName = "N2V",
            std::string classifierName = "LGR",
            int dim = 0,
            double posRatio = 1.0,
            double negRatio = 1.0,
            long int seed = 0 )
```

Add an encoder-classifier link predictor.

Parameters

name	A unique identifier for the predictor.

Parameters

encoderName	The name of the encoder. Possible values are: DPW (DeepWalk), HMSM (Hidden Metric Space Model), LVS (LargeVis), LEM (Laplacian Eigenmaps), LIN (LINE), LLE (Locally Linear Embedding), MFC (Matrix Factorization), and N2V (Node2Vec).
classifierName	The name of the classifier. Possible values are: FFN (feed-forward neural network withn default architecture), LSVM (linear SVM), LGR (logistic regression), NVB (naive Bayes). All classifiers except logistic regression requirte compilation with mlpack.
dim	The dimension of the embedding space. If set to zero, the default value is used (the default dimension depends on the ecnoder).
posRatio	Ratio of positive edges used in the training of the classifier.
negRatio	Ratio of negative edges used in the training of the classifier.
seed	Seed of the random number generator.

9.42.3.5 addESM()

```
void LinkPred::Simp::Evaluator::addESM (
            std::string const & name = "ESM-N2V-L2",
            std::string encoderName = "N2V",
            std::string simMeasureName = "L2",
            int dim = 0,
            long int seed = 0 )
```

Add an encoder-similarity measure link predictor.

Parameters

name	A unique identifier for the predictor.
encoderName	The name of the encoder. Possible values are: DPW (DeepWalk), HMSM (Hidden Metric Space Model), LVS (LargeVis), LEM (Laplacian Eigenmaps), LIN (LINE), LLE (Locally Linear Embedding), MFC (Matrix Factorization), and N2V (Node2Vec).
simMeasureName	The name of the similarity measure. Possible values are: CSM (cosine similarity), DTP (dot product), L1 (L1 similarity), L2 (L2 similarity), PRS (Pearson similarity).
dim	The dimension of the embedding space. If set to zero, the default value is used (the default dimension depends on the ecnoder).
seed	Seed of the random number generator.

9.42.3.6 addFBM()

```
void LinkPred::Simp::Evaluator::addFBM (
            std::string const & name = "FBM",
            int maxIter = 50,
            long int seed = 0 )
```

Add fast blocking model.

Parameters

name	A unique identifier for the predictor.
maxIter	Maximum number of iterations.
seed	Seed of the random number generator.

9.42.3.7 addHDI()

```
void LinkPred::Simp::Evaluator::addHDI (
            std::string const & name = "HDI" )
```

Add hub depromoted index.

Parameters

name	A unique identifier for the predictor.

9.42.3.8 addHPI()

```
void LinkPred::Simp::Evaluator::addHPI (
            std::string const & name = "HPI" )
```

Add Hub promoted index.

Parameters

name	A unique identifier for the predictor.

9.42.3.9 addHRG()

```
void LinkPred::Simp::Evaluator::addHRG (
            std::string const & name = "HRG",
            int nbBeans = 25,
            int nbSamples = 10000,
            long int seed = 0 )
```

Add hierarchical random graph.

Parameters

name	A unique identifier for the predictor.
nbBeans	Number of bins in edge statistics histogram.
nbSamples	Number of samples to take for predictions.
seed	Seed of the random number generator.

9.42.3.10 addHYP()

```
void LinkPred::Simp::Evaluator::addHYP (
            std::string const & name = "HYP",
            double m = 1.5,
            double L = 1,
            double gamma = 2.1,
            double zeta = 1,
            double T = 0.8,
            long int seed = 0 )
```

Add Hypermap.

Parameters

name	A unique identifier for the predictor.
m	The parameter m (see the algorithm description).
L	The parameter L (see the algorithm description).
gamma	The power law exponent gamma (see the algorithm description).
zeta	The parameter zeta (see the algorithm description).
T	The parameter T (see the algorithm description).
seed	The random number generator seed.

9.42.3.11 addJID()

```
void LinkPred::Simp::Evaluator::addJID (
            std::string const & name = "JID" )
```

Add Jackard index predictor.

Parameters

name	A unique identifier for the predictor.

9.42.3.12 addKAB()

```
void LinkPred::Simp::Evaluator::addKAB (
            std::string const & name = "KAB",
            int horizLim = 2 )
```

Add the scalable popularity similarity link predictor proposed in: "Kerrache, S., Alharbi, R. & Benhidour, H. A Scalable Similarity-Popularity Link Prediction Method. Sci Rep 10, 6394 (2020)".

Parameters

name	A unique identifier for the predictor.
horizLim	Horizon limit.

9.42.3.13 addLCP()

```
void LinkPred::Simp::Evaluator::addLCP (
            std::string const & name = "LCP",
            double epsilon = 0.001 )
```

Add local path.

Parameters

name	A unique identifier for the predictor.
epsilon	The weight of paths of length 3.

9.42.3.14 addLHN()

```
void LinkPred::Simp::Evaluator::addLHN (
            std::string const & name = "LHN" )
```

Add Leicht-Holme-Newman index.

Parameters

name	A unique identifier for the predictor.

9.42.3.15 addPAT()

```
void LinkPred::Simp::Evaluator::addPAT (
            std::string const & name = "PAT" )
```

Add preferential attachment index.

Parameters

name	A unique identifier for the predictor.

9.42.3.16 addPR()

```
void LinkPred::Simp::Evaluator::addPR ( )
```

Add area under the precision-recall curve.

9.42.3.17 addPST()

```
void LinkPred::Simp::Evaluator::addPST (
            std::string const & name = "PST",
            std::string fileName = "pst.csv" )
```

Add pre-stored results. This is designed to work with run(std::string const &obsEdgesFileName, std::string const &remEdgesFileName, long int seed) to measure the performance of user-defined prediction algorithms.

Parameters

name	A unique identifier for the predictor.
fileName	File containing the scores of all non-exisityng links in the training network.

9.42.3.18 addRAL()

```
void LinkPred::Simp::Evaluator::addRAL (
            std::string const & name = "RAL" )
```

Add resource allocation index.

Parameters

name	A unique identifier for the predictor.

9.42.3.19 addRND()

```
void LinkPred::Simp::Evaluator::addRND (
            std::string const & name = "RND",
            long int seed = 0 )
```

Add random predictor.

Parameters

name	A unique identifier for the predictor.
seed	The random number generator seed.

9.42.3.20 addROC()

```
void LinkPred::Simp::Evaluator::addROC ( )
```

Add area under the ROC curve.

9.42.3.21 addSAI()

```
void LinkPred::Simp::Evaluator::addSAI (
             std::string const & name = "SAI" )
```

Add Salton index.

Parameters

name	A unique identifier for the predictor.

9.42.3.22 addSBM()

```
void LinkPred::Simp::Evaluator::addSBM (
             std::string const & name = "SBM",
             int maxIter = 1000,
             long int seed = 0 )
```

Add stochastic blocking model.

Parameters

name	A unique identifier for the predictor.
maxIter	Maximum number of iterations.
seed	Seed of the random number generator.

9.42.3.23 addSHP()

```
void LinkPred::Simp::Evaluator::addSHP (
             std::string const & name = "SHP",
             long int seed = 0 )
```

Add shortest path predictor.

Parameters

name	A unique identifier for the predictor.
seed	The random number generator seed.

9.42.3.24 addSOI()

```
void LinkPred::Simp::Evaluator::addSOI (
            std::string const & name = "SOI" )
```

Add Sorensen index.

Parameters

name	A unique identifier for the predictor.

9.42.3.25 addTPR()

```
void LinkPred::Simp::Evaluator::addTPR ( )
```

Add top precision.

9.42.3.26 genTestData()

```
void LinkPred::Simp::Evaluator::genTestData (
            std::string const & fullNetFileName,
            std::string const & obsEdgesFileName,
            std::string const & remEdgesFileName,
            double remRatio = 0.1,
            bool keepConnected = false,
            long int seed = 0 )
```

Generate test data and save it to file.

Parameters

fullNetFileName	This the file containing the ground truth network.
obsEdgesFileName	The method writes the remaining edges into this file. This constitutes the training set.
remEdgesFileName	The method writes the removed edges into this file. This constitutes the positive examples of the test set.
remRatio	Edge remove ratio.
keepConnected	Whether to keep the graph connected when removing edges. This may be impossible for high ratios or if the network is initially disconnected.
seed	Seed for the andom number generator

9.42.3.27 getPerfRes()

```
std::vector<PerfRes> LinkPred::Simp::Evaluator::getPerfRes (
             int iter ) [inline]
```

Parameters

iter	Iteration number.

Returns

The performance results at the specified iteration.

9.42.3.28 run() [1/2]

```
void LinkPred::Simp::Evaluator::run (
             std::string const & fullNetFileName,
             int nbRuns = 10,
             double remRatio = 0.1,
             bool keepConnected = false,
             long int seed = 0 )
```

Run a performance evaluation. This method creates test data by randomnly removing edges from the full network.

Parameters

fullNetFileName	The network file name. This is the full network (ground truth) containing all edges.
nbRuns	Number of times the experiment is run. Each time the test set is changed.
remRatio	Edge remove ratio.
keepConnected	Whether to keep the graph connected when removing edges. This may be impossible for high ratios or if the network is initially disconnected.
seed	Seed for the andom number generator

9.42.3.29 run() [2/2]

```
void LinkPred::Simp::Evaluator::run (
             std::string const & obsEdgesFileName,
             std::string const & remEdgesFileName )
```

Run a performance evaluation. This method uses the test data given as input

Parameters

obsEdgesFileName	A file containing observed edges (training set).
remEdgesFileName	A file containing removed edges (the positive examples of the test set).

The documentation for this class was generated from the following file:

- include/linkpred/simp/evaluator.hpp

9.43 LinkPred::FastSig< T > Class Template Reference

A fast sigmoid.

```
#include <fastsig.hpp>
```

Public Member Functions

- FastSig ()
- FastSig (int n, T lowBound, T uppBound)
- FastSig (FastSig const &that)=default
- FastSig & operator= (FastSig const &that)=default
- FastSig (FastSig &&that)=default
- FastSig & operator= (FastSig &&that)=default
- T operator() (T x)
- virtual ∼FastSig ()=default

9.43.1 Detailed Description

template<typename T>
class LinkPred::FastSig< T >

A fast sigmoid.

Template Parameters

T	Function value type (must be floating point).

9.43.2 Constructor & Destructor Documentation

9.43.2.1 FastSig() [1/4]

```
template<typename T >
LinkPred::FastSig< T >::FastSig ( )  [inline]
```

Default constructor.

9.43.2.2 FastSig() [2/4]

```
template<typename T >
LinkPred::FastSig< T >::FastSig (
             int n,
             T lowBound,
             T uppBound )  [inline]
```

Constructor.

Parameters

n	Sigmoid table size.
lowBound	Lower bound. Any input smaller than lowBound is assigned the value 0.
uppBound	Upper bound. Any input greater than uppBound is assigned the value 1.

9.43.2.3 FastSig() [3/4]

```
template<typename T >
LinkPred::FastSig< T >::FastSig (
             FastSig< T > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.43.2.4 FastSig() [4/4]

```
template<typename T >
LinkPred::FastSig< T >::FastSig (
             FastSig< T > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.43.2.5 ∼FastSig()

```
template<typename T >
virtual LinkPred::FastSig< T >::∼FastSig ( )  [virtual], [default]
```

Destructor.

9.43.3 Member Function Documentation

9.43.3.1 operator()()

```
template<typename T >
T LinkPred::FastSig< T >::operator() (
             T x )  [inline]
```

Parameters

x	Input value.

Returns

Sigmoid(x) (approximated of course).

9.43.3.2 operator=() [1/2]

```
template<typename T >
FastSig& LinkPred::FastSig< T >::operator= (
             FastSig< T > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.43.3.3 operator=() [2/2]

```
template<typename T >
FastSig& LinkPred::FastSig< T >::operator= (
             FastSig< T > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

The documentation for this class was generated from the following file:

- include/linkpred/numerical/mf/fastsig.hpp

9.44 LinkPred::Simp::Evaluator::Factory::FBMParams Struct Reference

Parameters of FBM.

```
#include <evaluator.hpp>
```

Public Attributes

- int maxIter = 50
- long int seed = 0

9.44.1 Detailed Description

Parameters of FBM.

9.44.2 Member Data Documentation

9.44.2.1 maxIter

```
int LinkPred::Simp::Evaluator::Factory::FBMParams::maxIter = 50
```

Max iterations for FBM.

9.44.2.2 seed

```
long int LinkPred::Simp::Evaluator::Factory::FBMParams::seed = 0
```

Seed for FBM.

The documentation for this struct was generated from the following file:

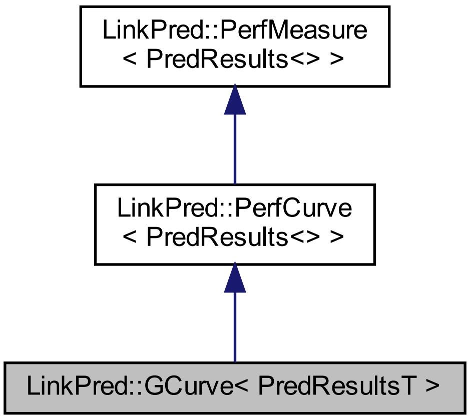
- include/linkpred/simp/evaluator.hpp

9.45 LinkPred::GCurve< PredResultsT > Class Template Reference

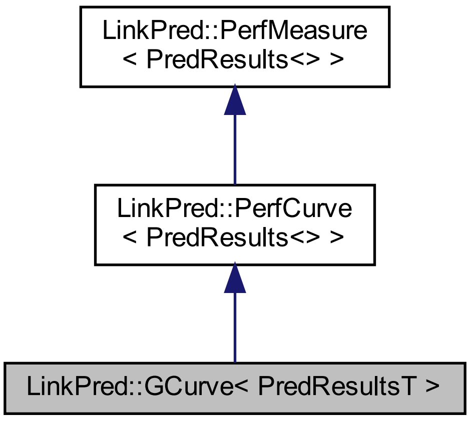
General performance curve.

```
#include <perfmeasure.hpp>
```

Inheritance diagram for LinkPred::GCurve< PredResultsT >:



Collaboration diagram for LinkPred::GCurve< PredResultsT >:



Public Types

- using ScoresItT = typename PerfMeasure< PredResultsT >::ScoresItT

Public Member Functions

- GCurve (typename PerfLambda::PerfLambdaT const &xLambda, typename PerfLambda::PerfLambdaT const &yLambda)
- GCurve (typename PerfLambda::PerfLambdaT const &xLambda, typename PerfLambda::PerfLambdaT const &yLambda, std::string name)
- GCurve (GCurve const &that)=default
- GCurve & operator= (GCurve const &that)=default
- GCurve (GCurve &&that)=default
- GCurve & operator= (GCurve &&that)=default
- virtual void eval (std::shared_ptr< PredResultsT > &predResults, PerfResults &results)
- virtual void eval (ScoresItT posScoresBegin, ScoresItT posScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, SortOrder &posSortOrder, SortOrder &negSortOrder, PerfResults &results)
- template<typename ScoresItT >
  std::vector< std::pair< double, double > > getGCurve (ScoresItT posScoresBegin, ScoresItT posScores↩ End, ScoresItT negScoresBegin, ScoresItT negScoresEnd, bool parallel=false)
- virtual std::vector< std::pair< double, double > > getCurve (std::shared_ptr< PredResultsT > &pred↩ Results)
- virtual std::vector< std::pair< double, double > > getCurve (ScoresItT posScoresBegin, ScoresItT pos↩ ScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, SortOrder &posSortOrder, SortOrder &negSortOrder)
- virtual ∼GCurve ()=default

Static Public Member Functions

- template<typename ScoresItT >
  static std::vector< double > getThresholds (ScoresItT posScoresBegin, ScoresItT posScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd)
- static double getGCurveAuc (std::vector< std::pair< double, double >> const &curve, bool parallel=false)

9.45.1 Detailed Description

template<typename PredResultsT = PredResults<>>
class LinkPred::GCurve< PredResultsT >

General performance curve.

Template Parameters

PredResultsT	The prediction results type.

9.45.2 Member Typedef Documentation

9.45.2.1 ScoresItT

```
template<typename PredResultsT = PredResults<>>
using LinkPred::GCurve< PredResultsT >::ScoresItT = typename PerfMeasure<PredResultsT>↩
::ScoresItT
```

Scores iterator type.

9.45.3 Constructor & Destructor Documentation

9.45.3.1 GCurve() [1/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::GCurve< PredResultsT >::GCurve (
            typename PerfLambda::PerfLambdaT const & xLambda,
            typename PerfLambda::PerfLambdaT const & yLambda )  [inline]
```

Constructor.

Parameters

xLambda	A lambda to compute the x-coordinates.
yLambda	A lambda to compute the y-coordinates.

9.45.3.2 GCurve() [2/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::GCurve< PredResultsT >::GCurve (
            typename PerfLambda::PerfLambdaT const & xLambda,
            typename PerfLambda::PerfLambdaT const & yLambda,
            std::string name )  [inline]
```

Constructor.

Parameters

xLambda	A lambda to compute the x-coordinates.
yLambda	A lambda to compute the y-coordinates.
name	The name of the performance measure.

9.45.3.3 GCurve() [3/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::GCurve< PredResultsT >::GCurve (
            GCurve< PredResultsT > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.45.3.4 GCurve() [4/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::GCurve< PredResultsT >::GCurve (
             GCurve< PredResultsT > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.45.3.5 ∼GCurve()

```
template<typename PredResultsT = PredResults<>>
virtual LinkPred::GCurve< PredResultsT >::∼GCurve ( )  [virtual], [default]
```

Destructor.

9.45.4 Member Function Documentation

9.45.4.1 eval() [1/2]

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::GCurve< PredResultsT >::eval (
             ScoresItT posScoresBegin,
             ScoresItT posScoresEnd,
             ScoresItT negScoresBegin,
             ScoresItT negScoresEnd,
             SortOrder & posSortOrder,
             SortOrder & negSortOrder,
             PerfResults & results )  [inline], [virtual]
```

Computes the area under the curve.

Parameters

posScoresBegin	Iterator to the first positive score.

Parameters

posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
posSortOrder	The sorting order of positive scores. This may be modified by the method.
negSortOrder	The sorting order of negative scores. This may be modified by the method.
results	To write results.

9.45.4.2 eval() [2/2]

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::GCurve< PredResultsT >::eval (
            std::shared_ptr< PredResultsT > & predResults,
            PerfResults & results )  [inline], [virtual]
```

Computes the area under the curve.

Parameters

predResults	The prediction results.
results	Iterator to write results.

9.45.4.3 getCurve() [1/2]

```
template<typename PredResultsT = PredResults<>>
virtual std::vector<std::pair<double, double> > LinkPred::GCurve< PredResultsT >::getCurve (
            ScoresItT posScoresBegin,
            ScoresItT posScoresEnd,
            ScoresItT negScoresBegin,
            ScoresItT negScoresEnd,
            SortOrder & posSortOrder,
            SortOrder & negSortOrder )  [inline], [virtual]
```

Computes the performance curve.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
posSortOrder	The sorting order of positive scores. This may be modified by the method.
negSortOrder	The sorting order of negative scores. This may be modified by the method.

Returns

A curve in the form of an std::vector of pairs representing the x and y coordinates.

9.45.4.4 getCurve() [2/2]

```
template<typename PredResultsT = PredResults<>>
virtual std::vector<std::pair<double, double> > LinkPred::GCurve< PredResultsT >::getCurve (
            std::shared_ptr< PredResultsT > & predResults )  [inline], [virtual]
```

Computes the performance curve.

Parameters

predResults	The prediction results.

Returns

A curve in the form of an std::vector of pairs representing the x and y coordinates.

9.45.4.5 getGCurve()

```
template<typename PredResultsT = PredResults<>>
template<typename ScoresItT >
std::vector<std::pair<double, double> > LinkPred::GCurve< PredResultsT >::getGCurve (
            ScoresItT posScoresBegin,
            ScoresItT posScoresEnd,
            ScoresItT negScoresBegin,
            ScoresItT negScoresEnd,
            bool parallel = false )  [inline]
```

Compute the curve. Both ranges must be sorted.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
parallel	Whether to run in parallel.

9.45.4.6 getGCurveAuc()

```
template<typename PredResultsT = PredResults<>>
```

```
static double LinkPred::GCurve< PredResultsT >::getGCurveAuc (
            std::vector< std::pair< double, double >> const & curve,
            bool parallel = false )  [inline], [static]
```

Computes the area under the curve using integration by linear interpolation.

Parameters

curve	The curve represented by its x-y coordinates.
parallel	Whether to run in parallel.

Returns

The area under the curve.

9.45.4.7 getThresholds()

```
template<typename PredResultsT = PredResults<>>
template<typename ScoresItT >
static std::vector<double> LinkPred::GCurve< PredResultsT >::getThresholds (
            ScoresItT posScoresBegin,
            ScoresItT posScoresEnd,
            ScoresItT negScoresBegin,
            ScoresItT negScoresEnd )  [inline], [static]
```

Compute the threshold of the GCurve curve. Ranges must be sorted in increasing order.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.

9.45.4.8 operator=() [1/2]

```
template<typename PredResultsT = PredResults<>>
GCurve& LinkPred::GCurve< PredResultsT >::operator= (
            GCurve< PredResultsT > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.45.4.9 operator=() [2/2]

```
template<typename PredResultsT = PredResults<>>
GCurve& LinkPred::GCurve< PredResultsT >::operator= (
            GCurve< PredResultsT > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

The documentation for this class was generated from the following file:

- include/linkpred/perf/perfmeasure.hpp

9.46 LinkPred::GFMatrix Class Reference

Generalized full matrix. The storage scheme used is column-major.

`#include <gfmatrix.hpp>`

Public Member Functions

- GFMatrix ()=delete
- GFMatrix (int m, int n, bool initZero=false)
- GFMatrix (GFMatrix const &that)
- GFMatrix & operator= (GFMatrix const &that)
- GFMatrix (GFMatrix &&that)
- GFMatrix & operator= (GFMatrix &&that)
- bool operator== (const GFMatrix &that) const
- bool operator!= (const GFMatrix &that) const
- void set (int i, int j, double v)
- double get (int i, int j) const
- void setRow (int i, Vec const &vec)
- Vec getRow (int i) const
- void setCol (int j, Vec const &vec)
- Vec getCol (int j) const
- GFMatrix getRows (std::vector< int > const &rowInd) const
- GFMatrix getCols (std::vector< int > const &colInd) const
- Vec sumCols () const
- Vec sumRows () const
- double sum ()
- void print () const
- void print (std::string name) const
- Vec diag () const
- void setDiag (double v)
- void removeNaN ()
- int getM () const
- int getN () const
- std::string getName () const
- void setName (const std::string &name)
- virtual ∼GFMatrix ()

Static Public Member Functions

- static GFMatrix mult (GFMatrix const &mat1, GFMatrix const &mat2, bool trans1=false, bool trans2=false)
- static GFMatrix elemMult (GFMatrix const &mat1, GFMatrix const &mat2)
- static GFMatrix mult (Vec const &v1, Vec const &v2)

Friends

- Vec operator∗ (const GFMatrix &mat, const Vec &vec)
- GFMatrix operator∗ (const GFMatrix &mat1, const GFMatrix &mat2)
- GFMatrix operator+ (const GFMatrix &mat1, const GFMatrix &mat2)
- GFMatrix operator- (const GFMatrix &mat1, const GFMatrix &mat2)
- GFMatrix operator/ (const GFMatrix &mat1, const GFMatrix &mat2)
- GFMatrix operator+ (const GFMatrix &mat1, const Vec &mat2)
- GFMatrix operator+ (const Vec &mat1, const GFMatrix &mat2)
- GFMatrix operator- (const GFMatrix &mat1, const Vec &mat2)
- GFMatrix operator- (const Vec &mat1, const GFMatrix &mat2)
- GFMatrix operator∗ (double a, const GFMatrix &mat)
- GFMatrix operator∗ (const GFMatrix &mat, double a)
- GFMatrix operator+ (double a, const GFMatrix &mat)
- GFMatrix operator+ (const GFMatrix &mat, double a)
- GFMatrix operator- (double a, const GFMatrix &mat)
- GFMatrix operator- (const GFMatrix &mat, double a)

9.46.1 Detailed Description

Generalized full matrix. The storage scheme used is column-major.

9.46.2 Constructor & Destructor Documentation

9.46.2.1 GFMatrix() [1/4]

```
LinkPred::GFMatrix::GFMatrix ( )  [delete]
```

Default constructor.

9.46.2.2 GFMatrix() [2/4]

```
LinkPred::GFMatrix::GFMatrix (
              int m,
              int n,
              bool initZero = false )
```

Constructor.

Parameters

m	The number of rows.
n	The number of columns.
initZero	If set to true, the matrix is initialized to zero.

9.46.2.3 GFMatrix() [3/4]

```
LinkPred::GFMatrix::GFMatrix (
            GFMatrix const & that )
```

Copy constructor.

Parameters

that	The object to copy.

9.46.2.4 GFMatrix() [4/4]

```
LinkPred::GFMatrix::GFMatrix (
            GFMatrix && that )
```

Move constructor.

Parameters

that	The object to move.

9.46.2.5 ∼GFMatrix()

```
virtual LinkPred::GFMatrix::∼GFMatrix ( )  [virtual]
```

Destructor.

9.46.3 Member Function Documentation

9.46.3.1 diag()

```
Vec LinkPred::GFMatrix::diag ( ) const
```

Returns

The diagonal of the matrix.

9.46.3.2 elemMult()

```
static GFMatrix LinkPred::GFMatrix::elemMult (
            GFMatrix const & mat1,
            GFMatrix const & mat2 )  [static]
```

Element-wise matrix multiplication.

Parameters

mat1	First matrix.
mat2	Second matrix.

Returns

The resulting matrix.

9.46.3.3 get()

```
double LinkPred::GFMatrix::get (
            int i,
            int j ) const  [inline]
```

Get a matrix entry.

Parameters

i	Row index.
j	Column index.

9.46.3.4 getCol()

```
Vec LinkPred::GFMatrix::getCol (
            int j ) const
```

Parameters

j	The column index.

Returns

The column vector j.

9.46.3.5 getCols()

```
GFMatrix LinkPred::GFMatrix::getCols (
             std::vector< int > const & colInd ) const
```

Parameters

colInd	The column indexes.

Returns

The matrix composed from the specified columns.

9.46.3.6 getM()

```
int LinkPred::GFMatrix::getM ( ) const  [inline]
```

Returns

The number of rows.

9.46.3.7 getN()

```
int LinkPred::GFMatrix::getN ( ) const  [inline]
```

Returns

The number of columns.

9.46.3.8 getName()

```
std::string LinkPred::GFMatrix::getName ( ) const  [inline]
```

Returns

The name of the matrix.

9.46.3.9 getRow()

```
Vec LinkPred::GFMatrix::getRow (
             int i ) const
```

Parameters

i	The row index.

Returns

The row vector i.

9.46.3.10 getRows()

```
GFMatrix LinkPred::GFMatrix::getRows (
             std::vector< int > const & rowInd ) const
```

Parameters

rowInd	The row indexes.

Returns

The matrix composed from the specified rows.

9.46.3.11 mult() [1/2]

```
static GFMatrix LinkPred::GFMatrix::mult (
             GFMatrix const & mat1,
             GFMatrix const & mat2,
             bool trans1 = false,
             bool trans2 = false )  [static]
```

Matrix-matrix multiplication with possibility of transposing.

Parameters

mat1	First matrix.
mat2	Second matrix.
trans1	Transposing mat1.
trans2	Transposing mat2.

Returns

The resulting matrix.

9.46.3.12 mult() [2/2]

```
static GFMatrix LinkPred::GFMatrix::mult (
            Vec const & v1,
            Vec const & v2 )  [static]
```

Vector'-Vector multiplication.

Parameters

v1	First vector.
v2	Second vector.

Returns

The resulting matrix.

9.46.3.13 operator"!=()

```
bool LinkPred::GFMatrix::operator!= (
            const GFMatrix & that ) const
```

Parameters

that	The other matrix.

Returns

True if the two matrices are not equal.

9.46.3.14 operator=() [1/2]

```
GFMatrix& LinkPred::GFMatrix::operator= (
             GFMatrix && that )
```

Move assignment operator.

Parameters

that	The object to move.

9.46.3.15 operator=() [2/2]

```
GFMatrix& LinkPred::GFMatrix::operator= (
             GFMatrix const & that )
```

Copy assignment operator.

Parameters

that	The object to copy.

9.46.3.16 operator==()

```
bool LinkPred::GFMatrix::operator== (
             const GFMatrix & that ) const
```

Parameters

that	The other matrix.

Returns

True if the two matrices are equal.

9.46.3.17 print() [1/2]

```
void LinkPred::GFMatrix::print ( ) const
```

Print matrix to standard output.

9.46.3.18 print() [2/2]

```
void LinkPred::GFMatrix::print (
            std::string name ) const
```

Print matrix to standard output adding the name.

Parameters

name	Name added to the output.

9.46.3.19 removeNaN()

```
void LinkPred::GFMatrix::removeNaN ( )
```

Remove NaN entries.

9.46.3.20 set()

```
void LinkPred::GFMatrix::set (
            int i,
            int j,
            double v ) [inline]
```

Set a matrix entry.

Parameters

i	Row index.
j	Column index.
v	The new value.

9.46.3.21 setCol()

```
void LinkPred::GFMatrix::setCol (
            int j,
            Vec const & vec )
```

Set column vector.

Parameters

j	The column index.
vec	The column vector to set.

9.46.3.22 setDiag()

```
void LinkPred::GFMatrix::setDiag (
             double v )
```

Set diagonal.

Parameters

v	The value to be put in the diagonal.

9.46.3.23 setName()

```
void LinkPred::GFMatrix::setName (
             const std::string & name )  [inline]
```

Set the name of the matrix.

Parameters

name	The new matrix name.

9.46.3.24 setRow()

```
void LinkPred::GFMatrix::setRow (
             int i,
             Vec const & vec )
```

Set row vector.

Parameters

i	The row index.
vec	The row vector to set.

9.46.3.25 sum()

```
double LinkPred::GFMatrix::sum ( )
```

Returns

The sum of all elements.

9.46.3.26 sumCols()

```
Vec LinkPred::GFMatrix::sumCols ( ) const
```

Returns

The sum of the columns of the matrix.

9.46.3.27 sumRows()

```
Vec LinkPred::GFMatrix::sumRows ( ) const
```

Returns

The sum of the rows of the matrix.

9.46.4 Friends And Related Function Documentation

9.46.4.1 operator* [1/4]

```
Vec operator* (
             const GFMatrix & mat,
             const Vec & vec )  [friend]
```

GFMatrix-vector multiplication.

Parameters

mat	The matrix.
vec	The vector that will be multiplied by the matrix.

Returns

The resulting vector.

9.46.4.2 operator∗ [2/4]

```
GFMatrix operator∗ (
            const GFMatrix & mat,
            double a )  [friend]
```

GFMatrix ∗ a.

Parameters

mat	The second matrix.
a	scalar.

Returns

The resulting matrix.

9.46.4.3 operator∗ [3/4]

```
GFMatrix operator∗ (
            const GFMatrix & mat1,
            const GFMatrix & mat2 )  [friend]
```

GFMatrix ∗ GFMatrix.

Parameters

mat1	The first matrix.
mat2	The second matrix.

Returns

The resulting matrix.

9.46.4.4 operator∗ [4/4]

```
GFMatrix operator∗ (
            double a,
            const GFMatrix & mat )  [friend]
```

a ∗ GFMatrix.

Parameters

a	scalar.
mat	The second matrix.

Returns

The resulting matrix.

9.46.4.5 operator+ [1/5]

```
GFMatrix operator+ (
            const GFMatrix & mat,
            double a )  [friend]
```

GFMatrix + a.

Parameters

mat	The second matrix.
a	A scalar.

Returns

The resulting matrix.

9.46.4.6 operator+ [2/5]

```
GFMatrix operator+ (
            const GFMatrix & mat1,
            const GFMatrix & mat2 )  [friend]
```

GFMatrix + GFMatrix.

Parameters

mat1	The first matrix.
mat2	The second matrix.

Returns

The resulting matrix.

9.46.4.7 operator+ [3/5]

```
GFMatrix operator+ (
            const GFMatrix & mat1,
            const Vec & mat2 )  [friend]
```

GFMatrix + Vec.

Parameters

mat1	The first matrix.
mat2	The second matrix (diagonal).

Returns

The resulting matrix.

9.46.4.8 operator+ [4/5]

```
GFMatrix operator+ (
            const Vec & mat1,
            const GFMatrix & mat2 )  [friend]
```

Vec + GFMatrix.

Parameters

mat1	The first matrix (diagonal).
mat2	The second matrix.

Returns

The resulting matrix.

9.46.4.9 operator+ [5/5]

```
GFMatrix operator+ (
            double a,
            const GFMatrix & mat )  [friend]
```

a + GFMatrix.

Parameters

a	scalar.
mat	The second matrix.

Returns

The resulting matrix.

9.46.4.10 operator- [1/5]

```
GFMatrix operator- (
             const GFMatrix & mat,
             double a )  [friend]
```

GFMatrix - a.

Parameters

mat	The second matrix.
a	scalar.

Returns

The resulting matrix.

9.46.4.11 operator- [2/5]

```
GFMatrix operator- (
             const GFMatrix & mat1,
             const GFMatrix & mat2 )  [friend]
```

GFMatrix - GFMatrix.

Parameters

mat1	The first matrix.
mat2	The second matrix.

Returns

The resulting matrix.

9.46.4.12 operator- [3/5]

```
GFMatrix operator- (
             const GFMatrix & mat1,
             const Vec & mat2 )  [friend]
```

GFMatrix - Vec.

Parameters

mat1	The first matrix.
mat2	The second matrix (diagonal).

Returns

The resulting matrix.

9.46.4.13 operator- [4/5]

```
GFMatrix operator- (
            const Vec & mat1,
            const GFMatrix & mat2 )  [friend]
```

Vec - GFMatrix.

Parameters

mat1	The first matrix (diagonal).
mat2	The second matrix.

Returns

The resulting matrix.

9.46.4.14 operator- [5/5]

```
GFMatrix operator- (
            double a,
            const GFMatrix & mat )  [friend]
```

a - GFMatrix.

Parameters

a	scalar.
mat	The second matrix.

Returns

The resulting matrix.

9.46.4.15 operator/

```
GFMatrix operator/ (
            const GFMatrix & mat1,
            const GFMatrix & mat2 )  [friend]
```

GFMatrix / GFMatrix (element-wise division).

Parameters

mat1	The first matrix.
mat2	The second matrix.

Returns

The resulting matrix.

The documentation for this class was generated from the following file:

- include/linkpred/numerical/linear/gfmatrix.hpp

9.47 LinkPred::GraphTraversal< Network, NodeProcessor > Class Template Reference

Graph traversal interface.

```
#include <graphtraversal.hpp>
```

Public Member Functions

- GraphTraversal (std::shared_ptr< Network const > net)
- GraphTraversal (GraphTraversal const &that)=default
- GraphTraversal & operator= (GraphTraversal const &that)=default
- GraphTraversal (GraphTraversal &&that)=default
- GraphTraversal & operator= (GraphTraversal &&that)=default
- virtual void traverse (typename Network::NodeID srcNode, NodeProcessor &processor)=0
- virtual ~GraphTraversal ()=default

9.47.1 Detailed Description

template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
class LinkPred::GraphTraversal< Network, NodeProcessor >

Graph traversal interface.

Template Parameters

Network	The network type.
NodeProcessor	The node processor type.

9.47.2 Constructor & Destructor Documentation

9.47.2.1 GraphTraversal() [1/3]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
LinkPred::GraphTraversal< Network, NodeProcessor >::GraphTraversal (
            std::shared_ptr< Network const > net ) [inline]
```

Constructor.

Parameters

net	The network on which traversal is done.

9.47.2.2 GraphTraversal() [2/3]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
LinkPred::GraphTraversal< Network, NodeProcessor >::GraphTraversal (
            GraphTraversal< Network, NodeProcessor > const & that ) [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.47.2.3 GraphTraversal() [3/3]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
LinkPred::GraphTraversal< Network, NodeProcessor >::GraphTraversal (
            GraphTraversal< Network, NodeProcessor > && that ) [default]
```

Move constructor.

Parameters

that	The object to move.

9.47.2.4 ∼GraphTraversal()

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
virtual LinkPred::GraphTraversal< Network, NodeProcessor >::~GraphTraversal ( ) [virtual],
[default]
```

Destructor.

9.47.3 Member Function Documentation

9.47.3.1 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
GraphTraversal& LinkPred::GraphTraversal< Network, NodeProcessor >::operator= (
            GraphTraversal< Network, NodeProcessor > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.47.3.2 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
GraphTraversal& LinkPred::GraphTraversal< Network, NodeProcessor >::operator= (
            GraphTraversal< Network, NodeProcessor > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.47.3.3 traverse()

```
template<typename Network = UNetwork<>, typename NodeProcessor = Collector< Network>>
virtual void LinkPred::GraphTraversal< Network, NodeProcessor >::traverse (
            typename Network::NodeID srcNode,
            NodeProcessor & processor )  [pure virtual]
```

Traverse the graph.

Parameters

srcNode	The source node.
processor	The node processor.

The documentation for this class was generated from the following file:

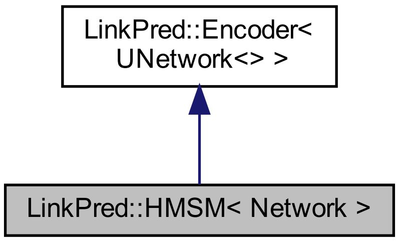
- include/linkpred/graphalg/traversal/graphtraversal.hpp

9.48 LinkPred::HMSM< Network > Class Template Reference

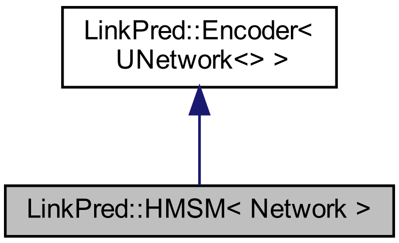
Contains the implementation of an algorithm for embedding a network using a a hidden metric space model. Reference: R. Alharbi, H. Benhidour, and S. Kerrache. “Link Prediction in Complex Net-works Based on a Hidden Variables Model”. In: 2016 UKSim-AMSS 18th Inter-national Conference on Computer Modelling and Simulation (UKSim). 2016,pages 119–124.

```
#include <hmsm.hpp>
```

Inheritance diagram for LinkPred::HMSM< Network >:



Collaboration diagram for LinkPred::HMSM< Network >:



Public Member Functions

- HMSM (std::shared_ptr< Network const > net, long int seed)
- HMSM (HMSM const &that)=default
- HMSM & operator= (HMSM const &that)=default
- HMSM (HMSM &&that)=default

- HMSM & operator= (HMSM &&that)=default
- virtual void init ()
- virtual void encode ()
- virtual void setWeightMap (const WeightMapSP &weightMap)
- const int getDefaultDim () const
- double getAlpha () const
- void setAlpha (double alpha)
- double getEps () const
- void setEps (double eps)
- double getHProb () const
- void setHProb (double hProb)
- double getLProb () const
- void setProb (double lProb)
- int getNbMdsRuns () const
- void setNbMdsRuns (int nbMdsRuns)
- double getTol () const
- void setTol (double tol)
- virtual ∼HMSM ()=default

Additional Inherited Members

9.48.1 Detailed Description

template<typename Network = UNetwork<>>
class LinkPred::HMSM< Network >

Contains the implementation of an algorithm for embedding a network using a a hidden metric space model. Reference: R. Alharbi, H. Benhidour, and S. Kerrache. “Link Prediction in Complex Net-works Based on a Hidden Variables Model”. In: 2016 UKSim-AMSS 18th Inter-national Conference on Computer Modelling and Simulation (UKSim). 2016,pages 119–124.

Template Parameters

Network	The network type.

9.48.2 Constructor & Destructor Documentation

9.48.2.1 HMSM() [1/3]

```
template<typename Network = UNetwork<>>
LinkPred::HMSM< Network >::HMSM (
            std::shared_ptr< Network const > net,
            long int seed )  [inline]
```

Constructor.

Parameters

net	The network.
seed	Random number generator seed.

9.48.2.2 HMSM() [2/3]

```
template<typename Network = UNetwork<>>
LinkPred::HMSM< Network >::HMSM (
             HMSM< Network > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.48.2.3 HMSM() [3/3]

```
template<typename Network = UNetwork<>>
LinkPred::HMSM< Network >::HMSM (
             HMSM< Network > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.48.2.4 ∼HMSM()

```
template<typename Network = UNetwork<>>
virtual LinkPred::HMSM< Network >::∼HMSM ( )  [virtual], [default]
```

Destructor.

9.48.3 Member Function Documentation

9.48.3.1 encode()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::HMSM< Network >::encode ( )  [virtual]
```

Encode the network.

Implements LinkPred::Encoder< UNetwork<> >.

9.48.3.2 getAlpha()

```
template<typename Network = UNetwork<>>
double LinkPred::HMSM< Network >::getAlpha ( ) const  [inline]
```

Returns

The parameter alpha of the HMSM model.

9.48.3.3 getDefaultDim()

```
template<typename Network = UNetwork<>>
const int LinkPred::HMSM< Network >::getDefaultDim ( ) const  [inline]
```

Returns

The default embedding dimension.

9.48.3.4 getEps()

```
template<typename Network = UNetwork<>>
double LinkPred::HMSM< Network >::getEps ( ) const  [inline]
```

Returns

Degree product when of the nodes has degree 0.

9.48.3.5 getHProb()

```
template<typename Network = UNetwork<>>
double LinkPred::HMSM< Network >::getHProb ( ) const  [inline]
```

Probability assigned to connected couples.

9.48.3.6 getLProb()

```
template<typename Network = UNetwork<>>
double LinkPred::HMSM< Network >::getLProb ( ) const  [inline]
```

Probability assigned to disconnected couples.

9.48.3.7 getNbMdsRuns()

```
template<typename Network = UNetwork<>>
int LinkPred::HMSM< Network >::getNbMdsRuns ( ) const  [inline]
```

Returns

The number of times MDS is run (with default starting point).

9.48.3.8 getTol()

```
template<typename Network = UNetwork<>>
double LinkPred::HMSM< Network >::getTol ( ) const  [inline]
```

Returns

Tolerance for stopping the MDS optimization problem.

9.48.3.9 init()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::HMSM< Network >::init ( )  [virtual]
```

Initialize encoder.

Implements LinkPred::Encoder< UNetwork<> >.

9.48.3.10 operator=() [1/2]

```
template<typename Network = UNetwork<>>
HMSM& LinkPred::HMSM< Network >::operator= (
             HMSM< Network > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.48.3.11 operator=() [2/2]

```
template<typename Network = UNetwork<>>
HMSM& LinkPred::HMSM< Network >::operator= (
            HMSM< Network > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.48.3.12 setAlpha()

```
template<typename Network = UNetwork<>>
void LinkPred::HMSM< Network >::setAlpha (
            double alpha )  [inline]
```

Set the parameter alpha of the HMSM model.

Parameters

alpha	The parameter alpha of the HMSM model.

9.48.3.13 setEps()

```
template<typename Network = UNetwork<>>
void LinkPred::HMSM< Network >::setEps (
            double eps )  [inline]
```

Set degree product when of the nodes has degree 0.

Parameters

eps	Degree product when of the nodes has degree 0.

9.48.3.14 setHProb()

```
template<typename Network = UNetwork<>>
void LinkPred::HMSM< Network >::setHProb (
             double hProb )  [inline]
```

Set the probability assigned to connected couples.

Parameters

hProb	Probability assigned to connected couples.

9.48.3.15 setNbMdsRuns()

```
template<typename Network = UNetwork<>>
void LinkPred::HMSM< Network >::setNbMdsRuns (
             int nbMdsRuns )  [inline]
```

Set the number of times MDS is run (with default starting point).

Parameters

nbMdsRuns	Number of times MDS is run (with default starting point).

9.48.3.16 setProb()

```
template<typename Network = UNetwork<>>
void LinkPred::HMSM< Network >::setProb (
             double lProb )  [inline]
```

Set the probability assigned to disconnected couples.

Parameters

lProb	Probability assigned to disconnected couples.

9.48.3.17 setTol()

```
template<typename Network = UNetwork<>>
void LinkPred::HMSM< Network >::setTol (
             double tol )  [inline]
```

Set the tolerance for stopping the MDS optimization problem.

Parameters

tol	Tolerance for stopping the MDS optimization problem.

9.48.3.18 setWeightMap()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::HMSM< Network >::setWeightMap (
            const WeightMapSP & weightMap )  [inline], [virtual]
```

Set edge weight map.

Parameters

weightMap	Edge weight map.

Reimplemented from LinkPred::Encoder< UNetwork<> >.

The documentation for this class was generated from the following file:

- include/linkpred/graphalg/encoders/hmsm/hmsm.hpp

9.49 LinkPred::Simp::Evaluator::Factory::HRGParams Struct Reference

Parameters of HRG.

```
#include <evaluator.hpp>
```

Public Attributes

- int nbBeans = 25
- int nbSamples = 10000
- long int seed = 0

9.49.1 Detailed Description

Parameters of HRG.

9.49.2 Member Data Documentation

9.49.2.1 nbBeans

```
int LinkPred::Simp::Evaluator::Factory::HRGParams::nbBeans = 25
```

Number of bins in edge statistics histogram in HRG.

9.49.2.2 nbSamples

```
int LinkPred::Simp::Evaluator::Factory::HRGParams::nbSamples = 10000
```

Number of samples to take for predictions in HRG.

9.49.2.3 seed

```
long int LinkPred::Simp::Evaluator::Factory::HRGParams::seed = 0
```

Seed for HRG

The documentation for this struct was generated from the following file:

- include/linkpred/simp/evaluator.hpp

9.50 LinkPred::Simp::Evaluator::Factory::HYPParams Struct Reference

Parameters of HYP.

```
#include <evaluator.hpp>
```

Public Attributes

- double m = 1.5
- double L = 1
- double gamma = 2.1
- double zeta = 1
- double T = 0.8
- long int seed = 0

9.50.1 Detailed Description

Parameters of HYP.

9.50.2 Member Data Documentation

9.50.2.1 gamma

```
double LinkPred::Simp::Evaluator::Factory::HYPParams::gamma = 2.1
```

The power law exponent gamma (see the HYP algorithm description).

9.50.2.2 L

```
double LinkPred::Simp::Evaluator::Factory::HYPParams::L = 1
```

The parameter L (see the HYP algorithm description).

9.50.2.3 m

```
double LinkPred::Simp::Evaluator::Factory::HYPParams::m = 1.5
```

The parameter m (see the HYP algorithm description).

9.50.2.4 seed

```
long int LinkPred::Simp::Evaluator::Factory::HYPParams::seed = 0
```

The random number generator seed for HYP.

9.50.2.5 T

```
double LinkPred::Simp::Evaluator::Factory::HYPParams::T = 0.8
```

The parameter T (see the HYP algorithm description).

9.50.2.6 zeta

```
double LinkPred::Simp::Evaluator::Factory::HYPParams::zeta = 1
```

The parameter zeta (see the HYP algorithm description).

The documentation for this struct was generated from the following file:

- include/linkpred/simp/evaluator.hpp

9.51 LinkPred::Simp::Evaluator::Factory::KABParams Struct Reference

Parameters of KAB.

```
#include <evaluator.hpp>
```

Public Attributes

- int horizLim = 2

9.51.1 Detailed Description

Parameters of KAB.

9.51.2 Member Data Documentation

9.51.2.1 horizLim

```
int LinkPred::Simp::Evaluator::Factory::KABParams::horizLim = 2
```

Horizon limit for KAB.

The documentation for this struct was generated from the following file:

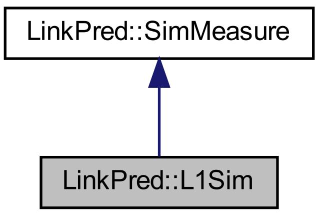
- include/linkpred/simp/evaluator.hpp

9.52 LinkPred::L1Sim Class Reference

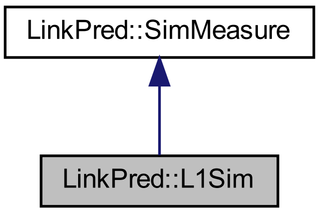
L1 similarity (negative the L1 norm or Manhattan distance).

```
#include <l1sim.hpp>
```

Inheritance diagram for LinkPred::L1Sim:



Collaboration diagram for LinkPred::L1Sim:



Public Member Functions

- L1Sim ()
- L1Sim (L1Sim const &that)=default
- L1Sim & operator= (L1Sim const &that)=default
- L1Sim (L1Sim &&that)=default
- L1Sim & operator= (L1Sim &&that)=default
- virtual double sim (Vec const &v1, Vec const &v2)
- virtual ∼L1Sim ()=default

9.52.1 Detailed Description

L1 similarity (negative the L1 norm or Manhattan distance).

9.52.2 Constructor & Destructor Documentation

9.52.2.1 L1Sim() [1/3]

```
LinkPred::L1Sim::L1Sim ( )  [inline]
```

Constructor.

9.52.2.2 L1Sim() [2/3]

```
LinkPred::L1Sim::L1Sim (
             L1Sim const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.52.2.3 L1Sim() [3/3]

```
LinkPred::L1Sim::L1Sim (
            L1Sim && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.52.2.4 ∼L1Sim()

```
virtual LinkPred::L1Sim::∼L1Sim ( )  [virtual], [default]
```

Destructor.

9.52.3 Member Function Documentation

9.52.3.1 operator=() [1/2]

```
L1Sim& LinkPred::L1Sim::operator= (
            L1Sim && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.52.3.2 operator=() [2/2]

```
L1Sim& LinkPred::L1Sim::operator= (
            L1Sim const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.52.3.3 sim()

```
virtual double LinkPred::L1Sim::sim (
            Vec const & v1,
            Vec const & v2 )  [virtual]
```

Compute the similarity between two vectors.

Parameters

v1	First vector.
v2	Second vector. Must be of the same dimension as v1.

Returns

The similarity between v1 and v2.

Implements LinkPred::SimMeasure.

The documentation for this class was generated from the following file:

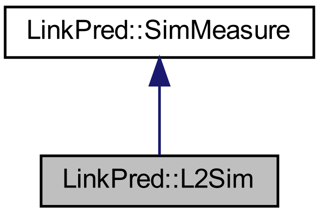
- include/linkpred/ml/simmeasures/l1sim.hpp

9.53 LinkPred::L2Sim Class Reference

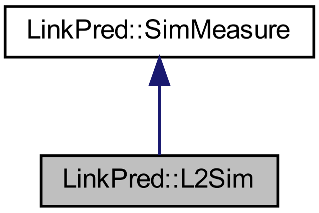
L2 similarity (negative the Euclidean distance).

```
#include <l2sim.hpp>
```

Inheritance diagram for LinkPred::L2Sim:



Collaboration diagram for LinkPred::L2Sim:



Public Member Functions

- L2Sim ()
- L2Sim (L2Sim const &that)=default
- L2Sim & operator= (L2Sim const &that)=default
- L2Sim (L2Sim &&that)=default
- L2Sim & operator= (L2Sim &&that)=default
- virtual double sim (Vec const &v1, Vec const &v2)
- virtual ∼L2Sim ()=default

9.53.1 Detailed Description

L2 similarity (negative the Euclidean distance).

9.53.2 Constructor & Destructor Documentation

9.53.2.1 L2Sim() [1/3]

```
LinkPred::L2Sim::L2Sim ( )  [inline]
```

Constructor.

9.53.2.2 L2Sim() [2/3]

```
LinkPred::L2Sim::L2Sim (
            L2Sim const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.53.2.3 L2Sim() [3/3]

```
LinkPred::L2Sim::L2Sim (
            L2Sim && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.53.2.4 ∼L2Sim()

```
virtual LinkPred::L2Sim::∼L2Sim ( )  [virtual], [default]
```

Destructor.

9.53.3 Member Function Documentation

9.53.3.1 operator=() [1/2]

```
L2Sim& LinkPred::L2Sim::operator= (
            L2Sim && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.53.3.2 operator=() [2/2]

```
L2Sim& LinkPred::L2Sim::operator= (
            L2Sim const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.53.3.3 sim()

```
virtual double LinkPred::L2Sim::sim (
            Vec const & v1,
            Vec const & v2 )  [virtual]
```

Compute the similarity between two vectors.

Parameters

v1	First vector.
v2	Second vector. Must be of the same dimension as v1.

Returns

The similarity between v1 and v2.

Implements LinkPred::SimMeasure.

The documentation for this class was generated from the following file:

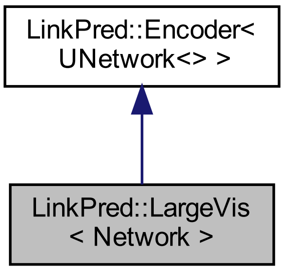
- include/linkpred/ml/simmeasures/l2sim.hpp

9.54 LinkPred::LargeVis< Network > Class Template Reference

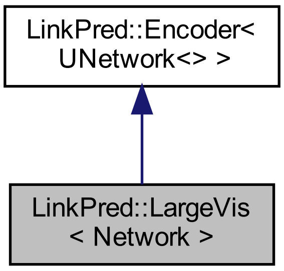
LargeVis encoder. Reference: Tang, J., Liu, J., Zhang, M., and Mei, Q. (2016b). Visualizing large-scale and high-dimensional data. In Bourdeau, J., Hendler, J., Nkambou, R., Horrocks, I., and Zhao, B. Y., editors, WWW, pages 287–297. ACM. This implementation is based on the code `https://github.com/lferry007/Large↩ Vis`.

```
#include <largevis.hpp>
```

Inheritance diagram for LinkPred::LargeVis< Network >:


LinkPred::Encoder< UNetwork<> >
LinkPred::LargeVis < Network >

Collaboration diagram for LinkPred::LargeVis< Network >:


LinkPred::Encoder< UNetwork<> >
LinkPred::LargeVis < Network >

Public Member Functions

- LargeVis (std::shared_ptr< Network const > net, long int seed)
- LargeVis (LargeVis const &that)=default
- LargeVis & operator= (LargeVis const &that)=default
- LargeVis (LargeVis &&that)=default
- LargeVis & operator= (LargeVis &&that)=default
- virtual void init ()
- virtual void encode ()
- void setNbSamples ()
- float getGamma () const
- void setGamma (float gamma)
- float getInitLR () const
- void setInitLR (float initLR)
- long long getNbNegSamples () const
- void setNbNegSamples (long long nbNegSamples)
- long long getNbSamples () const

- void setNbSamples (long long nbSamples)
- long long getNegSize () const
- void setNegSize (long long negSize)
- float getNegSamplingPower () const
- void setNegSamplingPower (float negSamplingPower)
- const int getDefaultDim () const
- virtual ∼LargeVis ()=default

Additional Inherited Members

9.54.1 Detailed Description

template<typename Network = UNetwork<>>
class LinkPred::LargeVis< Network >

LargeVis encoder. Reference: Tang, J., Liu, J., Zhang, M., and Mei, Q. (2016b). Visualizing large-scale and high-dimensional data. In Bourdeau, J., Hendler, J., Nkambou, R., Horrocks, I., and Zhao, B. Y., editors, WWW, pages 287–297. ACM. This implementation is based on the code `https://github.com/lferry007/Large↩ Vis`.

Template Parameters

Network	The network type.

9.54.2 Constructor & Destructor Documentation

9.54.2.1 LargeVis() [1/3]

```
template<typename Network = UNetwork<>>
LinkPred::LargeVis< Network >::LargeVis (
            std::shared_ptr< Network const > net,
            long int seed )  [inline]
```

Constructor.

Parameters

net	The network.
seed	Random number generator seed.

9.54.2.2 LargeVis() [2/3]

```
template<typename Network = UNetwork<>>
```

```
LinkPred::LargeVis< Network >::LargeVis (
            LargeVis< Network > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.54.2.3 LargeVis() [3/3]

```
template<typename Network = UNetwork<>>
LinkPred::LargeVis< Network >::LargeVis (
            LargeVis< Network > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.54.2.4 ∼LargeVis()

```
template<typename Network = UNetwork<>>
virtual LinkPred::LargeVis< Network >::∼LargeVis ( )  [virtual], [default]
```

Destructor.

9.54.3 Member Function Documentation

9.54.3.1 encode()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::LargeVis< Network >::encode ( )  [virtual]
```

Encode the network.

Implements LinkPred::Encoder< UNetwork<> >.

9.54.3.2 getDefaultDim()

```
template<typename Network = UNetwork<>>
const int LinkPred::LargeVis< Network >::getDefaultDim ( ) const  [inline]
```

Returns

The default embedding dimension.

9.54.3.3 getGamma()

```
template<typename Network = UNetwork<>>
float LinkPred::LargeVis< Network >::getGamma ( ) const  [inline]
```

Returns

The parameter gamma.

9.54.3.4 getInitLR()

```
template<typename Network = UNetwork<>>
float LinkPred::LargeVis< Network >::getInitLR ( ) const  [inline]
```

Returns

Initial learning rate.

9.54.3.5 getNbNegSamples()

```
template<typename Network = UNetwork<>>
long long LinkPred::LargeVis< Network >::getNbNegSamples ( ) const  [inline]
```

Returns

Number of negative samples.

9.54.3.6 getNbSamples()

```
template<typename Network = UNetwork<>>
long long LinkPred::LargeVis< Network >::getNbSamples ( ) const  [inline]
```

Returns

Number of samples.

9.54.3.7 getNegSamplingPower()

```
template<typename Network = UNetwork<>>
float LinkPred::LargeVis< Network >::getNegSamplingPower ( ) const  [inline]
```

Parameters

Power	used in negative sampling.

9.54.3.8 getNegSize()

```
template<typename Network = UNetwork<>>
long long LinkPred::LargeVis< Network >::getNegSize ( ) const  [inline]
```

Returns

The size of the table used in negative sampling.

9.54.3.9 init()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::LargeVis< Network >::init ( )  [virtual]
```

Initialize encoder.

Implements LinkPred::Encoder< UNetwork<> >.

9.54.3.10 operator=() [1/2]

```
template<typename Network = UNetwork<>>
LargeVis& LinkPred::LargeVis< Network >::operator= (
             LargeVis< Network > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.54.3.11 operator=() [2/2]

```
template<typename Network = UNetwork<>>
LargeVis& LinkPred::LargeVis< Network >::operator= (
             LargeVis< Network > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.54.3.12 setGamma()

```
template<typename Network = UNetwork<>>
void LinkPred::LargeVis< Network >::setGamma (
             float gamma )  [inline]
```

Set the parameter gamma.

Parameters

gamma	The parameter gamma.

9.54.3.13 setInitLR()

```
template<typename Network = UNetwork<>>
void LinkPred::LargeVis< Network >::setInitLR (
             float initLR )  [inline]
```

Set the initial learning rate.

Parameters

initLR	The initial learning rate.

9.54.3.14 setNbNegSamples()

```
template<typename Network = UNetwork<>>
void LinkPred::LargeVis< Network >::setNbNegSamples (
             long long nbNegSamples )  [inline]
```

Set the number of negative samples.

Parameters

nbNegSamples	The number of negative samples.

9.54.3.15 setNbSamples() [1/2]

```
template<typename Network = UNetwork<>>
void LinkPred::LargeVis< Network >::setNbSamples ( )
```

Set nbSamples using a simple rule of thumb.

9.54.3.16 setNbSamples() [2/2]

```
template<typename Network = UNetwork<>>
void LinkPred::LargeVis< Network >::setNbSamples (
             long long nbSamples )  [inline]
```

Set the number of samples.

Parameters

nbSamples	The number of samples.

9.54.3.17 setNegSamplingPower()

```
template<typename Network = UNetwork<>>
void LinkPred::LargeVis< Network >::setNegSamplingPower (
             float negSamplingPower )  [inline]
```

Set the power used in negative sampling.

Parameters

negSamplingPower	Power used in negative sampling.

9.54.3.18 setNegSize()

```
template<typename Network = UNetwork<>>
void LinkPred::LargeVis< Network >::setNegSize (
             long long negSize )  [inline]
```

Set the size of the table used in negative sampling.

Parameters

negSize	Size of the table used in negative sampling.

The documentation for this class was generated from the following file:

- include/linkpred/graphalg/encoders/largevis/largevis.hpp

9.55 LinkPred::Simp::Evaluator::Factory::LCPParams Struct Reference

Parameters of LCP.

```
#include <evaluator.hpp>
```

Public Attributes

- double epsilon = 0.001

9.55.1 Detailed Description

Parameters of LCP.

9.55.2 Member Data Documentation

9.55.2.1 epsilon

```
double LinkPred::Simp::Evaluator::Factory::LCPParams::epsilon = 0.001
```

The weight of paths of length 3 in LCP.

The documentation for this struct was generated from the following file:

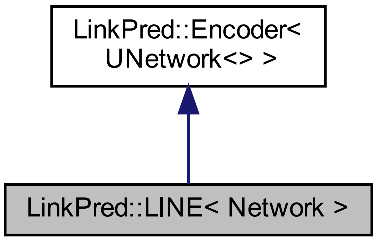
- include/linkpred/simp/evaluator.hpp

9.56 LinkPred::LINE< Network > Class Template Reference

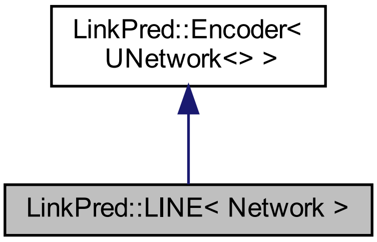
LINE encoder.

```
#include <line.hpp>
```

Inheritance diagram for LinkPred::LINE< Network >:



Collaboration diagram for LinkPred::LINE< Network >:



Public Member Functions

- LINE (std::shared_ptr< Network const > net, long int seed)
- LINE (LINE const &that)=default
- LINE & operator= (LINE const &that)=default
- LINE (LINE &&that)=default
- LINE & operator= (LINE &&that)=default
- virtual void init ()
- virtual void encode ()
- float getInitLr () const
- void setInitLr (float initLR)
- int getNbNegSamples () const
- void setNbNegSamples (int nbNegSamples)

- int getOrder () const
- void setOrder (int order)
- float getNegSamplingPower () const
- void setNegSamplingPower (float negSamplingPower)
- long long getNegSize () const
- void setNegSize (long long negSize)
- bool isEnableReconstruct () const
- void setEnableReconstruct (bool enableReconstruct)
- const std::shared_ptr< const Network > getRecNet () const
- const WeightMapSP & getRecWeightMap () const
- const int getDefaultDim () const
- virtual ∼LINE ()=default

Additional Inherited Members

9.56.1 Detailed Description

template<typename Network = UNetwork<>>
class LinkPred::LINE< Network >

LINE encoder.

This implementation is based on the code `https://github.com/tangjianpku/LINE` Reference: Tang, J., Qu, M., Wang, M., Zhang, M., Yan, J., and Mei, Q. (2015). LINE: Large-Scale Information Network Embedding, page 1067–1077. International World Wide Web Conferences Steering Committee, Republic and Canton of Geneva, CHE.

Template Parameters

Network	The network type.

9.56.2 Constructor & Destructor Documentation

9.56.2.1 LINE() [1/3]

```
template<typename Network = UNetwork<>>
LinkPred::LINE< Network >::LINE (
            std::shared_ptr< Network const > net,
            long int seed )  [inline]
```

Constructor.

Parameters

net	The network.
seed	Random number generator seed.

9.56.2.2 LINE() [2/3]

```
template<typename Network = UNetwork<>>
LinkPred::LINE< Network >::LINE (
             LINE< Network > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.56.2.3 LINE() [3/3]

```
template<typename Network = UNetwork<>>
LinkPred::LINE< Network >::LINE (
             LINE< Network > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.56.2.4 ∼LINE()

```
template<typename Network = UNetwork<>>
virtual LinkPred::LINE< Network >::∼LINE ( )  [virtual], [default]
```

Destructor.

9.56.3 Member Function Documentation

9.56.3.1 encode()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::LINE< Network >::encode ( )  [virtual]
```

Encode the network.

Implements LinkPred::Encoder< UNetwork<> >.

9.56.3.2 getDefaultDim()

```
template<typename Network = UNetwork<>>
const int LinkPred::LINE< Network >::getDefaultDim ( ) const  [inline]
```

Returns

The default embedding dimension.

9.56.3.3 getInitLr()

```
template<typename Network = UNetwork<>>
float LinkPred::LINE< Network >::getInitLr ( ) const  [inline]
```

Returns

Initial learning rate.

9.56.3.4 getNbNegSamples()

```
template<typename Network = UNetwork<>>
int LinkPred::LINE< Network >::getNbNegSamples ( ) const  [inline]
```

Returns

Number of negative samples.

9.56.3.5 getNegSamplingPower()

```
template<typename Network = UNetwork<>>
float LinkPred::LINE< Network >::getNegSamplingPower ( ) const  [inline]
```

Parameters

Power	used in negative sampling.

9.56.3.6 getNegSize()

```
template<typename Network = UNetwork<>>
long long LinkPred::LINE< Network >::getNegSize ( ) const  [inline]
```

Returns

The size of the table used in negative sampling.

9.56.3.7 getOrder()

```
template<typename Network = UNetwork<>>
int LinkPred::LINE< Network >::getOrder ( ) const  [inline]
```

Returns

The order of similarity. Possible values are: 1 (first order), 2 (second order), and 12 (concatenate first and second order). When order = 12, the embedding dimension is split between first order codes and second order codes.

9.56.3.8 getRecNet()

```
template<typename Network = UNetwork<>>
const std::shared_ptr<const Network> LinkPred::LINE< Network >::getRecNet ( ) const  [inline]
```

Returns

The reconstructed network.

9.56.3.9 getRecWeightMap()

```
template<typename Network = UNetwork<>>
const WeightMapSP& LinkPred::LINE< Network >::getRecWeightMap ( ) const  [inline]
```

Returns

The weight map of the reconstructed network.

9.56.3.10 init()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::LINE< Network >::init ( )  [virtual]
```

Initialize encoder.

Implements LinkPred::Encoder< UNetwork<> >.

9.56.3.11 isEnableReconstruct()

```
template<typename Network = UNetwork<>>
bool LinkPred::LINE< Network >::isEnableReconstruct ( ) const  [inline]
```

Returns

Whether the network is reconstructed (expanded).

9.56.3.12 operator=() [1/2]

```
template<typename Network = UNetwork<>>
LINE& LinkPred::LINE< Network >::operator= (
             LINE< Network > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.56.3.13 operator=() [2/2]

```
template<typename Network = UNetwork<>>
LINE& LinkPred::LINE< Network >::operator= (
             LINE< Network > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.56.3.14 setEnableReconstruct()

```
template<typename Network = UNetwork<>>
void LinkPred::LINE< Network >::setEnableReconstruct (
             bool enableReconstruct )  [inline]
```

Set whether the network is reconstructed (expanded).

Parameters

enableReconstruct	Whether the network is reconstructed (expanded).

9.56.3.15 setInitLr()

```
template<typename Network = UNetwork<>>
void LinkPred::LINE< Network >::setInitLr (
             float initLR )  [inline]
```

Set the initial learning rate.

Parameters

initLR	The initial learning rate.

9.56.3.16 setNbNegSamples()

```
template<typename Network = UNetwork<>>
void LinkPred::LINE< Network >::setNbNegSamples (
             int nbNegSamples )  [inline]
```

Set the number of negative samples.

Parameters

nbNegSamples	The number of negative samples.

9.56.3.17 setNegSamplingPower()

```
template<typename Network = UNetwork<>>
void LinkPred::LINE< Network >::setNegSamplingPower (
             float negSamplingPower )  [inline]
```

Set the power used in negative sampling.

Parameters

negSamplingPower	Power used in negative sampling.

9.56.3.18 setNegSize()

```
template<typename Network = UNetwork<>>
void LinkPred::LINE< Network >::setNegSize (
            long long negSize ) [inline]
```

Set the size of the table used in negative sampling.

Parameters

negSize	Size of the table used in negative sampling.

9.56.3.19 setOrder()

```
template<typename Network = UNetwork<>>
void LinkPred::LINE< Network >::setOrder (
            int order ) [inline]
```

Set the order of similarity. Possible values are: 1 (first order), 2 (second order), and 12 (concatenate first and second order). When order = 12, the embedding dimension is split between first order codes and second order codes.

Parameters

order	Order of similarity.

The documentation for this class was generated from the following file:

- include/linkpred/graphalg/encoders/line/line.hpp

9.57 LinkPred::LMapQueue< K, P, KComparator, PComparator > Class Template Reference

A map-priority queue with limit on the capacity.

```
#include <lmapqueue.hpp>
```

Public Member Functions

- LMapQueue (std::size_t l)
- LMapQueue (LMapQueue const &that)=default
- LMapQueue & operator= (LMapQueue const &that)=default
- LMapQueue (LMapQueue &&that)=default
- LMapQueue & operator= (LMapQueue &&that)=default
- const std::pair< K, P > & top () const
- bool empty () const

- std::size_t size () const
- void printPQ ()
- bool push (std::pair< K, P > const &elem)
- bool push (K const &key, P const &pr)
- bool compareTop (P const &pr)
- P & at (K const &key)
- const P & at (K const &key) const
- void pop ()
- void pop (P const pr)
- auto begin ()
- auto begin () const
- auto cbegin () const
- auto end ()
- auto end () const
- auto cend () const
- std::size_t getL () const
- void clear ()
- std::size_t count (K const &key) const
- auto find (K const &key) const
- virtual ∼LMapQueue ()=default

Static Public Member Functions

- template<typename RandomIterator >
  static LMapQueue< K, P, KComparator, PComparator > merge (std::size_t k, RandomIterator begin, RandomIterator end)

9.57.1 Detailed Description

**template<typename K, typename P, typename KComparator = std::less<K>, typename PComparator = std::greater<P>>
class LinkPred::LMapQueue< K, P, KComparator, PComparator >**

A map-priority queue with limit on the capacity.

Template Parameters

K	The key type.
P	The priority type.
KComparator	Key comparator.
PComparator	Priority comparator.

9.57.2 Constructor & Destructor Documentation

9.57.2.1 LMapQueue() `[1/3]`

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
```

```
LinkPred::LMapQueue< K, P, KComparator, PComparator >::LMapQueue (
             std::size_t l )  [inline]
```

Constructor.

Parameters

l	The capacity limit of the container.

9.57.2.2 LMapQueue() [2/3]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
LinkPred::LMapQueue< K, P, KComparator, PComparator >::LMapQueue (
             LMapQueue< K, P, KComparator, PComparator > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.57.2.3 LMapQueue() [3/3]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
LinkPred::LMapQueue< K, P, KComparator, PComparator >::LMapQueue (
             LMapQueue< K, P, KComparator, PComparator > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.57.2.4 ∼LMapQueue()

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
virtual LinkPred::LMapQueue< K, P, KComparator, PComparator >::~LMapQueue ( )  [virtual],
[default]
```

Destructor.

9.57.3 Member Function Documentation

9.57.3.1 at() [1/2]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
P& LinkPred::LMapQueue< K, P, KComparator, PComparator >::at (
            K const & key ) [inline]
```

Returns a reference to the priority of the element with key equivalent to key. If no such element exists, an exception of type std::out_of_range is thrown.

Parameters

key	The key of the element to find.

Returns

Reference to the priority of the requested element

9.57.3.2 at() [2/2]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
const P& LinkPred::LMapQueue< K, P, KComparator, PComparator >::at (
            K const & key ) const [inline]
```

Returns a reference to the priority of the element with key equivalent to key. If no such element exists, an exception of type std::out_of_range is thrown.

Parameters

key	The key of the element to find.

Returns

Reference to the priority of the requested element

9.57.3.3 begin() [1/2]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
auto LinkPred::LMapQueue< K, P, KComparator, PComparator >::begin ( ) [inline]
```

Returns

An iterator to the first element in the map.

9.57.3.4 begin() [2/2]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
auto LinkPred::LMapQueue< K, P, KComparator, PComparator >::begin ( ) const  [inline]
```

Returns

A constant iterator to the first element in the map.

9.57.3.5 cbegin()

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
auto LinkPred::LMapQueue< K, P, KComparator, PComparator >::cbegin ( ) const  [inline]
```

Returns

A constant iterator to the first element in the map.

9.57.3.6 cend()

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
auto LinkPred::LMapQueue< K, P, KComparator, PComparator >::cend ( ) const  [inline]
```

Returns

A constant iterator to the one-past-the-last element in the map.

9.57.3.7 clear()

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
void LinkPred::LMapQueue< K, P, KComparator, PComparator >::clear ( )  [inline]
```

Clear the content of the container.

9.57.3.8 compareTop()

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
bool LinkPred::LMapQueue< K, P, KComparator, PComparator >::compareTop (
             P const & pr )  [inline]
```

Compares the input priority to the priority of the top element in the queue. The queue must not be empty. A true return value means that an element with priority pr will be inserted to the queue.

Parameters

pr	The priority to be compared.

Returns

True result of comparing the priority of top to pr.

9.57.3.9 count()

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
std::size_t LinkPred::LMapQueue< K, P, KComparator, PComparator >::count (
             K const & key ) const  [inline]
```

Parameters

key	key value of the elements to count.

Returns

Number of elements with key that compares equivalent to key, which is either 1 or 0.

9.57.3.10 empty()

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
bool LinkPred::LMapQueue< K, P, KComparator, PComparator >::empty ( ) const  [inline]
```

Checks whether the container is empty.

Returns

True if the container is empty, false otherwise.

9.57.3.11 end() [1/2]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
auto LinkPred::LMapQueue< K, P, KComparator, PComparator >::end ( )  [inline]
```

Returns

An iterator to the one-past-the-last element in the map.

9.57.3.12 end() [2/2]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
auto LinkPred::LMapQueue< K, P, KComparator, PComparator >::end ( ) const  [inline]
```

Returns

A constant iterator to the one-past-the-last element in the map.

9.57.3.13 find()

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
auto LinkPred::LMapQueue< K, P, KComparator, PComparator >::find (
             K const & key ) const  [inline]
```

Parameters

key	value of the element to search for.

Returns

Iterator to an element with key equivalent to key. If no such element is found, past-the-end (see end()) iterator is returned.

9.57.3.14 getL()

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
std::size_t LinkPred::LMapQueue< K, P, KComparator, PComparator >::getL ( ) const  [inline]
```

Returns

The value of the limiting capacity.

9.57.3.15 merge()

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
template<typename RandomIterator >
static LMapQueue<K, P, KComparator, PComparator> LinkPred::LMapQueue< K, P, KComparator, P↩
Comparator >::merge (
             std::size_t k,
             RandomIterator begin,
             RandomIterator end )  [inline], [static]
```

Merge several queues by selecting at most the top k elements. The elements selected are unique. In case of duplication, the highest priority is considered. The input queues are emptied.

9.57.3.16 operator=() [1/2]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
LMapQueue& LinkPred::LMapQueue< K, P, KComparator, PComparator >::operator= (
             LMapQueue< K, P, KComparator, PComparator > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.57.3.17 operator=() [2/2]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
LMapQueue& LinkPred::LMapQueue< K, P, KComparator, PComparator >::operator= (
             LMapQueue< K, P, KComparator, PComparator > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.57.3.18 pop() [1/2]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
void LinkPred::LMapQueue< K, P, KComparator, PComparator >::pop ( )  [inline]
```

Removes the top element from the priority queue.

9.57.3.19 pop() [2/2]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
void LinkPred::LMapQueue< K, P, KComparator, PComparator >::pop (
             P const pr )  [inline]
```

Removes all element with priority strictly less than the specified value.

Parameters

pr	The threshold priority.

9.57.3.20 printPQ()

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
void LinkPred::LMapQueue< K, P, KComparator, PComparator >::printPQ ( )  [inline]
```

Print the content of the queue.

9.57.3.21 push() [1/2]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
bool LinkPred::LMapQueue< K, P, KComparator, PComparator >::push (
            K const & key,
            P const & pr )  [inline]
```

Insert an element into the map. Only the top l elements are kept.

Parameters

key	The key of the element top insert.
pr	The priority of the element.

Returns

True if the insertion takes place, false otherwise.

9.57.3.22 push() [2/2]

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
bool LinkPred::LMapQueue< K, P, KComparator, PComparator >::push (
            std::pair< K, P > const & elem )  [inline]
```

Insert an element into the map. Only the top l elements are kept.

Parameters

elem	A pair where the first element is the key of the element top insert, and the second element is the priority of the element.

Returns

True if the insertion takes place, false otherwise.

9.57.3.23 size()

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
std::size_t LinkPred::LMapQueue< K, P, KComparator, PComparator >::size ( ) const  [inline]
```

Returns

The number of elements in the container.

9.57.3.24 top()

```
template<typename K , typename P , typename KComparator = std::less<K>, typename PComparator
= std::greater<P>>
const std::pair<K, P>& LinkPred::LMapQueue< K, P, KComparator, PComparator >::top ( ) const
[inline]
```

Returns

A reference to the element with the highest priority.

The documentation for this class was generated from the following file:

- include/linkpred/core/ds/lmapqueue.hpp

9.58 LinkPred::Log Class Reference

A log class.

```
#include <log.hpp>
```

Public Member Functions

- Log (LogLevel level=logError)
- template<typename T >
  Log & operator<< (T const &value)
- ∼Log ()

Static Public Attributes

- static constexpr std::ostream ∗ DefaultOutputStream = &std::cerr
- static const LogLevel DefaultLogLevel = logError
- static std::ostream ∗ out
- static LogLevel logLevel

9.58.1 Detailed Description

A log class.

9.58.2 Constructor & Destructor Documentation

9.58.2.1 Log()

```
LinkPred::Log::Log (
            LogLevel level = logError )  [inline]
```

Constructor.

9.58.2.2 ∼Log()

```
LinkPred::Log::∼Log ( )  [inline]
```

Destructor.

9.58.3 Member Function Documentation

9.58.3.1 operator<<()

```
template<typename T >
Log& LinkPred::Log::operator<< (
            T const & value )  [inline]
```

Copy constructor.

Parameters

value	Value to be logged.

9.58.4 Member Data Documentation

9.58.4.1 DefaultLogLevel

```
const LogLevel LinkPred::Log::DefaultLogLevel = logError  [static]
```

Default log level.

9.58.4.2 DefaultOutputStream

```
constexpr std::ostream* LinkPred::Log::DefaultOutputStream = &std::cerr  [static], [constexpr]
```

Default output stream.

9.58.4.3 logLevel

```
LogLevel LinkPred::Log::logLevel  [static]
```

Log level.

9.58.4.4 out

```
std::ostream* LinkPred::Log::out  [static]
```

Output file.

The documentation for this class was generated from the following file:

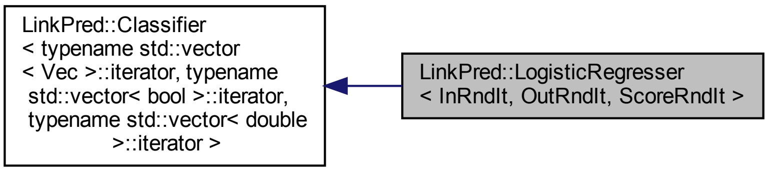
- include/linkpred/utils/log.hpp

9.59 LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt > Class Template Reference

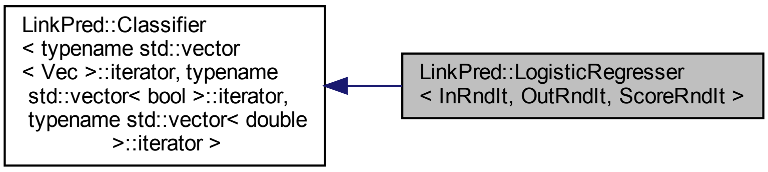
Logistic regression algorithm.

```
#include <logisticregresser.hpp>
```

Inheritance diagram for LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >:


LinkPred::Classifier
< typename std::vector
< Vec >::iterator, typename
std::vector< bool >::iterator,
typename std::vector< double
>::iterator >
LinkPred::LogisticRegresser
< InRndIt, OutRndIt, ScoreRndIt >

Collaboration diagram for LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >:


LinkPred::Classifier
< typename std::vector
< Vec >::iterator, typename
std::vector< bool >::iterator,
typename std::vector< double
>::iterator >
LinkPred::LogisticRegresser
< InRndIt, OutRndIt, ScoreRndIt >

Public Member Functions

- LogisticRegresser (double lambda, long int seed)
- LogisticRegresser (LogisticRegresser const &that)=default
- LogisticRegresser & operator= (LogisticRegresser const &that)=default
- LogisticRegresser (LogisticRegresser &&that)=default
- LogisticRegresser & operator= (LogisticRegresser &&that)=default
- virtual void learn (InRndIt trInBegin, InRndIt trInEnd, OutRndIt trOutBegin, OutRndIt trOutEnd)
- virtual void predict (InRndIt inBegin, InRndIt inEnd, ScoreRndIt scoresBegin)
- double getLambda () const
- void setLambda (double lambda)
- double getTol () const
- void setTol (double tol)
- const Vec & getTheta () const
- virtual ∼LogisticRegresser ()=default

9.59.1 Detailed Description

**template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename std::vector<bool>↩ ::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
class LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >**

Logistic regression algorithm.

Template Parameters

InRndIt	Input (features) iterator type.
OutRndIt	Output (class) iterator type.
Score↩ RndIt	Classification scores iterator type.

9.59.2 Constructor & Destructor Documentation

9.59.2.1 LogisticRegresser() [1/3]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >::LogisticRegresser (
             double lambda,
             long int seed )  [inline]
```

Constructor.

Parameters

lambda	Regularization coefficient.
seed	The random number generator's seed.

9.59.2.2 LogisticRegresser() [2/3]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >::LogisticRegresser (
             LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.59.2.3 LogisticRegresser() [3/3]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >::LogisticRegresser (
             LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.59.2.4 ∼LogisticRegresser()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
virtual LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >::∼LogisticRegresser ( )
[virtual], [default]
```

Destructor.

9.59.3 Member Function Documentation

9.59.3.1 getLambda()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
double LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >::getLambda ( ) const
[inline]
```

Returns

The regularization coefficient.

9.59.3.2 getTheta()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
const Vec& LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >::getTheta ( ) const
[inline]
```

Returns

The model parameters.

9.59.3.3 getTol()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
double LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >::getTol ( ) const  [inline]
```

Returns

The tolerance.

9.59.3.4 learn()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
virtual void LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >::learn (
             InRndIt trInBegin,
             InRndIt trInEnd,
             OutRndIt trOutBegin,
             OutRndIt trOutEnd )  [virtual]
```

Learn from data.

Parameters

trInBegin	Iterator to the first example features (input).
trInEnd	Iterator to one-past-the-last example features (input).
trOutBegin	Iterator to the first example class (output).
trOutEnd	Iterator to one-past-the-last example class (output).

9.59.3.5 operator=() [1/2]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
```

```
LogisticRegresser& LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >::operator= (
            LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.59.3.6 operator=() [2/2]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
LogisticRegresser& LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >::operator= (
            LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.59.3.7 predict()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
virtual void LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >::predict (
            InRndIt inBegin,
            InRndIt inEnd,
            ScoreRndIt scoresBegin )  [virtual]
```

Predict.

Parameters

inBegin	Iterator to the first instance features (input).
inEnd	Iterator to one-past-the-last instance features (input).
scoresBegin	Iterator to the first location where to store prediction scores.

9.59.3.8 setLambda()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
```

```
void LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >::setLambda (
            double lambda )  [inline]
```

Set the regularization coefficient.

Parameters

lambda	The new regularization coefficient.

9.59.3.9 setTol()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
void LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >::setTol (
            double tol )  [inline]
```

Set the tolerance.

Parameters

tol	The new value of the tolerance.

The documentation for this class was generated from the following file:

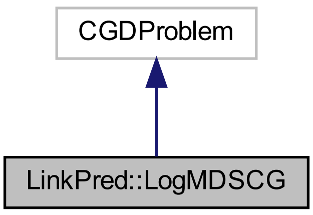
- include/linkpred/ml/classifiers/logistic/logisticregresser.hpp

9.60 LinkPred::LogMDSCG Class Reference

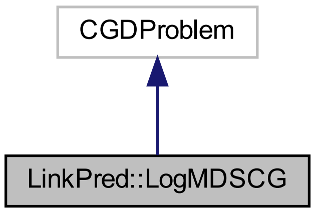
Optimization problem associated with multidimensional scaling using the logarithmic (MULTISCALE) loss function.

```
#include <logmdscg.hpp>
```

Inheritance diagram for LinkPred::LogMDSCG:



Collaboration diagram for LinkPred::LogMDSCG:



Public Member Functions

- LogMDSCG (std::size_t nbNodes, std::size_t nbKnownCouples, double ∗sqDist, double ∗weight, std::size_t dim, double ∗coords, long int seed)
- LogMDSCG (const LogMDSCG &that)=delete
- LogMDSCG & operator= (const LogMDSCG &that)=delete
- LogMDSCG (LogMDSCG &&that)=delete
- LogMDSCG & operator= (LogMDSCG &&that)=delete
- virtual void init (double ∗x, CG::INT n)
- virtual double f (double ∗x, CG::INT n)
- virtual void grad (double ∗grad_f, double ∗x, CG::INT n)
- virtual double fgrad (double ∗grad_f, double ∗x, CG::INT n)
- virtual void finalize (double ∗x, CG::INT n)
- virtual ∼LogMDSCG ()=default

9.60.1 Detailed Description

Optimization problem associated with multidimensional scaling using the logarithmic (MULTISCALE) loss function.

9.60.2 Constructor & Destructor Documentation

9.60.2.1 LogMDSCG() [1/3]

```
LinkPred::LogMDSCG::LogMDSCG (
             std::size_t nbNodes,
             std::size_t nbKnownCouples,
             double ∗ sqDist,
             double ∗ weight,
             std::size_t dim,
             double ∗ coords,
             long int seed )
```

Constructor.

Parameters

nbNodes	Number of nodes (or more generally, the number of data points).
nbKnownCouples	Number of couples for which the target distance is specified.
sqDist	Upper triangular matrix of squared distances without the diagonal stored sequentially as one vector.
weight	The weight associated with every distance (can be zero, if the distance is not relevant or unknown).
dim	The problem dimensionality.
coords	The coordinates (this is the solution to the problem).
seed	The random number generator's seed.

9.60.2.2 LogMDSCG() [2/3]

```
LinkPred::LogMDSCG::LogMDSCG (
            const LogMDSCG & that )   [delete]
```

Deleted copy constructor.

Parameters

that	The object to copy.

9.60.2.3 LogMDSCG() [3/3]

```
LinkPred::LogMDSCG::LogMDSCG (
            LogMDSCG && that )   [delete]
```

Deleted move constructor.

Parameters

that	The object to move.

9.60.2.4 ∼LogMDSCG()

```
virtual LinkPred::LogMDSCG::∼LogMDSCG ( )  [virtual], [default]
```

Default destructor.

9.60.3 Member Function Documentation

9.60.3.1 f()

```
virtual double LinkPred::LogMDSCG::f (
            double * x,
            CG::INT n )  [virtual]
```

Objective function.

Parameters

x	The variables.
n	The size.

Returns

The value of the objective.

9.60.3.2 fgrad()

```
virtual double LinkPred::LogMDSCG::fgrad (
            double * grad_f,
            double * x,
            CG::INT n )  [virtual]
```

Compute objective and gradient at the same time. This is a default implementation that should be overloaded if needed.

Parameters

grad↩_f	The gradient (output).
x	The variables.
n	The size.

Returns

The value of the objective.

9.60.3.3 finalize()

```
virtual void LinkPred::LogMDSCG::finalize (
            double * x,
            CG::INT n )  [virtual]
```

Finalize the solution.

Parameters

x	The variables.
n	The size.

9.60.3.4 grad()

```
virtual void LinkPred::LogMDSCG::grad (
             double * grad_f,
             double * x,
             CG::INT n ) [virtual]
```

Gradient.

Parameters

grad←↩ _f	The gradient (output).
x	The variables.
n	The size.

9.60.3.5 init()

```
virtual void LinkPred::LogMDSCG::init (
             double * x,
             CG::INT n ) [virtual]
```

Initializes x.

Parameters

x	The variables.
n	The size.

9.60.3.6 operator=() [1/2]

```
LogMDSCG& LinkPred::LogMDSCG::operator= (
             const LogMDSCG & that ) [delete]
```

Deleted copy assignment operator.

Parameters

that	The object to copy.

9.60.3.7 operator=() `[2/2]`

```
LogMDSCG& LinkPred::LogMDSCG::operator= (
            LogMDSCG && that )  [delete]
```

Deleted move assignment operator.

Parameters

that	The object to move.

The documentation for this class was generated from the following file:

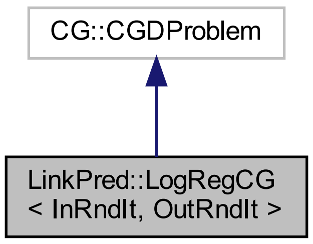
- include/linkpred/numerical/mds/logmdscg.hpp

9.61 LinkPred::LogRegCG< InRndIt, OutRndIt > Class Template Reference

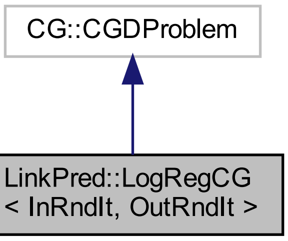
Logistic regression optimization problem.

```
#include <logregcg.hpp>
```

Inheritance diagram for LinkPred::LogRegCG< InRndIt, OutRndIt >:



Collaboration diagram for LinkPred::LogRegCG< InRndIt, OutRndIt >:



Public Member Functions

- LogRegCG (InRndIt trInBegin, InRndIt trInEnd, OutRndIt trOutBegin, OutRndIt trOutEnd, double lambda, long int seed)
- LogRegCG (const LogRegCG &that)=delete
- LogRegCG & operator= (const LogRegCG &that)=delete
- LogRegCG (LogRegCG &&that)=delete
- LogRegCG & operator= (LogRegCG &&that)=delete
- virtual void init (double ∗theta, CG::INT n)
- virtual double f (double ∗theta, CG::INT n)
- virtual void grad (double ∗grad_f, double ∗theta, CG::INT n)
- virtual double fgrad (double ∗grad_f, double ∗theta, CG::INT n)
- virtual void finalize (double ∗theta, CG::INT n)
- double getLambda () const
- void setLambda (double lambda)
- virtual ∼LogRegCG ()=default

9.61.1 Detailed Description

template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename std::vector<bool>↩ ::iterator>
class LinkPred::LogRegCG< InRndIt, OutRndIt >

Logistic regression optimization problem.

Template Parameters

InRndIt	Input (features) iterator type.
Out↩ RndIt	Output (class) iterator type.

9.61.2 Constructor & Destructor Documentation

9.61.2.1 LogRegCG() [1/3]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator>
LinkPred::LogRegCG< InRndIt, OutRndIt >::LogRegCG (
             InRndIt trInBegin,
             InRndIt trInEnd,
             OutRndIt trOutBegin,
             OutRndIt trOutEnd,
             double lambda,
             long int seed )  [inline]
```

Constructor.

Parameters

trInBegin	Iterator to the first example features (input).
trInEnd	Iterator to one-past-the-last example features (input).
trOutBegin	Iterator to the first example class (output).
trOutEnd	Iterator to one-past-the-last example class (output).
lambda	Regularization coefficient.
seed	The random number generator's seed.

9.61.2.2 LogRegCG() [2/3]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator>
LinkPred::LogRegCG< InRndIt, OutRndIt >::LogRegCG (
             const LogRegCG< InRndIt, OutRndIt > & that )  [delete]
```

Deleted copy constructor.

Parameters

that	The object to copy.

9.61.2.3 LogRegCG() [3/3]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator>
```

```
LinkPred::LogRegCG< InRndIt, OutRndIt >::LogRegCG (
            LogRegCG< InRndIt, OutRndIt > && that )  [delete]
```

Deleted move constructor.

Parameters

that	The object to move.

9.61.2.4 ∼LogRegCG()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator>
virtual LinkPred::LogRegCG< InRndIt, OutRndIt >::∼LogRegCG ( )  [virtual], [default]
```

Destructor.

9.61.3 Member Function Documentation

9.61.3.1 f()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator>
virtual double LinkPred::LogRegCG< InRndIt, OutRndIt >::f (
            double * theta,
            CG::INT n )  [virtual]
```

Objective function.

Parameters

theta	The variables.
n	The size.

Returns

The value of the objective.

9.61.3.2 fgrad()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator>
```

```
virtual double LinkPred::LogRegCG< InRndIt, OutRndIt >::fgrad (
            double * grad_f,
            double * theta,
            CG::INT n )  [virtual]
```

Compute objective and gradient at the same time. This is a default implementation that should be overloaded if needed.

Parameters

grad_f	The gradient (output).
theta	The variables.
n	The size.

Returns

The value of the objective.

9.61.3.3 finalize()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator>
virtual void LinkPred::LogRegCG< InRndIt, OutRndIt >::finalize (
            double * theta,
            CG::INT n )  [inline], [virtual]
```

Finalize the solution.

Parameters

theta	The variables.
n	The size.

9.61.3.4 getLambda()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator>
double LinkPred::LogRegCG< InRndIt, OutRndIt >::getLambda ( ) const  [inline]
```

Returns

The regularization coefficient.

9.61.3.5 grad()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator>
virtual void LinkPred::LogRegCG< InRndIt, OutRndIt >::grad (
            double * grad_f,
            double * theta,
            CG::INT n )  [virtual]
```

Gradient.

Parameters

grad↩_f	The gradient (output).
theta	The variables.
n	The size.

9.61.3.6 init()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator>
virtual void LinkPred::LogRegCG< InRndIt, OutRndIt >::init (
            double * theta,
            CG::INT n )  [virtual]
```

Initializes theta.

Parameters

theta	The variables.
n	The size.

9.61.3.7 operator=() [1/2]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator>
LogRegCG& LinkPred::LogRegCG< InRndIt, OutRndIt >::operator= (
            const LogRegCG< InRndIt, OutRndIt > & that )  [delete]
```

Deleted copy assignment operator.

Parameters

that	The object to copy.

9.61.3.8 operator=() [2/2]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator>
LogRegCG& LinkPred::LogRegCG< InRndIt, OutRndIt >::operator= (
            LogRegCG< InRndIt, OutRndIt > && that )  [delete]
```

Deleted move assignment operator.

Parameters

that	The object to move.

9.61.3.9 setLambda()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator>
void LinkPred::LogRegCG< InRndIt, OutRndIt >::setLambda (
            double lambda )  [inline]
```

Set the regularization coefficient.

Parameters

lambda	The new regularization coefficient.

The documentation for this class was generated from the following file:

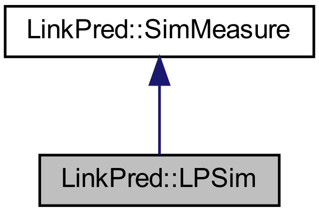
- include/linkpred/ml/classifiers/logistic/logregcg.hpp

9.62 LinkPred::LPSim Class Reference

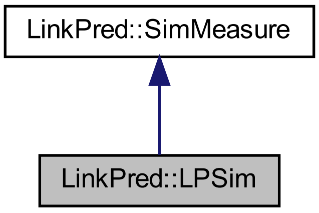
LP similarity (negative the Lp norm).

```
#include <lpsim.hpp>
```

Inheritance diagram for LinkPred::LPSim:



Collaboration diagram for LinkPred::LPSim:



Public Member Functions

- LPSim (double p)
- LPSim (LPSim const &that)=default
- LPSim & operator= (LPSim const &that)=default
- LPSim (LPSim &&that)=default
- LPSim & operator= (LPSim &&that)=default
- virtual double sim (Vec const &v1, Vec const &v2)
- double getP () const
- void setP (double p)
- virtual ∼LPSim ()=default

9.62.1 Detailed Description

LP similarity (negative the Lp norm).

9.62.2 Constructor & Destructor Documentation

9.62.2.1 LPSim() [1/3]

```
LinkPred::LPSim::LPSim (
             double p )  [inline]
```

Constructor.

Parameters

p	The p of the norm.

9.62.2.2 LPSim() [2/3]

```
LinkPred::LPSim::LPSim (
             LPSim const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.62.2.3 LPSim() [3/3]

```
LinkPred::LPSim::LPSim (
             LPSim && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.62.2.4 ∼LPSim()

```
virtual LinkPred::LPSim::∼LPSim ( )  [virtual], [default]
```

Destructor.

9.62.3 Member Function Documentation

9.62.3.1 getP()

```
double LinkPred::LPSim::getP ( ) const  [inline]
```

Returns

The power p of the norm.

9.62.3.2 operator=() [1/2]

```
LPSim& LinkPred::LPSim::operator= (
            LPSim && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.62.3.3 operator=() [2/2]

```
LPSim& LinkPred::LPSim::operator= (
            LPSim const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.62.3.4 setP()

```
void LinkPred::LPSim::setP (
            double p )  [inline]
```

Set the power p of the norm.

Parameters

p	The power p of the norm.

9.62.3.5 sim()

```
virtual double LinkPred::LPSim::sim (
            Vec const & v1,
            Vec const & v2 )  [virtual]
```

Compute the similarity between two vectors.

Parameters

v1	First vector.
v2	Second vector. Must be of the same dimension as v1.

Returns

The similarity between v1 and v2.

Implements LinkPred::SimMeasure.

The documentation for this class was generated from the following file:

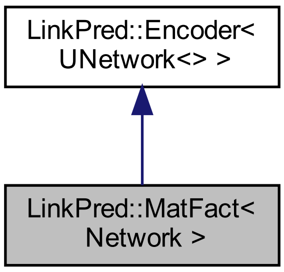
- include/linkpred/ml/simmeasures/lpsim.hpp

9.63 LinkPred::MatFact< Network > Class Template Reference

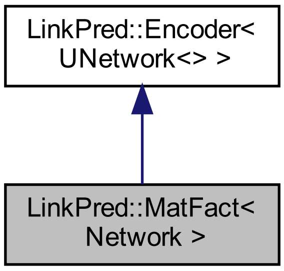
Contains the implementation of an algorithm for embedding a network using matrix factorization. Reference: Koren, Y., Bell, R., and Volinsky, C. (2009). Matrix factorization techniques for recommender systems. Computer, 42(8)↩ :30–37 Ahmed, A., Shervashidze, N., Narayanamurthy, S., Josifovski, V., and Smola, A. J. (2013). Distributed large-scale natural graph factorization. In Proceedings of the 22nd International Conference on World Wide Web, WWW '13, pages 37–48, New York, NY, USA. Association for Computing Machinery.

```
#include <matfact.hpp>
```

Inheritance diagram for LinkPred::MatFact< Network >:



Collaboration diagram for LinkPred::MatFact< Network >:



Public Member Functions

- MatFact (std::shared_ptr< Network const > net, long int seed)
- MatFact (MatFact const &that)=default
- MatFact & operator= (MatFact const &that)=default
- MatFact (MatFact &&that)=default
- MatFact & operator= (MatFact &&that)=default
- virtual void init ()
- virtual void encode ()
- const int getDefaultDim () const
- double getLambda () const
- void setLambda (double lambda)
- double getNegRatio () const
- void setNegRatio (double negRatio)
- double getPosRatio () const
- void setPosRatio (double posRatio)
- double getTol () const
- void setTol (double tol)
- virtual void setWeightMap (const WeightMapSP &weightMap)
- virtual ~MatFact ()=default

Additional Inherited Members

9.63.1 Detailed Description

template<typename Network = UNetwork<>>
class LinkPred::MatFact< Network >

Contains the implementation of an algorithm for embedding a network using matrix factorization. Reference: Koren, Y., Bell, R., and Volinsky, C. (2009). Matrix factorization techniques for recommender systems. Computer, 42(8)↩ :30–37 Ahmed, A., Shervashidze, N., Narayanamurthy, S., Josifovski, V., and Smola, A. J. (2013). Distributed large-scale natural graph factorization. In Proceedings of the 22nd International Conference on World Wide Web, WWW '13, pages 37–48, New York, NY, USA. Association for Computing Machinery.

Template Parameters

Network	The network type.

9.63.2 Constructor & Destructor Documentation

9.63.2.1 MatFact() [1/3]

```
template<typename Network = UNetwork<>>
LinkPred::MatFact< Network >::MatFact (
            std::shared_ptr< Network const > net,
            long int seed )  [inline]
```

Constructor.

Parameters

net	The network.
seed	Random number generator seed.

9.63.2.2 MatFact() [2/3]

```
template<typename Network = UNetwork<>>
LinkPred::MatFact< Network >::MatFact (
            MatFact< Network > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.63.2.3 MatFact() [3/3]

```
template<typename Network = UNetwork<>>
LinkPred::MatFact< Network >::MatFact (
            MatFact< Network > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.63.2.4 ~MatFact()

```
template<typename Network = UNetwork<>>
virtual LinkPred::MatFact< Network >::~MatFact ( )  [virtual], [default]
```

Destructor.

9.63.3 Member Function Documentation

9.63.3.1 encode()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::MatFact< Network >::encode ( )  [virtual]
```

Encode the network.

Implements LinkPred::Encoder< UNetwork<> >.

9.63.3.2 getDefaultDim()

```
template<typename Network = UNetwork<>>
const int LinkPred::MatFact< Network >::getDefaultDim ( ) const  [inline]
```

Returns

The default embedding dimension.

9.63.3.3 getLambda()

```
template<typename Network = UNetwork<>>
double LinkPred::MatFact< Network >::getLambda ( ) const  [inline]
```

Returns

The regularization coeffcient.

9.63.3.4 getNegRatio()

```
template<typename Network = UNetwork<>>
double LinkPred::MatFact< Network >::getNegRatio ( ) const  [inline]
```

Returns

The ratio of negative edges used for fitting the model.

9.63.3.5 getPosRatio()

```
template<typename Network = UNetwork<>>
double LinkPred::MatFact< Network >::getPosRatio ( ) const  [inline]
```

Returns

The ratio of positive edges used for fitting the model.

9.63.3.6 getTol()

```
template<typename Network = UNetwork<>>
double LinkPred::MatFact< Network >::getTol ( ) const  [inline]
```

Returns

The tolerance for stopping the optimization.

9.63.3.7 init()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::MatFact< Network >::init ( )  [virtual]
```

Initialize encoder.

Implements LinkPred::Encoder< UNetwork<> >.

9.63.3.8 operator=() [1/2]

```
template<typename Network = UNetwork<>>
MatFact& LinkPred::MatFact< Network >::operator= (
             MatFact< Network > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.63.3.9 operator=() [2/2]

```
template<typename Network = UNetwork<>>
MatFact& LinkPred::MatFact< Network >::operator= (
             MatFact< Network > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.63.3.10 setLambda()

```
template<typename Network = UNetwork<>>
void LinkPred::MatFact< Network >::setLambda (
             double lambda )  [inline]
```

Set the regularization coeffcient.

Parameters

lambda	The regularization coeffcient.

9.63.3.11 setNegRatio()

```
template<typename Network = UNetwork<>>
void LinkPred::MatFact< Network >::setNegRatio (
             double negRatio )  [inline]
```

Set the ratio of negative edges used for fitting the model.

Parameters

negRatio	The ratio of negative edges used for fitting the model.

9.63.3.12 setPosRatio()

```
template<typename Network = UNetwork<>>
void LinkPred::MatFact< Network >::setPosRatio (
             double posRatio )  [inline]
```

Set the ratio of positive edges used for fitting the model.

Parameters

posRatio	The ratio of positive edges used for fitting the model.

9.63.3.13 setTol()

```
template<typename Network = UNetwork<>>
void LinkPred::MatFact< Network >::setTol (
             double tol )  [inline]
```

Set the tolerance for stopping the optimization.

Parameters

tol	The tolerance for stopping the optimization.

9.63.3.14 setWeightMap()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::MatFact< Network >::setWeightMap (
             const WeightMapSP & weightMap )  [inline], [virtual]
```

Set the edge weight map.

Parameters

weightMap	The edge weight map.

Reimplemented from LinkPred::Encoder< UNetwork<> >.

The documentation for this class was generated from the following file:

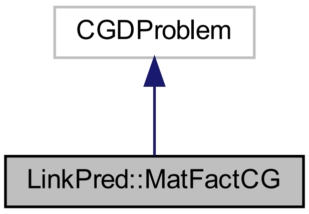
- include/linkpred/graphalg/encoders/matfact/matfact.hpp

9.64 LinkPred::MatFactCG Class Reference

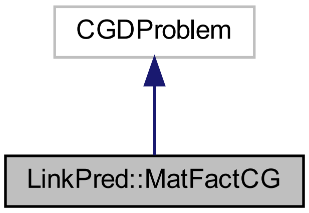
Optimization problem associated with matrix factorization.

```
#include <matfactcg.hpp>
```

Inheritance diagram for LinkPred::MatFactCG:



Collaboration diagram for LinkPred::MatFactCG:



Public Member Functions

- MatFactCG (long int nbNodes, std::vector< MatFactPbData > const &pbData, int dim, double lambda, long int seed)
- MatFactCG (const MatFactCG &that)=delete
- MatFactCG & operator= (const MatFactCG &that)=delete
- MatFactCG (MatFactCG &&that)=delete
- MatFactCG & operator= (MatFactCG &&that)=delete
- virtual void init (double ∗x, CG::INT n)
- virtual double f (double ∗x, CG::INT n)
- virtual void grad (double ∗grad_f, double ∗x, CG::INT n)
- virtual double fgrad (double ∗grad_f, double ∗x, CG::INT n)
- virtual void finalize (double ∗x, CG::INT n)
- virtual ∼MatFactCG ()=default

9.64.1 Detailed Description

Optimization problem associated with matrix factorization.

9.64.2 Constructor & Destructor Documentation

9.64.2.1 MatFactCG() [1/3]

```
LinkPred::MatFactCG::MatFactCG (
             long int nbNodes,
             std::vector< MatFactPbData > const & pbData,
             int dim,
             double lambda,
             long int seed )
```

Constructor.

Parameters

nbNodes	The number of nodes in the network.
pbData	The problem data.
dim	The problem dimensionality.
lambda	Regularization coeffcient.
seed	The random number generator's seed.

9.64.2.2 MatFactCG() [2/3]

```
LinkPred::MatFactCG::MatFactCG (
             const MatFactCG & that )  [delete]
```

Deleted copy constructor.

Parameters

that	The object to copy.

9.64.2.3 MatFactCG() [3/3]

```
LinkPred::MatFactCG::MatFactCG (
             MatFactCG && that )  [delete]
```

Deleted move constructor.

Parameters

that	The object to move.

9.64.2.4 ∼MatFactCG()

```
virtual LinkPred::MatFactCG::∼MatFactCG ( )  [virtual], [default]
```

Default destructor.

9.64.3 Member Function Documentation

9.64.3.1 f()

```
virtual double LinkPred::MatFactCG::f (
            double * x,
            CG::INT n )  [virtual]
```

Objective function.

Parameters

x	The variables.
n	The size.

Returns

The value of the objective.

9.64.3.2 fgrad()

```
virtual double LinkPred::MatFactCG::fgrad (
            double * grad_f,
            double * x,
            CG::INT n )  [virtual]
```

Compute objective and gradient at the same time. This is a default implementation that should be overloaded if needed.

Parameters

grad↩_f	The gradient (output).
x	The variables.
n	The size.

Returns

The value of the objective.

9.64.3.3 finalize()

```
virtual void LinkPred::MatFactCG::finalize (
             double * x,
             CG::INT n )  [virtual]
```

Finalize the solution.

Parameters

x	The variables.
n	The size.

9.64.3.4 grad()

```
virtual void LinkPred::MatFactCG::grad (
             double * grad_f,
             double * x,
             CG::INT n )  [virtual]
```

Gradient.

Parameters

grad↩_f	The gradient (output).
x	The variables.
n	The size.

9.64.3.5 init()

```
virtual void LinkPred::MatFactCG::init (
            double * x,
            CG::INT n )  [virtual]
```

Initializes x.

Parameters

x	The variables.
n	The size.

9.64.3.6 operator=() [1/2]

```
MatFactCG& LinkPred::MatFactCG::operator= (
            const MatFactCG & that )  [delete]
```

Deleted copy assignment operator.

Parameters

that	The object to copy.

9.64.3.7 operator=() [2/2]

```
MatFactCG& LinkPred::MatFactCG::operator= (
            MatFactCG && that )  [delete]
```

Deleted move assignment operator.

Parameters

that	The object to move.

The documentation for this class was generated from the following file:

- include/linkpred/graphalg/encoders/matfact/matfactcg.hpp

9.65 LinkPred::MatFactPbData Struct Reference

A simple structure to store matrix factoization problem data.

```
#include <matfactcg.hpp>
```

Public Attributes

- long int i
- long int j
- double target

9.65.1 Detailed Description

A simple structure to store matrix factoization problem data.

9.65.2 Member Data Documentation

9.65.2.1 i

```
long int LinkPred::MatFactPbData::i
```

Start node.

9.65.2.2 j

```
long int LinkPred::MatFactPbData::j
```

End node.

9.65.2.3 target

```
double LinkPred::MatFactPbData::target
```

Target value (0/1 for unweighted graphs.

The documentation for this struct was generated from the following file:

- include/linkpred/graphalg/encoders/matfact/matfactcg.hpp

9.66 LinkPred::MDS Class Reference

Solve the MDS problem.

```
#include <mds.hpp>
```

Public Member Functions

- MDS ()=default
- MDS (MDSAlg alg, double tol, std::size_t nbRuns)
- MDSAlg getAlg ()
- void setAlg (MDSAlg alg)
- double getTol ()
- void setTol (double tol)
- std::size_t getNbRuns ()
- void setNbRuns (std::size_t nbRuns)
- double solve (std::size_t nbNodes, std::size_t nbKnownCouples, double ∗sqDist, double ∗weight, std::size_t dim, double ∗coord, long int seed, bool init=true)
- double cgMDS (std::size_t nbNodes, std::size_t nbKnownCouples, std::size_t dim, double ∗sqDist, double ∗weight, double ∗coord, long int seed, bool init)
- virtual ∼MDS ()=default

9.66.1 Detailed Description

Solve the MDS problem.

9.66.2 Constructor & Destructor Documentation

9.66.2.1 MDS() [1/2]

```
LinkPred::MDS::MDS ( )  [default]
```

Constructor.

9.66.2.2 MDS() [2/2]

```
LinkPred::MDS::MDS (
             MDSAlg alg,
             double tol,
             std::size_t nbRuns )  [inline]
```

Constructor.

Parameters

alg	The algorithm used to solve the MDS problem.
tol	The tolerance.
nbRuns	The number of times multidimensional scaling is run using different random initial positions.

9.66.2.3 ∼MDS()

```
virtual LinkPred::MDS::∼MDS ( )  [virtual], [default]
```

Destructor.

9.66.3 Member Function Documentation

9.66.3.1 cgMDS()

```
double LinkPred::MDS::cgMDS (
             std::size_t nbNodes,
             std::size_t nbKnownCouples,
             std::size_t dim,
             double * sqDist,
             double * weight,
             double * coord,
             long int seed,
             bool init )
```

MDS using CG.

Parameters

nbNodes	Number of nodes (or more generally, the number of data points).
nbKnownCouples	Number of couples for which the target distance is specified.
sqDist	Upper triangular matrix of squared distances without the diagonal stored sequentially as one vector.
weight	The weight associated with every distance (can be zero, if the distance is not relevant or unknown).
dim	The problem dimensionality.
coord	The coordinates (this is the solution to the problem).
seed	The random number generator's seed.
init	Whether to initialize points randomly or use the current values of the coordinates as the initial positions of the data points.

Returns

The objective function value.

9.66.3.2 getAlg()

```
MDSAlg LinkPred::MDS::getAlg ( )  [inline]
```

Returns

The algorithm used to solve the MDS problem.

9.66.3.3 getNbRuns()

```
std::size_t LinkPred::MDS::getNbRuns ( )  [inline]
```

Returns

The number of times multidimensional scaling is run using different random initial positions.

9.66.3.4 getTol()

```
double LinkPred::MDS::getTol ( )  [inline]
```

Returns

The tolerance.

9.66.3.5 setAlg()

```
void LinkPred::MDS::setAlg (
             MDSAlg alg )  [inline]
```

Set the MDS algorithm.

Parameters

alg	The algorithm used to solve the MDS problem.

9.66.3.6 setNbRuns()

```
void LinkPred::MDS::setNbRuns (
             std::size_t nbRuns )  [inline]
```

Set the number of runs.

Parameters

nbRuns	The new value of the number of runs.

9.66.3.7 setTol()

```
void LinkPred::MDS::setTol (
            double tol )  [inline]
```

Set the tolerance.

Parameters

tol	The new value of the tolerance.

9.66.3.8 solve()

```
double LinkPred::MDS::solve (
            std::size_t nbNodes,
            std::size_t nbKnownCouples,
            double * sqDist,
            double * weight,
            std::size_t dim,
            double * coord,
            long int seed,
            bool init = true )
```

Solve the MDS problem.

Parameters

nbNodes	Number of nodes (or more generally, the number of data points).
nbKnownCouples	Number of couples for which the target distance is specified.
sqDist	Upper triangular matrix of squared distances without the diagonal stored sequentially as one vector.
weight	The weight associated with every distance (can be zero, if the distance is not relevant or unknown).
dim	The problem dimensionality.
coord	The coordinates (this is the solution to the problem).
seed	The random number generator's seed.
init	Whether to initialize points randomly or use the current values of the coordinates as the initial positions of the data points.

Returns

The objective function value.

The documentation for this class was generated from the following file:

- include/linkpred/numerical/mds/mds.hpp

9.67 LinkPred::NetDistCalculator< Network, DistType, NbHopsType > Class Template Reference

Interface for calculating the distance between nodes in a network.

```
#include <netdistcalculator.hpp>
```

Public Types

- using LengthMapIdType = long int
- using NetworkSP = std::shared_ptr< Network >
- using NodeID = typename Network::NodeID
- using Label = typename Network::Label
- using Edge = typename Network::Edge
- using NodeDistMap = typename Network::template NodeMap< std::pair< DistType, NbHopsType > >
- using NodeDistMapSP = typename Network::template NodeMapSP< std::pair< DistType, NbHopsType > >
- using EdgeLengthMap = typename Network::template EdgeMap< DistType >
- using EdgeLengthMapSP = typename Network::template EdgeMapSP< DistType >

Public Member Functions

- virtual std::pair< DistType, NbHopsType > getDist (NodeID const &i, NodeID const &j)=0
- virtual std::pair< DistType, NbHopsType > getIndDist (NodeID const &i, NodeID const &j)=0
- virtual NodeDistMapSP getDist (NodeID const &i)=0
- virtual std::pair< DistType, NbHopsType > getMaxDist (NodeID const &i)
- double getDiscDist () const
- void setDiscDist (DistType discDist)
- std::size_t getDiscNbHops () const
- void setDiscNbHops (NbHopsType discNbHops)
- virtual ~NetDistCalculator ()=default

9.67.1 Detailed Description

template<typename Network, typename DistType, typename NbHopsType>
class LinkPred::NetDistCalculator< Network, DistType, NbHopsType >

Interface for calculating the distance between nodes in a network.

Template Parameters

Network	The network type.
DistType	The distance type (can be an integer or floating point type).
NbHopsType	The type of the number of hops (must be an integer type).

9.67.2 Member Typedef Documentation

9.67.2.1 Edge

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::Edge = typename Network↩
::Edge
```

Edge type.

9.67.2.2 EdgeLengthMap

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMap = typename
Network::template EdgeMap<DistType>
```

Edge length map.

9.67.2.3 EdgeLengthMapSP

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::EdgeLengthMapSP = typename
Network::template EdgeMapSP<DistType>
```

Shared pointer to an edge length map.

9.67.2.4 Label

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::Label = typename Network↩
::Label
```

Nodes label type.

9.67.2.5 LengthMapIdType

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::LengthMapIdType = long int
```

Length map ID type.

9.67.2.6 NetworkSP

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::NetworkSP = std::shared_↩
ptr<Network>
```

Shared pointer to network.

9.67.2.7 NodeDistMap

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::NodeDistMap = typename
Network::template NodeMap<std::pair<DistType, NbHopsType> >
```

Distance map.

9.67.2.8 NodeDistMapSP

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::NodeDistMapSP = typename
Network::template NodeMapSP<std::pair<DistType, NbHopsType> >
```

Shared pointer to a distance map.

9.67.2.9 NodeID

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::NodeID = typename Network↩
::NodeID
```

Nodes ID type.

9.67.3 Constructor & Destructor Documentation

9.67.3.1 ∼NetDistCalculator()

```
template<typename Network , typename DistType , typename NbHopsType >
virtual LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::∼NetDistCalculator ( )
[virtual], [default]
```

Destructor.

9.67.4 Member Function Documentation

9.67.4.1 getDiscDist()

```
template<typename Network , typename DistType , typename NbHopsType >
double LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::getDiscDist ( ) const
[inline]
```

Returns

The distance assigned to disconnected nodes.

9.67.4.2 getDiscNbHops()

```
template<typename Network , typename DistType , typename NbHopsType >
std::size_t LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::getDiscNbHops ( )
const [inline]
```

Returns

The value that should be assigned as number of hops between disconnected nodes.

9.67.4.3 getDist() [1/2]

```
template<typename Network , typename DistType , typename NbHopsType >
virtual NodeDistMapSP LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::getDist (
          NodeID const & i ) [pure virtual]
```

Parameters

i	Source node.

Returns

The distance from i to all other nodes.

Implemented in LinkPred::ESPLDistCalculator< UNetwork<>, double, std::size_t >.

9.67.4.4 getDist() [2/2]

```
template<typename Network , typename DistType , typename NbHopsType >
virtual std::pair<DistType, NbHopsType> LinkPred::NetDistCalculator< Network, DistType, Nb←
HopsType >::getDist (
          NodeID const & i,
          NodeID const & j ) [pure virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j.

Implemented in LinkPred::ESPLDistCalculator< UNetwork<>, double, std::size_t >.

9.67.4.5 getIndDist()

```
template<typename Network , typename DistType , typename NbHopsType >
virtual std::pair<DistType, NbHopsType> LinkPred::NetDistCalculator< Network, DistType, Nb↩
HopsType >::getIndDist (
            NodeID const & i,
            NodeID const & j )  [pure virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The distance between i and j ignoring the edge between i and j.

Implemented in LinkPred::ESPLDistCalculator< UNetwork<>, double, std::size_t >.

9.67.4.6 getMaxDist()

```
template<typename Network , typename DistType , typename NbHopsType >
virtual std::pair<DistType, NbHopsType> LinkPred::NetDistCalculator< Network, DistType, Nb↩
HopsType >::getMaxDist (
            NodeID const & i )  [inline], [virtual]
```

Parameters

i	Index of the source node.

Returns

The maximum distance from i to any other node in the same connected component.

9.67.4.7 setDiscDist()

```
template<typename Network , typename DistType , typename NbHopsType >
void LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::setDiscDist (
            DistType discDist )  [inline]
```

Set the distance assigned to disconnected nodes.

Parameters

discDist	The distance assigned to disconnected nodes.

9.67.4.8 setDiscNbHops()

```
template<typename Network , typename DistType , typename NbHopsType >
void LinkPred::NetDistCalculator< Network, DistType, NbHopsType >::setDiscNbHops (
            NbHopsType discNbHops )  [inline]
```

Set the value that should be assigned as number of hops between disconnected nodes.

Parameters

discNbHops	The value that should be assigned as number of hops between disconnected nodes.

The documentation for this class was generated from the following file:

- include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp

9.68 LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType > Class Template Reference

Interface for calculating the indirect similarity between nodes in a network.

```
#include <netdistcalculator.hpp>
```

Public Types

- using LengthMapIdType = long int
- using NetworkSP = std::shared_ptr< Network >
- using NodeID = typename Network::NodeID
- using Label = typename Network::Label
- using Edge = typename Network::Edge
- using EdgeLengthMap = typename Network::template EdgeMap< DistType >
- using EdgeLengthMapSP = typename Network::template EdgeMapSP< DistType >

Public Member Functions

- virtual std::tuple< DistType, DistType, NbHopsType > getIndSiml (NodeID const &i, NodeID const &j)=0
- virtual std::tuple< DistType, DistType, NbHopsType > getDirIndSiml (NodeID const &i, NodeID const &j)=0
- double getSelfSiml () const
- void setSelfSiml (DistType selfSiml)
- double getDiscDist () const
- void setDiscDist (DistType discDist)
- std::size_t getDiscNbHops () const
- void setDiscNbHops (NbHopsType discNbHops)
- double getLambda () const
- void setLambda (double lambda)
- virtual ~NetIndSimlCalculator ()=default

9.68.1 Detailed Description

**template<typename Network, typename DistType, typename NbHopsType>
class LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >**

Interface for calculating the indirect similarity between nodes in a network.

Template Parameters

Network	The network type.
DistType	The distance and similarity type (can be an integer or floating point type).
NbHopsType	The type of the number of hops (must be an integer type).

9.68.2 Member Typedef Documentation

9.68.2.1 Edge

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::Edge = typename Network↩
::Edge
```

Edge type.

9.68.2.2 EdgeLengthMap

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::EdgeLengthMap = typename
Network::template EdgeMap<DistType>
```

Edge length map.

9.68.2.3 EdgeLengthMapSP

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::EdgeLengthMapSP =
typename Network::template EdgeMapSP<DistType>
```

Shared pointer to an edge length map.

9.68.2.4 Label

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::Label = typename Network↩
::Label
```

Nodes label type.

9.68.2.5 LengthMapIdType

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::LengthMapIdType = long
int
```

Length map ID type.

9.68.2.6 NetworkSP

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::NetworkSP = std::shared↩
_ptr<Network>
```

Shared pointer to network.

9.68.2.7 NodeID

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::NodeID = typename
Network::NodeID
```

Nodes ID type.

9.68.3 Constructor & Destructor Documentation

9.68.3.1 ∼NetIndSimlCalculator()

```
template<typename Network , typename DistType , typename NbHopsType >
virtual LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::∼NetIndSimlCalculator
( ) [virtual], [default]
```

Destructor.

9.68.4 Member Function Documentation

9.68.4.1 getDirIndSiml()

```
template<typename Network , typename DistType , typename NbHopsType >
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::NetIndSimlCalculator< Network,
DistType, NbHopsType >::getDirIndSiml (
             NodeID const & i,
             NodeID const & j ) [pure virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The directed similarity between i and j ignoring the edge between i and j.

9.68.4.2 getDiscDist()

```
template<typename Network , typename DistType , typename NbHopsType >
double LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::getDiscDist ( ) const
[inline]
```

Returns

The distance assigned to disconnected nodes.

9.68.4.3 getDiscNbHops()

```
template<typename Network , typename DistType , typename NbHopsType >
std::size_t LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::getDiscNbHops ( )
const  [inline]
```

Returns

The value that should be assigned as number of hops between disconnected nodes.

9.68.4.4 getIndSiml()

```
template<typename Network , typename DistType , typename NbHopsType >
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::NetIndSimlCalculator< Network,
DistType, NbHopsType >::getIndSiml (
            NodeID const & i,
            NodeID const & j )  [pure virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The similarity between i and j ignoring the edge between i and j.

9.68.4.5 getLambda()

```
template<typename Network , typename DistType , typename NbHopsType >
double LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::getLambda ( ) const
[inline]
```

Returns

The conductance.

9.68.4.6 getSelfSiml()

```
template<typename Network , typename DistType , typename NbHopsType >
double LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::getSelfSiml ( ) const
[inline]
```

Returns

The similarity between a node and itself.

9.68.4.7 setDiscDist()

```
template<typename Network , typename DistType , typename NbHopsType >
void LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::setDiscDist (
             DistType discDist )  [inline]
```

Set the distance assigned to disconnected nodes.

Parameters

discDist	The distance assigned to disconnected nodes.

9.68.4.8 setDiscNbHops()

```
template<typename Network , typename DistType , typename NbHopsType >
void LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::setDiscNbHops (
             NbHopsType discNbHops )  [inline]
```

Set the value that should be assigned as number of hops between disconnected nodes.

Parameters

discNbHops	The value that should be assigned as number of hops between disconnected nodes.

9.68.4.9 setLambda()

```
template<typename Network , typename DistType , typename NbHopsType >
void LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::setLambda (
             double lambda )  [inline]
```

Set the conductance.

Parameters

lambda	The new value of the weight.

9.68.4.10 setSelfSiml()

```
template<typename Network , typename DistType , typename NbHopsType >
void LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >::setSelfSiml (
             DistType selfSiml )  [inline]
```

Set the similarity between a node and itself.

Parameters

selfSiml	The similarity similarity between a node and itself.

The documentation for this class was generated from the following file:

- include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp

9.69 LinkPred::NetSimlCalculator< Network, DistType, NbHopsType > Class Template Reference

Interface for calculating the similarity between nodes in a network.

```
#include <netdistcalculator.hpp>
```

Public Types

- using LengthMapIdType = long int
- using NetworkSP = std::shared_ptr< Network >
- using NodeID = typename Network::NodeID
- using Label = typename Network::Label
- using Edge = typename Network::Edge
- using EdgeLengthMap = typename Network::template EdgeMap< DistType >
- using EdgeLengthMapSP = typename Network::template EdgeMapSP< DistType >
- using NodeSDistMap = typename Network::template NodeSMap< std::pair< DistType, NbHopsType > >
- using NodeSDistMapSP = typename Network::template NodeSMapSP< std::pair< DistType, NbHopsType > >

Public Member Functions

- virtual std::tuple< DistType, DistType, NbHopsType > getSiml (NodeID const &i, NodeID const &j)=0
- virtual std::tuple< DistType, DistType, NbHopsType > getDirSiml (NodeID const &i, NodeID const &j)=0
- virtual NodeSDistMapSP getNnzSimlMap (NodeID const &srcNode)
- virtual NodeSDistMapSP getNnzSimlMapNoNeighb (NodeID const &srcNode)
- double getSelfSiml () const
- void setSelfSiml (DistType selfSiml)
- double getDiscDist () const
- void setDiscDist (DistType discDist)
- std::size_t getDiscNbHops () const
- void setDiscNbHops (NbHopsType discNbHops)
- double getLambda () const
- void setLambda (double lambda)
- virtual ~NetSimlCalculator ()=default

9.69.1 Detailed Description

**template< typename Network, typename DistType, typename NbHopsType>
class LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >**

Interface for calculating the similarity between nodes in a network.

Template Parameters

Network	The network type.
DistType	The distance and similarity type (can be an integer or floating point type).
NbHopsType	The type of the number of hops (must be an integer type).

9.69.2 Member Typedef Documentation

9.69.2.1 Edge

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::Edge = typename Network↩
::Edge
```

Edge type.

9.69.2.2 EdgeLengthMap

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::EdgeLengthMap = typename
Network::template EdgeMap<DistType>
```

Edge length map.

9.69.2.3 EdgeLengthMapSP

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::EdgeLengthMapSP = typename
Network::template EdgeMapSP<DistType>
```

Shared pointer to an edge length map.

9.69.2.4 Label

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::Label = typename Network↩
::Label
```

Nodes label type.

9.69.2.5 LengthMapIdType

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::LengthMapIdType = long int
```

Length map ID type.

9.69.2.6 NetworkSP

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::NetworkSP = std::shared_↩
ptr<Network>
```

Shared pointer to network.

9.69.2.7 NodeID

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::NodeID = typename Network↩
::NodeID
```

Nodes ID type.

9.69.2.8 NodeSDistMap

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::NodeSDistMap = typename
Network::template NodeSMap<std::pair<DistType, NbHopsType> >
```

Distance map.

9.69.2.9 NodeSDistMapSP

```
template<typename Network , typename DistType , typename NbHopsType >
using LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::NodeSDistMapSP = typename
Network::template NodeSMapSP<std::pair<DistType, NbHopsType> >
```

Shared pointer to a distance map.

9.69.3 Constructor & Destructor Documentation

9.69.3.1 ∼NetSimlCalculator()

```
template<typename Network , typename DistType , typename NbHopsType >
virtual LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::∼NetSimlCalculator ( )
[virtual], [default]
```

Destructor.

9.69.4 Member Function Documentation

9.69.4.1 getDirSiml()

```
template<typename Network , typename DistType , typename NbHopsType >
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::NetSimlCalculator< Network,
DistType, NbHopsType >::getDirSiml (
             NodeID const & i,
             NodeID const & j )  [pure virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The directed similarity between i and j.

9.69.4.2 getDiscDist()

```
template<typename Network , typename DistType , typename NbHopsType >
double LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::getDiscDist ( ) const
[inline]
```

Returns

The distance assigned to disconnected nodes.

9.69.4.3 getDiscNbHops()

```
template<typename Network , typename DistType , typename NbHopsType >
std::size_t LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::getDiscNbHops ( )
const  [inline]
```

Returns

The value that should be assigned as number of hops between disconnected nodes.

9.69.4.4 getLambda()

```
template<typename Network , typename DistType , typename NbHopsType >
double LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::getLambda ( ) const
[inline]
```

Returns

The conductance.

9.69.4.5 getNnzSimlMap()

```
template<typename Network , typename DistType , typename NbHopsType >
virtual NodeSDistMapSP LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::getNnz↩
SimlMap (
            NodeID const & srcNode )  [inline], [virtual]
```

Returns

A sparse similarity map of nodes having non-zero similarity to a given source node. Only nodes not connected to srcNode ar considered.

Parameters

srcNode	The source node.

9.69.4.6 getNnzSimlMapNoNeighb()

```
template<typename Network , typename DistType , typename NbHopsType >
virtual NodeSDistMapSP LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::getNnz↩
SimlMapNoNeighb (
            NodeID const & srcNode )  [inline], [virtual]
```

Returns

A sparse similarity map of nodes having non-zero similarity to a given source node. Only nodes not connected to srcNode are considered. The node srcNode itself is also excluded.

Parameters

srcNode	The source node.

9.69.4.7 getSelfSiml()

```
template<typename Network , typename DistType , typename NbHopsType >
double LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::getSelfSiml ( ) const
[inline]
```

Returns

The similarity between a node and itself.

9.69.4.8 getSiml()

```
template<typename Network , typename DistType , typename NbHopsType >
virtual std::tuple<DistType, DistType, NbHopsType> LinkPred::NetSimlCalculator< Network,
DistType, NbHopsType >::getSiml (
            NodeID const & i,
            NodeID const & j )  [pure virtual]
```

Parameters

i	Index of the source node.
j	Index of the end node.

Returns

The similarity between i and j.

9.69.4.9 setDiscDist()

```
template<typename Network , typename DistType , typename NbHopsType >
void LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::setDiscDist (
             DistType discDist )  [inline]
```

Set the distance assigned to disconnected nodes.

Parameters

discDist	The distance assigned to disconnected nodes.

9.69.4.10 setDiscNbHops()

```
template<typename Network , typename DistType , typename NbHopsType >
void LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::setDiscNbHops (
             NbHopsType discNbHops )  [inline]
```

Set the value that should be assigned as number of hops between disconnected nodes.

Parameters

discNbHops	The value that should be assigned as number of hops between disconnected nodes.

9.69.4.11 setLambda()

```
template<typename Network , typename DistType , typename NbHopsType >
void LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::setLambda (
             double lambda )  [inline]
```

Set the conductance.

Parameters

lambda	The new value of the conductance.

9.69.4.12 setSelfSiml()

```
template<typename Network , typename DistType , typename NbHopsType >
void LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >::setSelfSiml (
            DistType selfSiml ) [inline]
```

Set the similarity between a node and itself.

Parameters

selfSiml	The similarity similarity between a node and itself.

The documentation for this class was generated from the following file:

- include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp

9.70 LinkPred::NetworkManipulator< Network > Class Template Reference

Class to manipulate network by removing or adding edges.

```
#include <networkmanipulator.hpp>
```

Public Types

- using NetworkSP = std::shared_ptr< Network >
- using NetworkCSP = std::shared_ptr< const Network >
- using NodeID = typename Network::NodeID
- using Label = typename Network::Label
- using Edge = typename Network::Edge
- template<typename ValueT >
  using NodeMap = typename Network::template NodeMap< ValueT >
- template<typename ValueT >
  using EdgeMap = typename Network::template EdgeMap< ValueT >

Public Member Functions

- NetworkManipulator ()=default
- virtual ~NetworkManipulator ()=default

Static Public Member Functions

- template<typename InserterIt >
  static void rst (NetworkCSP net, long int seed, InserterIt inserter)
- static std::pair< NetworkCSP, std::shared_ptr< std::vector< Edge > > > rndConExtract (NetworkCSP net, double ratio, long int seed)
- static std::pair< NetworkCSP, std::shared_ptr< std::vector< Edge > > > rndExtract (NetworkCSP net, double ratio, long int seed)
- template<typename InserterIt >
  static void getAllNegLinksExcept (NetworkCSP net, std::set< Edge > const &excepts, InserterIt inserter)
- template<typename InserterIt >
  static void getRndNegLinksExcept (NetworkCSP net, double ratio, long int seed, std::set< Edge > const &excepts, InserterIt inserter)
- template<typename InserterIt >
  static void getRndPosLinksExcept (NetworkCSP net, double ratio, long int seed, std::set< Edge > const &excepts, InserterIt inserter)
- static TestData< Network, std::vector< Edge > > createTestDataRem (NetworkCSP refNet, double rem←Ratio, bool keepConnected, bool aTP, double tpRatio, bool aTN, double tnRatio, long int seed, bool pre←GenerateTPN=true)
- static TestData< Network, std::vector< Edge > > createTestDataRem (NetworkCSP refNet, double rem←Ratio, long int seed, bool preGenerateTPN=true)
- static TestData< Network, std::vector< Edge > > createTestDataAdd (NetworkCSP refNet, double addRatio, bool aTP, double tpRatio, bool aTN, double tnRatio, long int seed, bool preGenerateTPN=true)
- static TestData< Network, std::vector< Edge > > createTestDataAdd (NetworkCSP refNet, double addRatio, long int seed, bool preGenerateTPN=true)
- static TestData< Network, std::vector< Edge > > createTestData (NetworkCSP refNet, double remRatio, double addRatio, bool keepConnected, bool aTP, double tpRatio, bool aTN, double tnRatio, LinkClass pos←Class, LinkClass negClass, long int seed, bool preGenerateTPN=true)
- static TestData< Network, std::vector< Edge > > createTestData (NetworkCSP refNet, double remRatio, double addRatio, LinkClass posClass, LinkClass negClass, long int seed, bool preGenerateTPN=true)
- static TestData< Network, std::vector< Edge > > createTestDataSeqInter (NetworkCSP firstNet, NetworkCSP secondNet, bool aTP, double tpRatio, bool aTN, double tnRatio, LinkClass posClass, LinkClass negClass, long int seed, bool preGenerateTPN=true)
- static TestData< Network, std::vector< Edge > > createTestDataSeq (NetworkCSP firstNet, NetworkCSP secondNet, bool aTP, double tpRatio, bool aTN, double tnRatio, LinkClass posClass, LinkClass negClass, long int seed, bool preGenerateTPN=true)
- static TestData< Network, std::vector< Edge > > loadTestData (std::string obsEdgesFileName, std::string remEdgesFileName, std::string addEdgesFileName, bool aTP, double tpRatio, bool aTN, double tnRatio, LinkClass posClass, LinkClass negClass, long int seed, bool preGenerateTPN=true)
- static TestData< Network, std::vector< Edge > > loadTestDataRem (std::string obsEdgesFileName, std←::string remEdgesFileName, bool preGenerateTPN=true)
- static TestData< Network, std::vector< Edge > > loadTestDataAdd (std::string obsEdgesFileName, std←::string addEdgesFileName, bool preGenerateTPN=true)
- static bool isConnected (NetworkCSP net)

9.70.1 Detailed Description

template<typename Network = UNetwork<>>
class LinkPred::NetworkManipulator< Network >

Class to manipulate network by removing or adding edges.

The following terminology is used: When removing links: TP: Edges of observed network TN: Non-edges of reference network FP: None FN: Removed links When adding links: TP: Edges of reference network TN: Non-edges of observed network FP: Added links FN: None When adding/removing links: TP: Edges of observed network - added links = Edges of reference network - removed links TN: Non-edges of observed network - removed links = Non-edges of reference network - added links FP: Added links FN: Removed links

Template Parameters

Network	The network type.

9.70.2 Member Typedef Documentation

9.70.2.1 Edge

```
template<typename Network = UNetwork<>>
using LinkPred::NetworkManipulator< Network >::Edge = typename Network::Edge
```

The edge type.

9.70.2.2 EdgeMap

```
template<typename Network = UNetwork<>>
template<typename ValueT >
using LinkPred::NetworkManipulator< Network >::EdgeMap = typename Network::template EdgeMap<ValueT>
```

Edge map.

9.70.2.3 Label

```
template<typename Network = UNetwork<>>
using LinkPred::NetworkManipulator< Network >::Label = typename Network::Label
```

Nodes labels type.

9.70.2.4 NetworkCSP

```
template<typename Network = UNetwork<>>
using LinkPred::NetworkManipulator< Network >::NetworkCSP = std::shared_ptr<const Network>
```

Constant shared pointer to a network.

9.70.2.5 NetworkSP

```
template<typename Network = UNetwork<>>
using LinkPred::NetworkManipulator< Network >::NetworkSP = std::shared_ptr<Network>
```

Shared pointer to a network.

9.70.2.6 NodeID

```
template<typename Network = UNetwork<>>
using LinkPred::NetworkManipulator< Network >::NodeID = typename Network::NodeID
```

Nodes IDs type.

9.70.2.7 NodeMap

```
template<typename Network = UNetwork<>>
template<typename ValueT >
using LinkPred::NetworkManipulator< Network >::NodeMap = typename Network::template NodeMap<ValueT>
```

Node map.

9.70.3 Constructor & Destructor Documentation

9.70.3.1 NetworkManipulator()

```
template<typename Network = UNetwork<>>
LinkPred::NetworkManipulator< Network >::NetworkManipulator ( )  [default]
```

Constructor.

9.70.3.2 ∼NetworkManipulator()

```
template<typename Network = UNetwork<>>
virtual LinkPred::NetworkManipulator< Network >::∼NetworkManipulator ( )  [virtual], [default]
```

Destructor.

9.70.4 Member Function Documentation

9.70.4.1 createTestData() [1/2]

```
template<typename Network = UNetwork<>>
static TestData<Network, std::vector<Edge> > LinkPred::NetworkManipulator< Network >::create↩
TestData (
            NetworkCSP refNet,
            double remRatio,
            double addRatio,
            bool keepConnected,
            bool aTP,
            double tpRatio,
            bool aTN,
            double tnRatio,
            LinkClass posClass,
            LinkClass negClass,
            long int seed,
            bool preGenerateTPN = true )  [static]
```

Creates test data by adding/removing edges from a network. The reference network is not modified. The two networks have the same external-internal ID mapping.

Parameters

refNet	The reference network.
remRatio	Value between 0 and 1 that specifies the percentage of edges that are removed.
addRatio	Value between 0 and 1 that specifies the percentage of edges that are added.
keepConnected	Whether to keep the network connected.
aTP	Whether to use all true positive links in the test set.
tpRatio	Ratio of true positive inks to e used in the test set. This parameter is only relevant when aTP is false.
aTN	Whether to use all true negative links in the test set.
tnRatio	Ratio of true negative inks to e used in the test set. This parameter is only relevant when aTN is false.
posClass	Indicates which links will be considered the positive links.
negClass	Indicates which links will be considered the negative links.
seed	The random number generator's seed.
preGenerateTPN	Whether to pre-generate true positives and true negatives.

Returns

The test data.

9.70.4.2 createTestData() [2/2]

```
template<typename Network = UNetwork<>>
static TestData<Network, std::vector<Edge> > LinkPred::NetworkManipulator< Network >::create←
TestData (
             NetworkCSP refNet,
             double remRatio,
             double addRatio,
             LinkClass posClass,
             LinkClass negClass,
             long int seed,
             bool preGenerateTPN = true )  [static]
```

Creates test data by adding/removing edges from a network. The reference network is not modified. The two networks have the same external-internal ID mapping.

Parameters

refNet	The reference network.
remRatio	Value between 0 and 1 that specifies the percentage of edges that are removed.
addRatio	Value between 0 and 1 that specifies the percentage of edges that are added.
posClass	Indicates which links will be considered the positive links.
negClass	Indicates which links will be considered the negative links.
seed	The random number generator's seed.
preGenerateTPN	Whether to pre-generate true positives and true negatives.

Returns

The test data.

9.70.4.3 createTestDataAdd() [1/2]

```
template<typename Network = UNetwork<>>
static TestData<Network, std::vector<Edge> > LinkPred::NetworkManipulator< Network >::create↩
TestDataAdd (
             NetworkCSP refNet,
             double addRatio,
             bool aTP,
             double tpRatio,
             bool aTN,
             double tnRatio,
             long int seed,
             bool preGenerateTPN = true )  [static]
```

Creates test data by adding edges to a network. The reference network is not modified. The two networks have the same external-internal ID mapping.

Parameters

refNet	The reference network.
addRatio	Value between 0 and 1 that specifies the percentage of edges that are added.
aTP	Whether to use all true positive links in the test set.
tpRatio	Ratio of true positive inks to e used in the test set. This parameter is only relevant when aTP is false.
aTN	Whether to use all true negative links in the test set.
tnRatio	Ratio of true negative inks to e used in the test set. This parameter is only relevant when aTN is false.
seed	The random number generator's seed.
preGenerateTPN	Whether to pre-generate true positives and true negatives.

Returns

The test data.

9.70.4.4 createTestDataAdd() [2/2]

```
template<typename Network = UNetwork<>>
static TestData<Network, std::vector<Edge> > LinkPred::NetworkManipulator< Network >::create↩
TestDataAdd (
             NetworkCSP refNet,
             double addRatio,
             long int seed,
             bool preGenerateTPN = true )  [static]
```

Creates test data by adding edges to a network. The reference network is not modified. The two networks have the same external-internal ID mapping.

Parameters

refNet	The reference network.
addRatio	Value between 0 and 1 that specifies the percentage of edges that are added.
seed	The random number generator's seed.
preGenerateTPN	Whether to pre-generate true positives and true negatives.

Returns

The test data.

9.70.4.5 createTestDataRem() [1/2]

```
template<typename Network = UNetwork<>>
static TestData<Network, std::vector<Edge> > LinkPred::NetworkManipulator< Network >::create↩
TestDataRem (
            NetworkCSP refNet,
            double remRatio,
            bool keepConnected,
            bool aTP,
            double tpRatio,
            bool aTN,
            double tnRatio,
            long int seed,
            bool preGenerateTPN = true )  [static]
```

Creates test data by removing edges from a network. The reference network is not modified. The two networks have the same external-internal ID mapping.

Parameters

refNet	The reference network.
remRatio	Value between 0 and 1 that specifies the percentage of edges that are removed.
keepConnected	Whether to keep the network connected.
aTP	Whether to use all true positive links in the test set.
tpRatio	Ratio of true positive inks to e used in the test set. This parameter is only relevant when aTP is false.
aTN	Whether to use all true negative links in the test set.
tnRatio	Ratio of true negative inks to e used in the test set. This parameter is only relevant when aTN is false.
seed	The random number generator's seed.
preGenerateTPN	Whether to pre-generate true positives and true negatives.

Returns

The test data.

9.70.4.6 createTestDataRem() [2/2]

```
template<typename Network = UNetwork<>>
static TestData<Network, std::vector<Edge> > LinkPred::NetworkManipulator< Network >::create↩
TestDataRem (
            NetworkCSP refNet,
            double remRatio,
            long int seed,
            bool preGenerateTPN = true )  [static]
```

Creates test data by removing edges from a network. The reference network is not modified. The two networks have the same external-internal ID mapping.

Parameters

refNet	The reference network.
remRatio	Value between 0 and 1 that specifies the percentage of edges that are removed.
seed	The random number generator's seed.
preGenerateTPN	Whether to pre-generate true positives and true negatives.

Returns

The test data.

9.70.4.7 createTestDataSeq()

```
template<typename Network = UNetwork<>>
static TestData<Network, std::vector<Edge> > LinkPred::NetworkManipulator< Network >::create↩
TestDataSeq (
            NetworkCSP firstNet,
            NetworkCSP secondNet,
            bool aTP,
            double tpRatio,
            bool aTN,
            double tnRatio,
            LinkClass posClass,
            LinkClass negClass,
            long int seed,
            bool preGenerateTPN = true )  [static]
```

Creates test data from two networks. Nodes not present in the second network and associated edges are removed from the test set.

Parameters

firstNet	The first network.
secondNet	The second network.
aTP	Whether to use all true positive links in the test set.
tpRatio	Ratio of true positive inks to e used in the test set. This parameter is only relevant when aTP is false.
aTN	Whether to use all true negative links in the test set.

Parameters

tnRatio	Ratio of true negative inks to e used in the test set. This parameter is only relevant when aTN is false.
posClass	Indicates which links will be considered the positive links.
negClass	Indicates which links will be considered the negative links.
seed	The random number generator's seed.
preGenerateTPN	Whether to pre-generate true positives and true negatives.

Returns

The test data.

9.70.4.8 createTestDataSeqInter()

```
template<typename Network = UNetwork<>>
static TestData<Network, std::vector<Edge> > LinkPred::NetworkManipulator< Network >::create←
TestDataSeqInter (
            NetworkCSP firstNet,
            NetworkCSP secondNet,
            bool aTP,
            double tpRatio,
            bool aTN,
            double tnRatio,
            LinkClass posClass,
            LinkClass negClass,
            long int seed,
            bool preGenerateTPN = true )  [static]
```

Creates test data from two networks. Only nodes common to both networks are considered.

Parameters

firstNet	The first network.
secondNet	The second network.
aTP	Whether to use all true positive links in the test set.
tpRatio	Ratio of true positive inks to e used in the test set. This parameter is only relevant when aTP is false.
aTN	Whether to use all true negative links in the test set.
tnRatio	Ratio of true negative inks to e used in the test set. This parameter is only relevant when aTN is false.
posClass	Indicates which links will be considered the positive links.
negClass	Indicates which links will be considered the negative links.
seed	The random number generator's seed.
preGenerateTPN	Whether to pre-generate true positives and true negatives.

Returns

The test data.

9.70.4.9 getAllNegLinksExcept()

```
template<typename Network = UNetwork<>>
template<typename InserterIt >
static void LinkPred::NetworkManipulator< Network >::getAllNegLinksExcept (
             NetworkCSP net,
             std::set< Edge > const & excepts,
             InserterIt inserter )  [inline], [static]
```

Return all negative links except those passed in parameter. Be aware that this can be computationally intensive both in term of time and space.

Parameters

net	The network.
excepts	The links that are excepted.
inserter	An inserter iterator.

9.70.4.10 getRndNegLinksExcept()

```
template<typename Network = UNetwork<>>
template<typename InserterIt >
static void LinkPred::NetworkManipulator< Network >::getRndNegLinksExcept (
             NetworkCSP net,
             double ratio,
             long int seed,
             std::set< Edge > const & excepts,
             InserterIt inserter )  [inline], [static]
```

Select random negative links except those passed in parameter.

Parameters

net	The network.
ratio	The ratio of negative links to be selected.
seed	The random seed.
excepts	The links that are excepted.
inserter	The inserter iterator where the selected edges will be inserted.

9.70.4.11 getRndPosLinksExcept()

```
template<typename Network = UNetwork<>>
template<typename InserterIt >
```

```
static void LinkPred::NetworkManipulator< Network >::getRndPosLinksExcept (
             NetworkCSP net,
             double ratio,
             long int seed,
             std::set< Edge > const & excepts,
             InserterIt inserter )  [inline], [static]
```

Select random negative links except those passed in parameter.

Parameters

net	The network.
ratio	The ratio of positive links to be selected.
seed	The random seed.
excepts	The links that are excepted.
inserter	The inserter iterator where the selected edges will be inserted.

9.70.4.12 isConnected()

```
template<typename Network = UNetwork<>>
static bool LinkPred::NetworkManipulator< Network >::isConnected (
             NetworkCSP net )  [inline], [static]
```

Check if a network is connected.

Parameters

net	The network.

Returns

True if the network net is connected, false otherwise.

9.70.4.13 loadTestData()

```
template<typename Network = UNetwork<>>
static TestData<Network, std::vector<Edge> > LinkPred::NetworkManipulator< Network >::load↩
TestData (
             std::string obsEdgesFileName,
             std::string remEdgesFileName,
             std::string addEdgesFileName,
             bool aTP,
             double tpRatio,
             bool aTN,
             double tnRatio,
             LinkClass posClass,
             LinkClass negClass,
             long int seed,
             bool preGenerateTPN = true )  [static]
```

Read test data from file.

Parameters

obsEdgesFileName	A file containing the observed edges (edge list format).
remEdgesFileName	A file containing the removed edges (edge list format). This is ignored if equal to empty string "".
addEdgesFileName	A file containing the add edges (edge list format). This is ignored if equal to empty string "".
aTP	Whether to use all true positive links in the test set.
tpRatio	Ratio of true positive inks to e used in the test set. This parameter is only relevant when aTP is false.
aTN	Whether to use all true negative links in the test set.
tnRatio	Ratio of true negative inks to e used in the test set. This parameter is only relevant when aTN is false.
posClass	Indicates which links will be considered the positive links.
negClass	Indicates which links will be considered the negative links.
seed	The random number generator's seed.
preGenerateTPN	Whether to pre-generate true positives and true negatives.

Returns

The test data.

9.70.4.14 loadTestDataAdd()

```
template<typename Network = UNetwork<>>
static TestData<Network, std::vector<Edge> > LinkPred::NetworkManipulator< Network >::load↩
TestDataAdd (
             std::string obsEdgesFileName,
             std::string addEdgesFileName,
             bool preGenerateTPN = true )  [static]
```

Read test data from file (test data obtained by adding edges).

Parameters

obsEdgesFileName	A file containing the observed edges (edge list format).
addEdgesFileName	A file containing the added edges (edge list format).
preGenerateTPN	Whether to pre-generate true positives and true negatives.

Returns

The test data.

9.70.4.15 loadTestDataRem()

```
template<typename Network = UNetwork<>>
static TestData<Network, std::vector<Edge> > LinkPred::NetworkManipulator< Network >::load↩
```

```
TestDataRem (
             std::string obsEdgesFileName,
             std::string remEdgesFileName,
             bool preGenerateTPN = true )  [static]
```

Read test data from file (test data obtained by removing edges).

Parameters

obsEdgesFileName	A file containing the observed edges (edge list format).
remEdgesFileName	A file containing the removed edges (edge list format).
preGenerateTPN	Whether to pre-generate true positives and true negatives.

Returns

The test data.

9.70.4.16 rndConExtract()

```
template<typename Network = UNetwork<>>
static std::pair<NetworkCSP, std::shared_ptr<std::vector<Edge> > > LinkPred::NetworkManipulator<
Network >::rndConExtract (
             NetworkCSP net,
             double ratio,
             long int seed )  [static]
```

Creates a new connected network from the current by extracting uniformly randomly a specified ratio of edges. The reference network is not modified. The two networks have the same external-internal ID mapping.

Parameters

net	The reference network.
ratio	Value between 0 and 1 that specifies the percentage of edges that are removed.
seed	The random number generator's seed.

Returns

A pair that contains a pointer to the resulting network and pointer to the set of extracted links.

9.70.4.17 rndExtract()

```
template<typename Network = UNetwork<>>
static std::pair<NetworkCSP, std::shared_ptr<std::vector<Edge> > > LinkPred::NetworkManipulator<
Network >::rndExtract (
             NetworkCSP net,
             double ratio,
             long int seed )  [static]
```

Creates a new network from the current by extracting uniformly randomly a specified ratio of edges. The reference network is not modified. The two networks have the same external-internal ID mapping.

Parameters

net	The reference network.
ratio	Value between 0 and 1 that specifies the percentage of edges that are removed.
seed	The random number generator's seed.

Returns

A pair that contains a pointer to the resulting network and pointer to the set of extracted links.

9.70.4.18 rst()

```
template<typename Network = UNetwork<>>
template<typename InserterIt >
static void LinkPred::NetworkManipulator< Network >::rst (
            NetworkCSP net,
            long int seed,
            InserterIt inserter )  [inline], [static]
```

Generate a random spanning tree.

Template Parameters

Inserter↩ It	Type of iterator to insert tree edges.

Parameters

net	The network.
seed	The random number generator's seed.
inserter	An inserter iterator to insert the tree edges.

The documentation for this class was generated from the following file:

- include/linkpred/perf/networkmanipulator.hpp

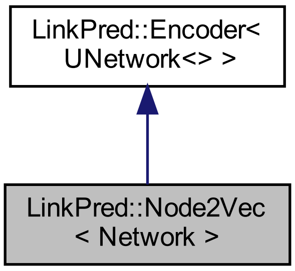
9.71 LinkPred::Node2Vec< Network > Class Template Reference

Node2Vec encoder. References: Grover, A. and Leskovec, J. (2016). Node2vec: Scalable feature learning for networks. In Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data

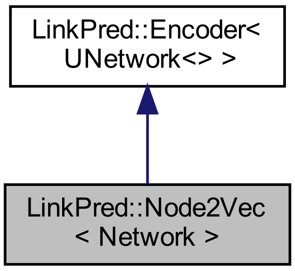
Mining, KDD'16, pages 855–864, New York, NY, USA. Association for Computing Machinery. This implementation is based on the code `https://github.com/xgfs/node2vec-c`.

`#include <node2vec.hpp>`

Inheritance diagram for LinkPred::Node2Vec< Network >:


LinkPred::Encoder< UNetwork<> >
LinkPred::Node2Vec < Network >

Collaboration diagram for LinkPred::Node2Vec< Network >:


LinkPred::Encoder< UNetwork<> >
LinkPred::Node2Vec < Network >

Public Member Functions

- Node2Vec (std::shared_ptr< Network const > net, long int seed)
- Node2Vec (Node2Vec const &that)=default
- Node2Vec & operator= (Node2Vec const &that)=default
- Node2Vec (Node2Vec &&that)=default
- Node2Vec & operator= (Node2Vec &&that)=default
- virtual void init ()
- virtual void encode ()
- float getInitLR () const
- void setInitLR (float initLR)
- int getNbNegSamples () const
- void setNbNegSamples (int nbNegSamples)

- int getNbWalks () const
- void setNbWalks (int nbWalks)
- float getP () const
- void setP (float p)
- float getQ () const
- void setQ (float q)
- int getWalkLength () const
- void setWalkLength (int walkLength)
- int getWindowSize () const
- void setWindowSize (int windowSize)
- virtual void setWeightMap (const WeightMapSP &weightMap)
- long long getStepInterval () const
- void setStepInterval (long long stepInterval)
- long long getTotalSteps () const
- const int getDefaultDim () const
- float getSubSample () const
- void setSubSample (float subSample)
- virtual ∼Node2Vec ()=default

Additional Inherited Members

9.71.1 Detailed Description

template<typename Network = UNetwork<>>
class LinkPred::Node2Vec< Network >

Node2Vec encoder. References: Grover, A. and Leskovec, J. (2016). Node2vec: Scalable feature learning for networks. In Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, KDD'16, pages 855–864, New York, NY, USA. Association for Computing Machinery. This implementation is based on the code `https://github.com/xgfs/node2vec-c`.

Template Parameters

Network	The network type.

9.71.2 Constructor & Destructor Documentation

9.71.2.1 Node2Vec() [1/3]

```
template<typename Network = UNetwork<>>
LinkPred::Node2Vec< Network >::Node2Vec (
            std::shared_ptr< Network const > net,
            long int seed )  [inline]
```

Constructor.

Parameters

net	The network.
seed	Random number generator seed.

9.71.2.2 Node2Vec() [2/3]

```
template<typename Network = UNetwork<>>
LinkPred::Node2Vec< Network >::Node2Vec (
             Node2Vec< Network > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.71.2.3 Node2Vec() [3/3]

```
template<typename Network = UNetwork<>>
LinkPred::Node2Vec< Network >::Node2Vec (
             Node2Vec< Network > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.71.2.4 ∼Node2Vec()

```
template<typename Network = UNetwork<>>
virtual LinkPred::Node2Vec< Network >::∼Node2Vec ( )  [virtual], [default]
```

Destructor.

9.71.3 Member Function Documentation

9.71.3.1 encode()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::Node2Vec< Network >::encode ( )  [virtual]
```

Encode the network.

Implements LinkPred::Encoder< UNetwork<> >.

9.71.3.2 getDefaultDim()

```
template<typename Network = UNetwork<>>
const int LinkPred::Node2Vec< Network >::getDefaultDim ( ) const  [inline]
```

Returns

Default embedding dimension.

9.71.3.3 getInitLR()

```
template<typename Network = UNetwork<>>
float LinkPred::Node2Vec< Network >::getInitLR ( ) const  [inline]
```

Returns

Initial learning rate.

9.71.3.4 getNbNegSamples()

```
template<typename Network = UNetwork<>>
int LinkPred::Node2Vec< Network >::getNbNegSamples ( ) const  [inline]
```

Returns

Number of negative samples.

9.71.3.5 getNbWalks()

```
template<typename Network = UNetwork<>>
int LinkPred::Node2Vec< Network >::getNbWalks ( ) const  [inline]
```

Returns

Number of walks per vertex ("\gamma").

9.71.3.6 getP()

```
template<typename Network = UNetwork<>>
float LinkPred::Node2Vec< Network >::getP ( ) const  [inline]
```

Returns

The parameter p.

9.71.3.7 getQ()

```
template<typename Network = UNetwork<>>
float LinkPred::Node2Vec< Network >::getQ ( ) const  [inline]
```

Returns

The parameter q.

9.71.3.8 getStepInterval()

```
template<typename Network = UNetwork<>>
long long LinkPred::Node2Vec< Network >::getStepInterval ( ) const  [inline]
```

Returns

The number of steps after which the learning rate is updated.

9.71.3.9 getSubSample()

```
template<typename Network = UNetwork<>>
float LinkPred::Node2Vec< Network >::getSubSample ( ) const  [inline]
```

Returns

Sub-sample size.

9.71.3.10 getTotalSteps()

```
template<typename Network = UNetwork<>>
long long LinkPred::Node2Vec< Network >::getTotalSteps ( ) const  [inline]
```

Returns

The total number of steps.

9.71.3.11 getWalkLength()

```
template<typename Network = UNetwork<>>
int LinkPred::Node2Vec< Network >::getWalkLength ( ) const  [inline]
```

Returns

DeepWalk parameter "t" = length of the walk.

9.71.3.12 getWindowSize()

```
template<typename Network = UNetwork<>>
int LinkPred::Node2Vec< Network >::getWindowSize ( ) const  [inline]
```

Returns

DeepWalk parameter "w" = window size.

9.71.3.13 init()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::Node2Vec< Network >::init ( )  [virtual]
```

Initialize encoder.

Implements LinkPred::Encoder< UNetwork<> >.

9.71.3.14 operator=() [1/2]

```
template<typename Network = UNetwork<>>
Node2Vec& LinkPred::Node2Vec< Network >::operator= (
             Node2Vec< Network > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.71.3.15 operator=() [2/2]

```
template<typename Network = UNetwork<>>
Node2Vec& LinkPred::Node2Vec< Network >::operator= (
             Node2Vec< Network > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.71.3.16 setInitLR()

```
template<typename Network = UNetwork<>>
void LinkPred::Node2Vec< Network >::setInitLR (
             float initLR )  [inline]
```

Set the initial learning rate.

Parameters

initLR	Initial learning rate.

9.71.3.17 setNbNegSamples()

```
template<typename Network = UNetwork<>>
void LinkPred::Node2Vec< Network >::setNbNegSamples (
             int nbNegSamples )  [inline]
```

Set the number of negative samples.

Parameters

nbNegSamples	The number of negative samples.

9.71.3.18 setNbWalks()

```
template<typename Network = UNetwork<>>
void LinkPred::Node2Vec< Network >::setNbWalks (
             int nbWalks ) [inline]
```

Set the number of walks per vertex ("\gamma").

Parameters

nbWalks	Number of walks per vertex ("\gamma").

9.71.3.19 setP()

```
template<typename Network = UNetwork<>>
void LinkPred::Node2Vec< Network >::setP (
             float p ) [inline]
```

Set the parameter p.

Parameters

p	The parameter p.

9.71.3.20 setQ()

```
template<typename Network = UNetwork<>>
void LinkPred::Node2Vec< Network >::setQ (
             float q ) [inline]
```

Set the parameter q.

Parameters

q	The parameter q.

9.71.3.21 setStepInterval()

```
template<typename Network = UNetwork<>>
void LinkPred::Node2Vec< Network >::setStepInterval (
             long long stepInterval ) [inline]
```

Set the number of steps after which the learning rate is updated.

Parameters

stepInterval	Number of steps after which the learning rate is updated.

9.71.3.22 setSubSample()

```
template<typename Network = UNetwork<>>
void LinkPred::Node2Vec< Network >::setSubSample (
             float subSample )  [inline]
```

Set sub-sample size.

Parameters

subSample	Sub-sample size.

9.71.3.23 setWalkLength()

```
template<typename Network = UNetwork<>>
void LinkPred::Node2Vec< Network >::setWalkLength (
             int walkLength )  [inline]
```

Set the DeepWalk parameter "t" = length of the walk.

Parameters

walkLength	DeepWalk parameter "t" = length of the walk.

9.71.3.24 setWeightMap()

```
template<typename Network = UNetwork<>>
virtual void LinkPred::Node2Vec< Network >::setWeightMap (
             const WeightMapSP & weightMap )  [inline], [virtual]
```

Set edge weight map.

Reimplemented from LinkPred::Encoder< UNetwork<> >.

9.71.3.25 setWindowSize()

```
template<typename Network = UNetwork<>>
void LinkPred::Node2Vec< Network >::setWindowSize (
             int windowSize )  [inline]
```

Set the DeepWalk parameter "w" = window size.

Parameters

windowSize	DeepWalk parameter "w" = window size.

The documentation for this class was generated from the following file:

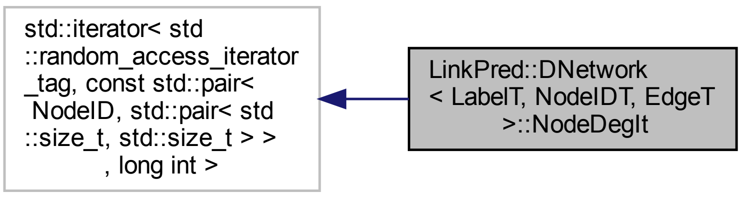
- include/linkpred/graphalg/encoders/node2vec/node2vec.hpp

9.72 LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt Class Reference

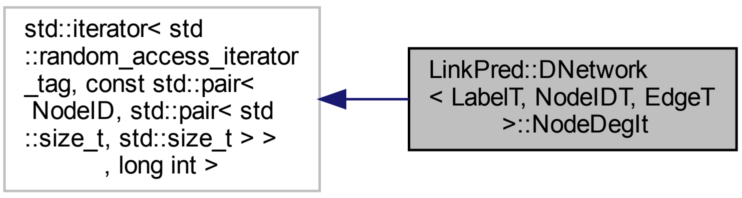
Node-degree iterator. This class can be used to iterate over pairs of node IDs and in and out degrees.

```
#include <dnetwork.hpp>
```

Inheritance diagram for LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt:


std::iterator< std ::random_access_iterator _tag, const std::pair< NodeID, std::pair< std ::size_t, std::size_t > > , long int >
LinkPred::DNetwork < LabelT, NodeIDT, EdgeT >::NodeDegIt

Collaboration diagram for LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt:


std::iterator< std ::random_access_iterator _tag, const std::pair< NodeID, std::pair< std ::size_t, std::size_t > > , long int >
LinkPred::DNetwork < LabelT, NodeIDT, EdgeT >::NodeDegIt

Public Types

- using pointer = typename std::iterator< std::random_access_iterator_tag, const std::pair< NodeID, std↩ ::pair< std::size_t, std::size_t > >, long int >::pointer
- using reference = typename std::iterator< std::random_access_iterator_tag, const std::pair< NodeID, std↩ ::pair< std::size_t, std::size_t > >, long int >::reference
- using difference_type = typename std::iterator< std::random_access_iterator_tag, const std::pair< NodeID, std::pair< std::size_t, std::size_t > >, long int >::difference_type

Public Member Functions

- NodeDegIt (NodeDegIt const &that)=default
- NodeDegIt & operator= (NodeDegIt const &that)=default
- NodeDegIt (NodeDegIt &&that)=default
- NodeDegIt & operator= (NodeDegIt &&that)=default
- reference operator* ()
- pointer operator-> ()
- NodeDegIt & operator++ ()
- NodeDegIt & operator-- ()
- NodeDegIt operator++ (int)
- NodeDegIt operator-- (int)
- NodeDegIt operator+ (const difference_type &n) const
- NodeDegIt & operator+= (const difference_type &n)
- NodeDegIt operator- (const difference_type &n) const
- NodeDegIt & operator-= (const difference_type &n)
- difference_type operator- (const NodeDegIt &that) const
- bool operator== (const NodeDegIt &that) const
- bool operator!= (const NodeDegIt &that) const
- bool operator< (const NodeDegIt &that) const
- bool operator> (const NodeDegIt &that) const
- bool operator<= (const NodeDegIt &that) const
- bool operator>= (const NodeDegIt &that) const

Friends

- class DNetwork

9.72.1 Detailed Description

**template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt**

Node-degree iterator. This class can be used to iterate over pairs of node IDs and in and out degrees.

9.72.2 Member Typedef Documentation

9.72.2.1 difference_type

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::difference_type = typename
std::iterator<std::random_access_iterator_tag, const std::pair<NodeID, std::pair<std::size↩
_t, std::size_t> >, long int>::difference_type
```

The difference type associated with the iterator.

9.72.2.2 pointer

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::pointer = typename std::iterator<std↩
::random_access_iterator_tag, const std::pair<NodeID, std::pair<std::size_t, std::size_t> >,
long int>::pointer
```

The pointer type associated with the iterator.

9.72.2.3 reference

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::reference = typename std↩
::iterator<std::random_access_iterator_tag, const std::pair<NodeID, std::pair<std::size_t,
std::size_t> >, long int>::reference
```

The reference type associated with the iterator.

9.72.3 Constructor & Destructor Documentation

9.72.3.1 NodeDegIt() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::NodeDegIt (
             NodeDegIt const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.72.3.2 NodeDegIt() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::NodeDegIt (
             NodeDegIt && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.72.4 Member Function Documentation

9.72.4.1 operator"!=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator!= (
             const NodeDegIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.72.4.2 operator*()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
reference LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator* ( )  [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.72.4.3 operator+()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator+ (
             const difference_type & n ) const  [inline]
```

Arithmetic + operator.

Parameters

n	Increment value.

Returns

The new iterator.

9.72.4.4 operator++() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator++ ( )  [inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.72.4.5 operator++() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator++ (
             int   )  [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.72.4.6 operator+=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator+= (
             const difference_type & n )  [inline]
```

Arithmetic += operator.

Parameters

n	Increment value.

Returns

A reference to the new iterator.

9.72.4.7 operator-() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator- (
            const difference_type & n ) const  [inline]
```

Arithmetic - operator.

Parameters

n	Decrement value.

Returns

The new iterator.

9.72.4.8 operator-() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
difference_type LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator- (
            const NodeDegIt & that ) const  [inline]
```

Difference between the present iterator and the one passed as parameter.

Parameters

that	The other iterator.

Returns

The difference between the current and that iterator.

9.72.4.9 operator--() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator-- ( )  [inline]
```

Pre-decrement operator.

Returns

A reference to the new iterator.

9.72.4.10 operator--() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator-- (
             int  )  [inline]
```

Post-decrement operator.

Returns

A reference to the new iterator.

9.72.4.11 operator-=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator-= (
             const difference_type & n )  [inline]
```

Arithmetic -= operator.

Parameters

n	Decrement value.

Returns

A reference to the new iterator.

9.72.4.12 operator->()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
pointer LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator-> ( )  [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.72.4.13 operator<()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator< (
             const NodeDegIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less than that.

9.72.4.14 operator<=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator<= (
             const NodeDegIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater or equal to that.

9.72.4.15 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator= (
            NodeDegIt && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.72.4.16 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator= (
            NodeDegIt const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.72.4.17 operator==()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator== (
            const NodeDegIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

9.72.4.18 operator>()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator> (
             const NodeDegIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater that.

9.72.4.19 operator>=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator>= (
             const NodeDegIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less or equal to that.

9.72.5 Friends And Related Function Documentation

9.72.5.1 DNetwork

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
friend class DNetwork  [friend]
```

DNetwork is a friend.

The documentation for this class was generated from the following file:

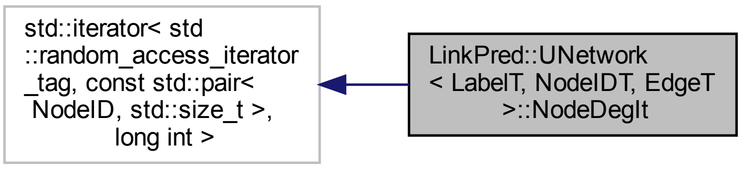
- include/linkpred/core/dnetwork/dnetwork.hpp

9.73 LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt Class Reference

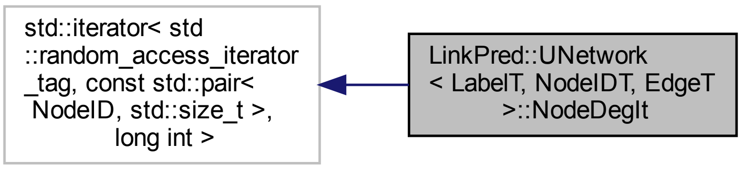
Node-degree iterator. This class can be used to iterate over pairs of node IDs and degrees.

`#include <unetwork.hpp>`

Inheritance diagram for LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt:


std::iterator< std ::random_access_iterator _tag, const std::pair< NodeID, std::size_t >, long int >
LinkPred::UNetwork < LabelT, NodeIDT, EdgeT >::NodeDegIt

Collaboration diagram for LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt:


std::iterator< std ::random_access_iterator _tag, const std::pair< NodeID, std::size_t >, long int >
LinkPred::UNetwork < LabelT, NodeIDT, EdgeT >::NodeDegIt

Public Types

- using pointer = typename std::iterator< std::random_access_iterator_tag, const std::pair< NodeID, std::size_t >, long int >::pointer
- using reference = typename std::iterator< std::random_access_iterator_tag, const std::pair< NodeID, std::size_t >, long int >::reference
- using difference_type = typename std::iterator< std::random_access_iterator_tag, const std::pair< NodeID, std::size_t >, long int >::difference_type

Public Member Functions

- NodeDegIt (NodeDegIt const &that)=default
- NodeDegIt & operator= (NodeDegIt const &that)=default
- NodeDegIt (NodeDegIt &&that)=default
- NodeDegIt & operator= (NodeDegIt &&that)=default

- reference operator∗ ()
- pointer operator-> ()
- NodeDegIt & operator++ ()
- NodeDegIt & operator-- ()
- NodeDegIt operator++ (int)
- NodeDegIt operator-- (int)
- NodeDegIt operator+ (const difference_type &n) const
- NodeDegIt & operator+= (const difference_type &n)
- NodeDegIt operator- (const difference_type &n) const
- NodeDegIt & operator-= (const difference_type &n)
- difference_type operator- (const NodeDegIt &that) const
- bool operator== (const NodeDegIt &that) const
- bool operator!= (const NodeDegIt &that) const
- bool operator< (const NodeDegIt &that) const
- bool operator> (const NodeDegIt &that) const
- bool operator<= (const NodeDegIt &that) const
- bool operator>= (const NodeDegIt &that) const

Friends

- class UNetwork

9.73.1 Detailed Description

**template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt**

Node-degree iterator. This class can be used to iterate over pairs of node IDs and degrees.

9.73.2 Member Typedef Documentation

9.73.2.1 difference_type

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::difference_type = typename
std::iterator<std::random_access_iterator_tag, const std::pair<NodeID, std::size_t>, long
int>::difference_type
```

The difference type associated with the iterator.

9.73.2.2 pointer

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::pointer = typename std::iterator<std←
::random_access_iterator_tag, const std::pair<NodeID, std::size_t>, long int>::pointer
```

The pointer type associated with the iterator.

9.73.2.3 reference

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::reference = typename std↩
::iterator<std::random_access_iterator_tag, const std::pair<NodeID, std::size_t>, long int>↩
::reference
```

The reference type associated with the iterator.

9.73.3 Constructor & Destructor Documentation

9.73.3.1 NodeDegIt() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::NodeDegIt (
             NodeDegIt const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.73.3.2 NodeDegIt() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::NodeDegIt (
             NodeDegIt && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.73.4 Member Function Documentation

9.73.4.1 operator"!=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator!= (
            const NodeDegIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.73.4.2 operator*()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
reference LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator* ( )  [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.73.4.3 operator+()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator+ (
            const difference_type & n ) const  [inline]
```

Arithmetic + operator.

Parameters

n	Increment value.

Returns

The new iterator.

9.73.4.4 operator++() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator++ ( )  [inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.73.4.5 operator++() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator++ (
             int  )  [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.73.4.6 operator+=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator+= (
             const difference_type & n )  [inline]
```

Arithmetic += operator.

Parameters

n	Increment value.

Returns

A reference to the new iterator.

9.73.4.7 operator-() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator- (
            const difference_type & n ) const  [inline]
```

Arithmetic - operator.

Parameters

n	Decrement value.

Returns

The new iterator.

9.73.4.8 operator-() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
difference_type LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator- (
            const NodeDegIt & that ) const  [inline]
```

Difference between the present iterator and the one passed as parameter.

Parameters

that	The other iterator.

Returns

The difference between the current and that iterator.

9.73.4.9 operator--() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator-- ( )  [inline]
```

Pre-decrement operator.

Returns

A reference to the new iterator.

9.73.4.10 operator--() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator-- (
             int  )  [inline]
```

Post-decrement operator.

Returns

A reference to the new iterator.

9.73.4.11 operator-=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator-= (
             const difference_type & n )  [inline]
```

Arithmetic -= operator.

Parameters

n	Decrement value.

Returns

A reference to the new iterator.

9.73.4.12 operator->()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
pointer LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator-> ( )  [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.73.4.13 operator<()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator< (
             const NodeDegIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less than that.

9.73.4.14 operator<=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator<= (
             const NodeDegIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater or equal to that.

9.73.4.15 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator= (
             NodeDegIt && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.73.4.16 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
```

```
NodeDegIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator= (
            NodeDegIt const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.73.4.17 operator==()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator== (
             const NodeDegIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

9.73.4.18 operator>()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator> (
             const NodeDegIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater that.

9.73.4.19 operator>=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt::operator>= (
             const NodeDegIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less or equal to that.

9.73.5 Friends And Related Function Documentation

9.73.5.1 UNetwork

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
friend class UNetwork  [friend]
```

UNetwork is a friend.

The documentation for this class was generated from the following file:

- include/linkpred/core/unetwork/unetwork.hpp

9.74 LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType > Class Template Reference

A node map.

```
#include <unetwork.hpp>
```

Public Types

- using NodeMapIt = typename std::vector< ValueType >::iterator
- using NodeMapConstIt = typename std::vector< ValueType >::const_iterator

Public Member Functions

- NodeMap (NodeMap const &that)=default
- NodeMap & operator= (NodeMap const &that)=default
- NodeMap (NodeMap &&that)=default
- NodeMap & operator= (NodeMap &&that)=default
- ValueType operator[ ] (NodeID const &i) const
- ValueType & operator[ ] (NodeID const &i)
- ValueType at (NodeID const &i) const
- NodeMapIt begin ()
- NodeMapIt end ()
- NodeMapConstIt cbegin () const
- NodeMapConstIt cend () const
- ∼NodeMap ()=default

Friends

- class **UNetwork**

9.74.1 Detailed Description

template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
template<typename ValueType>
class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >

A node map.

This class can be used to assign a value to every node in the network. Access to values is done in constant time.

Template Parameters

ValueType	Type of mapped values.

9.74.2 Member Typedef Documentation

9.74.2.1 NodeMapConstIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::NodeMapConstIt =
typename std::vector<ValueType>::const_iterator
```

A constant iterator on the map values.

9.74.2.2 NodeMapIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::NodeMapIt = typename
std::vector<ValueType>::iterator
```

Iterator on the map values.

9.74.3 Constructor & Destructor Documentation

9.74.3.1 NodeMap() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::NodeMap (
             NodeMap< ValueType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.74.3.2 NodeMap() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::NodeMap (
             NodeMap< ValueType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.74.3.3 ∼NodeMap()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::∼NodeMap ( )  [default]
```

Destructor.

9.74.4 Member Function Documentation

9.74.4.1 at()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::at (
             NodeID const & i ) const  [inline]
```

Parameters

i	A node ID.

Returns

The value associated with the node i.

9.74.4.2 begin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeMapIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::begin ( )  [inline]
```

Returns

An iterator to the first element in the map.

9.74.4.3 cbegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeMapConstIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::cbegin ( )
const  [inline]
```

Returns

A constant iterator to the first element in the map.

9.74.4.4 cend()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeMapConstIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::cend ( )
const  [inline]
```

Returns

A constant iterator to one-past-the-last element in the map.

9.74.4.5 end()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeMapIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::end ( )  [inline]
```

Returns

An iterator to one-past-the-last element in the map.

9.74.4.6 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeMap& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::operator= (
             NodeMap< ValueType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.74.4.7 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeMap& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::operator= (
             NodeMap< ValueType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.74.4.8 operator[]() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
```

```
template<typename ValueType >
ValueType& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::operator[] (
            NodeID const & i )  [inline]
```

Parameters

i	A node ID.

Returns

A reference to the value associated with the node i.

9.74.4.9 operator[]() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::operator[] (
            NodeID const & i ) const  [inline]
```

Parameters

i	A node ID.

Returns

The value associated with the node i.

The documentation for this class was generated from the following file:

- include/linkpred/core/unetwork/unetwork.hpp

9.75 LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType > Class Template Reference

A node map.

```
#include <dnetwork.hpp>
```

Public Types

- using NodeMapIt = typename std::vector< ValueType >::iterator
- using NodeMapConstIt = typename std::vector< ValueType >::const_iterator

Public Member Functions

- NodeMap (NodeMap const &that)=default
- NodeMap & operator= (NodeMap const &that)=default
- NodeMap (NodeMap &&that)=default
- NodeMap & operator= (NodeMap &&that)=default
- ValueType operator[ ] (NodeID const &i) const
- ValueType & operator[ ] (NodeID const &i)
- ValueType at (NodeID const &i) const
- NodeMapIt begin ()
- NodeMapIt end ()
- NodeMapConstIt cbegin () const
- NodeMapConstIt cend () const
- ∼NodeMap ()=default

Friends

- class **DNetwork**

9.75.1 Detailed Description

template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
template<typename ValueType>
class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >

A node map.

This class can be used to assign a value to every node in the network. Access to values is done in constant time.

Template Parameters

ValueType	Type of mapped values.

9.75.2 Member Typedef Documentation

9.75.2.1 NodeMapConstIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::NodeMapConstIt =
typename std::vector<ValueType>::const_iterator
```

A constant iterator on the map values.

9.75.2.2 NodeMapIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::NodeMapIt = typename
std::vector<ValueType>::iterator
```

Iterator on the map values.

9.75.3 Constructor & Destructor Documentation

9.75.3.1 NodeMap() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::NodeMap (
             NodeMap< ValueType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.75.3.2 NodeMap() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::NodeMap (
             NodeMap< ValueType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.75.3.3 ∼NodeMap()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::~NodeMap ( )  [default]
```

Destructor.

9.75.4 Member Function Documentation

9.75.4.1 at()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::at (
            NodeID const & i ) const  [inline]
```

Parameters

i	A node ID.

Returns

The value associated with the node i.

9.75.4.2 begin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeMapIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::begin ( )  [inline]
```

Returns

An iterator to the first element in the map.

9.75.4.3 cbegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeMapConstIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::cbegin ( )
const  [inline]
```

Returns

A constant iterator to the first element in the map.

9.75.4.4 cend()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeMapConstIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::cend ( )
const  [inline]
```

Returns

A constant iterator to one-past-the-last element in the map.

9.75.4.5 end()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeMapIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::end ( )  [inline]
```

Returns

An iterator to one-past-the-last element in the map.

9.75.4.6 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeMap& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::operator= (
             NodeMap< ValueType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.75.4.7 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
```

```
NodeMap& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::operator= (
            NodeMap< ValueType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.75.4.8 operator[]() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::operator[] (
            NodeID const & i )  [inline]
```

Parameters

i	A node ID.

Returns

A reference to the value associated with the node i.

9.75.4.9 operator[]() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >::operator[] (
            NodeID const & i ) const  [inline]
```

Parameters

i	A node ID.

Returns

The value associated with the node i.

The documentation for this class was generated from the following file:

- include/linkpred/core/dnetwork/dnetwork.hpp

9.76 LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType > Class Template Reference

A sparse node map.

```
#include <dnetwork.hpp>
```

Public Types

- using NodeSMapIterator = typename std::map< NodeID, ValueType >::iterator
- using NodeSMapConstIterator = typename std::map< NodeID, ValueType >::const_iterator

Public Member Functions

- NodeSMap (NodeSMap const &that)=default
- NodeSMap & operator= (NodeSMap const &that)=default
- NodeSMap (NodeSMap &&that)=default
- NodeSMap & operator= (NodeSMap &&that)=default
- auto find (NodeID const &i)
- ValueType operator[ ] (NodeID const &i) const
- ValueType & operator[ ] (NodeID const &i)
- ValueType at (NodeID const &i) const
- NodeSMapIterator begin ()
- NodeSMapIterator end ()
- NodeSMapConstIterator cbegin () const
- NodeSMapConstIterator cend () const
- std::size_t size () const
- ∼NodeSMap ()=default

Friends

- class **DNetwork**

9.76.1 Detailed Description

template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
template<typename ValueType>
class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >

A sparse node map.

This class can be used to assign a value to every node in the network. Access to values is done in constant time.

Template Parameters

ValueType	Type of mapped values.

9.76.2 Member Typedef Documentation

9.76.2.1 NodeSMapConstIterator

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::NodeSMapConstIterator
= typename std::map<NodeID, ValueType>::const_iterator
```

A constant iterator on the map values.

9.76.2.2 NodeSMapIterator

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::NodeSMapIterator =
typename std::map<NodeID, ValueType>::iterator
```

Iterator on the map values.

9.76.3 Constructor & Destructor Documentation

9.76.3.1 NodeSMap() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::NodeSMap (
             NodeSMap< ValueType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.76.3.2 NodeSMap() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
```

```
template<typename ValueType >
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::NodeSMap (
             NodeSMap< ValueType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.76.3.3 ∼NodeSMap()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::∼NodeSMap ( )  [default]
```

Destructor.

9.76.4 Member Function Documentation

9.76.4.1 at()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::at (
             NodeID const & i ) const  [inline]
```

Parameters

i	A node ID.

Returns

The value associated with the node i.

9.76.4.2 begin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeSMapIterator LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::begin (
)  [inline]
```

Returns

An iterator to the first element in the map.

9.76.4.3 cbegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeSMapConstIterator LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >↩
::cbegin ( ) const  [inline]
```

Returns

A constant iterator to the first element in the map.

9.76.4.4 cend()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeSMapConstIterator LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >↩
::cend ( ) const  [inline]
```

Returns

A constant iterator to one-past-the-last element in the map.

9.76.4.5 end()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeSMapIterator LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::end ( )
[inline]
```

Returns

An iterator to one-past-the-last element in the map.

9.76.4.6 find()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
auto LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::find (
            NodeID const & i )  [inline]
```

Parameters

i	A node ID.

Returns

An iterator to the element with key i.

9.76.4.7 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeSMap& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::operator= (
            NodeSMap< ValueType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.76.4.8 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeSMap& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::operator= (
            NodeSMap< ValueType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.76.4.9 operator[]() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::operator[] (
            NodeID const & i )  [inline]
```

Parameters

i	A node ID.

Returns

A reference to the value associated with the node i.

9.76.4.10 operator[]() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::operator[] (
            NodeID const & i ) const  [inline]
```

Parameters

i	A node ID.

Returns

The value associated with the node i.

9.76.4.11 size()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
std::size_t LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::size ( )
const  [inline]
```

Returns

The number of elements in the map (those that were explicitly inserted).

The documentation for this class was generated from the following file:

- include/linkpred/core/dnetwork/dnetwork.hpp

9.77 LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType > Class Template Reference

A sparse node map.

```
#include <unetwork.hpp>
```

Public Types

- using NodeSMapIterator = typename std::map< NodeID, ValueType >::iterator
- using NodeSMapConstIterator = typename std::map< NodeID, ValueType >::const_iterator

Public Member Functions

- NodeSMap (NodeSMap const &that)=default
- NodeSMap & operator= (NodeSMap const &that)=default
- NodeSMap (NodeSMap &&that)=default
- NodeSMap & operator= (NodeSMap &&that)=default
- auto find (NodeID const &i)
- ValueType operator[ ] (NodeID const &i) const
- ValueType & operator[ ] (NodeID const &i)
- ValueType at (NodeID const &i) const
- NodeSMapIterator begin ()
- NodeSMapIterator end ()
- NodeSMapConstIterator cbegin () const
- NodeSMapConstIterator cend () const
- std::size_t size () const
- ∼NodeSMap ()=default

Friends

- class **UNetwork**

9.77.1 Detailed Description

template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
template<typename ValueType>
class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >

A sparse node map.

This class can be used to assign a value to every node in the network. Access to values is done in constant time.

Template Parameters

ValueType	Type of mapped values.

9.77.2 Member Typedef Documentation

9.77.2.1 NodeSMapConstIterator

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
```

```
template<typename ValueType >
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::NodeSMapConstIterator
= typename std::map<NodeID, ValueType>::const_iterator
```

A constant iterator on the map values.

9.77.2.2 NodeSMapIterator

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::NodeSMapIterator =
typename std::map<NodeID, ValueType>::iterator
```

Iterator on the map values.

9.77.3 Constructor & Destructor Documentation

9.77.3.1 NodeSMap() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::NodeSMap (
             NodeSMap< ValueType > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.77.3.2 NodeSMap() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::NodeSMap (
             NodeSMap< ValueType > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.77.3.3 ∼NodeSMap()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::∼NodeSMap ( )  [default]
```

Destructor.

9.77.4 Member Function Documentation

9.77.4.1 at()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::at (
            NodeID const & i ) const  [inline]
```

Parameters

i	A node ID.

Returns

The value associated with the node i.

9.77.4.2 begin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeSMapIterator LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::begin (
)  [inline]
```

Returns

An iterator to the first element in the map.

9.77.4.3 cbegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeSMapConstIterator LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >↩
::cbegin ( ) const  [inline]
```

Returns

A constant iterator to the first element in the map.

9.77.4.4 cend()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeSMapConstIterator LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >↩
::cend ( ) const  [inline]
```

Returns

A constant iterator to one-past-the-last element in the map.

9.77.4.5 end()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeSMapIterator LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::end ( )
[inline]
```

Returns

An iterator to one-past-the-last element in the map.

9.77.4.6 find()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
auto LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::find (
            NodeID const & i )  [inline]
```

Parameters

i	A node ID.

Returns

An iterator to the element with key i.

9.77.4.7 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeSMap& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::operator= (
            NodeSMap< ValueType > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.77.4.8 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
NodeSMap& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::operator= (
            NodeSMap< ValueType > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.77.4.9 operator[]() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::operator[] (
            NodeID const & i )  [inline]
```

Parameters

i	A node ID.

Returns

A reference to the value associated with the node i.

9.77.4.10 operator[]() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
ValueType LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::operator[] (
            NodeID const & i ) const  [inline]
```

Parameters

i	A node ID.

Returns

The value associated with the node i.

9.77.4.11 size()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueType >
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >::size ( )
const  [inline]
```

Returns

The number of elements in the map (those that were explicitly inserted).

The documentation for this class was generated from the following file:

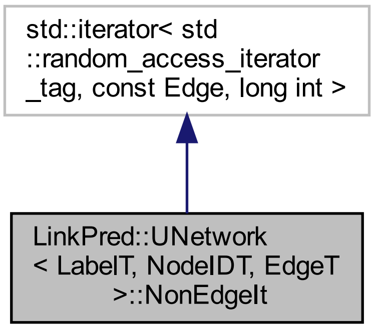
- include/linkpred/core/unetwork/unetwork.hpp

9.78 LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt Class Reference

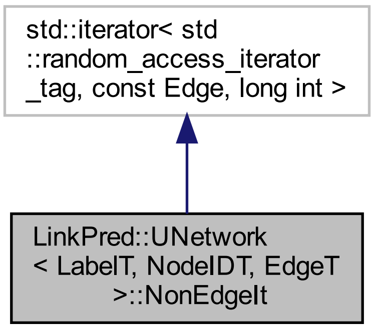
Nonedges iterator.

`#include <unetwork.hpp>`

Inheritance diagram for LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt:


std::iterator< std ::random_access_iterator _tag, const Edge, long int >
LinkPred::UNetwork < LabelT, NodeIDT, EdgeT >::NonEdgeIt

Collaboration diagram for LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt:


std::iterator< std ::random_access_iterator _tag, const Edge, long int >
LinkPred::UNetwork < LabelT, NodeIDT, EdgeT >::NonEdgeIt

Public Types

- using pointer = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >::pointer
- using reference = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >↩ ::reference
- using difference_type = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >↩ ::difference_type

Public Member Functions

- NonEdgeIt (NonEdgeIt const &that)=default
- NonEdgeIt & operator= (NonEdgeIt const &that)=default
- NonEdgeIt (NonEdgeIt &&that)=default
- NonEdgeIt & operator= (NonEdgeIt &&that)=default
- reference operator∗ ()
- pointer operator-> ()
- NonEdgeIt & operator++ ()
- NonEdgeIt & operator-- ()
- NonEdgeIt operator++ (int)
- NonEdgeIt operator-- (int)
- NonEdgeIt operator+ (const difference_type &n) const
- NonEdgeIt & operator+= (const difference_type &n)
- NonEdgeIt operator- (const difference_type &n) const
- NonEdgeIt & operator-= (const difference_type &n)
- difference_type operator- (const NonEdgeIt &that) const
- bool operator== (const NonEdgeIt &that) const
- bool operator!= (const NonEdgeIt &that) const
- bool operator< (const NonEdgeIt &that) const
- bool operator> (const NonEdgeIt &that) const
- bool operator<= (const NonEdgeIt &that) const
- bool operator>= (const NonEdgeIt &that) const

Friends

- class UNetwork

9.78.1 Detailed Description

template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int> class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt

Nonedges iterator.

9.78.2 Member Typedef Documentation

9.78.2.1 difference_type

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::difference_type = typename
std::iterator<std::random_access_iterator_tag, const Edge, long int>::difference_type
```

The difference type associated with the iterator.

9.78.2.2 pointer

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::pointer = typename std::iterator<std↩
::random_access_iterator_tag, const Edge, long int>::pointer
```

The pointer type associated with the iterator.

9.78.2.3 reference

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::reference = typename std↩
::iterator<std::random_access_iterator_tag, const Edge, long int>::reference
```

The reference type associated with the iterator.

9.78.3 Constructor & Destructor Documentation

9.78.3.1 NonEdgeIt() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::NonEdgeIt (
             NonEdgeIt const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.78.3.2 NonEdgeIt() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::NonEdgeIt (
             NonEdgeIt && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.78.4 Member Function Documentation

9.78.4.1 operator"!=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator!= (
            const NonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.78.4.2 operator∗()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
reference LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator* ( )  [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.78.4.3 operator+()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator+ (
            const difference_type & n ) const  [inline]
```

Arithmetic + operator.

Parameters

n	Increment value.

Returns

The new iterator.

9.78.4.4 operator++() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator++ ( )  [inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.78.4.5 operator++() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator++ (
             int  )  [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.78.4.6 operator+=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator+= (
             const difference_type & n )  [inline]
```

Arithmetic += operator.

Parameters

n	Increment value.

Returns

A reference to the new iterator.

9.78.4.7 operator-() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator- (
             const difference_type & n ) const  [inline]
```

Arithmetic - operator.

Parameters

n	Decrement value.

Returns

The new iterator.

9.78.4.8 operator-() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
difference_type LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator- (
             const NonEdgeIt & that ) const  [inline]
```

Difference between the present iterator and the one passed as parameter.

Parameters

that	The other iterator.

Returns

The difference between the current and that iterator.

9.78.4.9 operator--() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator-- ( )  [inline]
```

Pre-decrement operator.

Returns

A reference to the new iterator.

9.78.4.10 operator--() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator-- (
             int  )  [inline]
```

Post-decrement operator.

Returns

A reference to the new iterator.

9.78.4.11 operator-=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator-= (
             const difference_type & n )  [inline]
```

Arithmetic -= operator.

Parameters

n	Decrement value.

Returns

A reference to the new iterator.

9.78.4.12 operator->()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
pointer LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator-> ( )  [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.78.4.13 operator<()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator< (
             const NonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less than that.

9.78.4.14 operator<=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator<= (
             const NonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater or equal to that.

9.78.4.15 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator= (
             NonEdgeIt && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.78.4.16 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator= (
             NonEdgeIt const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.78.4.17 operator==()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator== (
             const NonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

9.78.4.18 operator>()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator> (
             const NonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater that.

9.78.4.19 operator>=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator>= (
             const NonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less or equal to that.

9.78.5 Friends And Related Function Documentation

9.78.5.1 UNetwork

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
friend class UNetwork  [friend]
```

UNetwork is a friend.

The documentation for this class was generated from the following file:

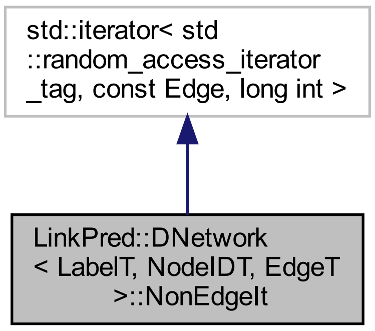
- include/linkpred/core/unetwork/unetwork.hpp

9.79 LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt Class Reference

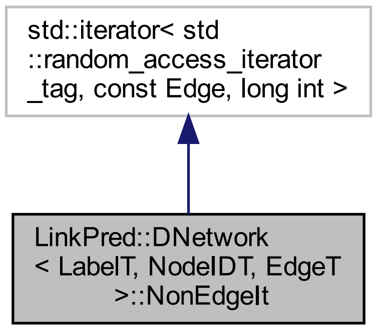
Nonedges iterator.

`#include <dnetwork.hpp>`

Inheritance diagram for LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt:


std::iterator< std ::random_access_iterator _tag, const Edge, long int >
LinkPred::DNetwork < LabelT, NodeIDT, EdgeT >::NonEdgeIt

Collaboration diagram for LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt:


std::iterator< std ::random_access_iterator _tag, const Edge, long int >
LinkPred::DNetwork < LabelT, NodeIDT, EdgeT >::NonEdgeIt

Public Types

- using pointer = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >::pointer
- using reference = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >↩ ::reference
- using difference_type = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >↩ ::difference_type

Public Member Functions

- NonEdgeIt (NonEdgeIt const &that)=default
- NonEdgeIt & operator= (NonEdgeIt const &that)=default
- NonEdgeIt (NonEdgeIt &&that)=default
- NonEdgeIt & operator= (NonEdgeIt &&that)=default
- reference operator∗ ()
- pointer operator-> ()
- NonEdgeIt & operator++ ()
- NonEdgeIt & operator-- ()
- NonEdgeIt operator++ (int)
- NonEdgeIt operator-- (int)
- NonEdgeIt operator+ (const difference_type &n) const
- NonEdgeIt & operator+= (const difference_type &n)
- NonEdgeIt operator- (const difference_type &n) const
- NonEdgeIt & operator-= (const difference_type &n)
- difference_type operator- (const NonEdgeIt &that) const
- bool operator== (const NonEdgeIt &that) const
- bool operator!= (const NonEdgeIt &that) const
- bool operator< (const NonEdgeIt &that) const
- bool operator> (const NonEdgeIt &that) const
- bool operator<= (const NonEdgeIt &that) const
- bool operator>= (const NonEdgeIt &that) const

Friends

- class DNetwork

9.79.1 Detailed Description

**template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt**

Nonedges iterator.

9.79.2 Member Typedef Documentation

9.79.2.1 difference_type

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::difference_type = typename
std::iterator<std::random_access_iterator_tag, const Edge, long int>::difference_type
```

The difference type associated with the iterator.

9.79.2.2 pointer

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::pointer = typename std::iterator<std↩
::random_access_iterator_tag, const Edge, long int>::pointer
```

The pointer type associated with the iterator.

9.79.2.3 reference

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::reference = typename std↩
::iterator<std::random_access_iterator_tag, const Edge, long int>::reference
```

The reference type associated with the iterator.

9.79.3 Constructor & Destructor Documentation

9.79.3.1 NonEdgeIt() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::NonEdgeIt (
             NonEdgeIt const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.79.3.2 NonEdgeIt() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::NonEdgeIt (
            NonEdgeIt && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.79.4 Member Function Documentation

9.79.4.1 operator"!=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator!= (
            const NonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.79.4.2 operator*()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
reference LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator* ( )  [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.79.4.3 operator+()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator+ (
             const difference_type & n ) const  [inline]
```

Arithmetic + operator.

Parameters

n	Increment value.

Returns

The new iterator.

9.79.4.4 operator++() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator++ ( )  [inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.79.4.5 operator++() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator++ (
             int  )  [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.79.4.6 operator+=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator+= (
             const difference_type & n )  [inline]
```

Arithmetic += operator.

Parameters

n	Increment value.

Returns

A reference to the new iterator.

9.79.4.7 operator-() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator- (
             const difference_type & n ) const  [inline]
```

Arithmetic - operator.

Parameters

n	Decrement value.

Returns

The new iterator.

9.79.4.8 operator-() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
difference_type LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator- (
             const NonEdgeIt & that ) const  [inline]
```

Difference between the present iterator and the one passed as parameter.

Parameters

that	The other iterator.

Returns

The difference between the current and that iterator.

9.79.4.9 operator--() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator-- ( )  [inline]
```

Pre-decrement operator.

Returns

A reference to the new iterator.

9.79.4.10 operator--() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator-- (
             int  )  [inline]
```

Post-decrement operator.

Returns

A reference to the new iterator.

9.79.4.11 operator-=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator-= (
             const difference_type & n )  [inline]
```

Arithmetic -= operator.

Parameters

n	Decrement value.

Returns

A reference to the new iterator.

9.79.4.12 operator->()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
pointer LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator-> ( )  [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.79.4.13 operator<()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator< (
            const NonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less than that.

9.79.4.14 operator<=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator<= (
            const NonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater or equal to that.

9.79.4.15 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator= (
            NonEdgeIt && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.79.4.16 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator= (
            NonEdgeIt const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.79.4.17 operator==()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator== (
            const NonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

9.79.4.18 operator>()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator> (
            const NonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater that.

9.79.4.19 operator>=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt::operator>= (
            const NonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less or equal to that.

9.79.5 Friends And Related Function Documentation

9.79.5.1 DNetwork

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
friend class DNetwork  [friend]
```

DNetwork is a friend.

The documentation for this class was generated from the following file:

- include/linkpred/core/dnetwork/dnetwork.hpp

9.80 LinkPred::Utils::PairCompRight< FirstT, SecondT, CompareT > Struct Template Reference

Class for comparing pairs based on second elements only.

```
#include <miscutils.hpp>
```

Public Member Functions

- bool operator() (std::pair< FirstT, SecondT > const &l, std::pair< FirstT, SecondT > const &r) const

9.80.1 Detailed Description

template<typename FirstT, typename SecondT, typename CompareT>
struct LinkPred::Utils::PairCompRight< FirstT, SecondT, CompareT >

Class for comparing pairs based on second elements only.

Template Parameters

FirstT	The first pair type.
SecondT	The second pair type.
CompareT	The comparator type.

9.80.2 Member Function Documentation

9.80.2.1 operator()()

```
template<typename FirstT , typename SecondT , typename CompareT >
bool LinkPred::Utils::PairCompRight< FirstT, SecondT, CompareT >::operator() (
            std::pair< FirstT, SecondT > const & l,
            std::pair< FirstT, SecondT > const & r ) const  [inline]
```

Compare pair based on second elements.

Parameters

l	The first pair.
r	The second pair.

Returns

The result of the comparison.

The documentation for this struct was generated from the following file:

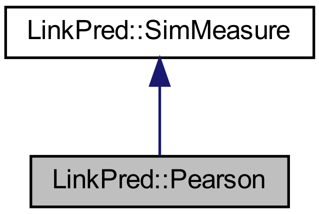
- include/linkpred/utils/miscutils.hpp

9.81 LinkPred::Pearson Class Reference

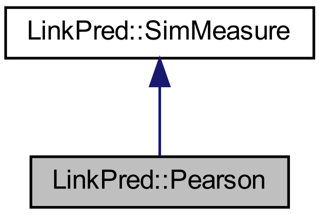
Pearson similarity (Pearson correlation coefficient).

`#include <pearson.hpp>`

Inheritance diagram for LinkPred::Pearson:



Collaboration diagram for LinkPred::Pearson:



Public Member Functions

- Pearson ()
- Pearson (Pearson const &that)=default
- Pearson & operator= (Pearson const &that)=default
- Pearson (Pearson &&that)=default
- Pearson & operator= (Pearson &&that)=default
- virtual double sim (Vec const &v1, Vec const &v2)
- virtual ∼Pearson ()=default

9.81.1 Detailed Description

Pearson similarity (Pearson correlation coefficient).

9.81.2 Constructor & Destructor Documentation

9.81.2.1 Pearson() [1/3]

```
LinkPred::Pearson::Pearson ( )  [inline]
```

Constructor.

9.81.2.2 Pearson() [2/3]

```
LinkPred::Pearson::Pearson (
            Pearson const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.81.2.3 Pearson() [3/3]

```
LinkPred::Pearson::Pearson (
            Pearson && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.81.2.4 ∼Pearson()

```
virtual LinkPred::Pearson::∼Pearson ( )  [virtual], [default]
```

Destructor.

9.81.3 Member Function Documentation

9.81.3.1 operator=() [1/2]

```
Pearson& LinkPred::Pearson::operator= (
            Pearson && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.81.3.2 operator=() [2/2]

```
Pearson& LinkPred::Pearson::operator= (
            Pearson const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.81.3.3 sim()

```
virtual double LinkPred::Pearson::sim (
            Vec const & v1,
            Vec const & v2 )  [virtual]
```

Compute the similarity between two vectors.

Parameters

v1	First vector.
v2	Second vector. Must be of the same dimension as v1.

Returns

The similarity between v1 and v2.

Implements LinkPred::SimMeasure.

The documentation for this class was generated from the following file:

- include/linkpred/ml/simmeasures/pearson.hpp

9.82 LinkPred::PEFactory< Network, LPredictorT, TestDataT, PerfMeasureT > Class Template Reference

Factory class to create link predictors and performance measures.

```
#include <perfevaluator.hpp>
```

Public Member Functions

- virtual std::vector< std::shared_ptr< LPredictorT > > getPredictors (std::shared_ptr< Network const > obsNet)=0
- virtual std::vector< std::shared_ptr< PerfMeasureT > > getPerfMeasures (TestDataT const &testData)=0
- virtual ∼PEFactory ()=default

9.82.1 Detailed Description

template<typename Network = UNetwork<>, typename LPredictorT = ULPredictor<>, typename TestDataT = TestData<>, typename PerfMeasureT = PerfMeasure< PredResults<TestDataT, LPredictorT>>>
class LinkPred::PEFactory< Network, LPredictorT, TestDataT, PerfMeasureT >

Factory class to create link predictors and performance measures.

Template Parameters

Network	The network data type.
LPredictorT	The link predictor type.
TestDataT	The test data type.
PerfMeasureT	The performance measure type.

9.82.2 Constructor & Destructor Documentation

9.82.2.1 ∼PEFactory()

```
template<typename Network = UNetwork<>, typename LPredictorT = ULPredictor<>, typename Test↩
DataT = TestData<>, typename PerfMeasureT = PerfMeasure< PredResults<TestDataT, LPredictor↩
T>>>
virtual LinkPred::PEFactory< Network, LPredictorT, TestDataT, PerfMeasureT >::∼PEFactory ( )
[virtual], [default]
```

Destructor.

9.82.3 Member Function Documentation

9.82.3.1 getPerfMeasures()

```
template<typename Network = UNetwork<>, typename LPredictorT = ULPredictor<>, typename Test←
DataT = TestData<>, typename PerfMeasureT = PerfMeasure< PredResults<TestDataT, LPredictor←
T>>>
virtual std::vector<std::shared_ptr<PerfMeasureT> > LinkPred::PEFactory< Network, LPredictorT,
TestDataT, PerfMeasureT >::getPerfMeasures (
             TestDataT const & testData )  [pure virtual]
```

Returns

A vector of performance measures.

9.82.3.2 getPredictors()

```
template<typename Network = UNetwork<>, typename LPredictorT = ULPredictor<>, typename Test←
DataT = TestData<>, typename PerfMeasureT = PerfMeasure< PredResults<TestDataT, LPredictor←
T>>>
virtual std::vector<std::shared_ptr<LPredictorT> > LinkPred::PEFactory< Network, LPredictorT,
TestDataT, PerfMeasureT >::getPredictors (
             std::shared_ptr< Network const > obsNet )  [pure virtual]
```

Returns

A vector of predictors.

The documentation for this class was generated from the following file:

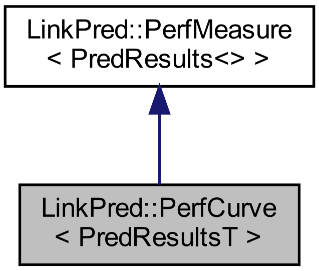
- include/linkpred/perf/perfevaluator.hpp

9.83 LinkPred::PerfCurve< PredResultsT > Class Template Reference

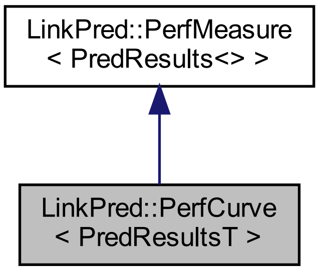
Abstract performance curve.

`#include <perfmeasure.hpp>`

Inheritance diagram for LinkPred::PerfCurve< PredResultsT >:



Collaboration diagram for LinkPred::PerfCurve< PredResultsT >:



Public Types

- using ScoresItT = typename PerfMeasure< PredResultsT >::ScoresItT

Public Member Functions

- PerfCurve ()=default
- PerfCurve (std::string name)
- PerfCurve (PerfCurve const &that)=default
- PerfCurve & operator= (PerfCurve const &that)=default
- PerfCurve (PerfCurve &&that)=default
- PerfCurve & operator= (PerfCurve &&that)=default
- virtual void eval (std::shared_ptr< PredResultsT > &predResults, PerfResults &results)=0
- virtual void eval (ScoresItT posScoresBegin, ScoresItT posScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, SortOrder &posSortOrder, SortOrder &negSortOrder, PerfResults &results)=0
- virtual std::vector< std::pair< double, double > > getCurve (std::shared_ptr< PredResultsT > &pred↵ Results)=0

- virtual std::vector< std::pair< double, double > > getCurve (ScoresItT posScoresBegin, ScoresItT pos↩ ScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, SortOrder &posSortOrder, SortOrder &negSortOrder)=0
- virtual ∼PerfCurve ()=default

9.83.1 Detailed Description

template<typename PredResultsT = PredResults<>>
class LinkPred::PerfCurve< PredResultsT >

Abstract performance curve.

Template Parameters

PredResultsT	The prediction results type.

9.83.2 Member Typedef Documentation

9.83.2.1 ScoresItT

```
template<typename PredResultsT = PredResults<>>
using LinkPred::PerfCurve< PredResultsT >::ScoresItT = typename PerfMeasure<PredResultsT>↩
::ScoresItT
```

Scores iterator type.

9.83.3 Constructor & Destructor Documentation

9.83.3.1 PerfCurve() [1/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::PerfCurve< PredResultsT >::PerfCurve ( )  [default]
```

< The name of the performance measure. Constructor.

9.83.3.2 PerfCurve() [2/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::PerfCurve< PredResultsT >::PerfCurve (
            std::string name )  [inline]
```

Constructor.

Parameters

name	The name of the performance measure.

9.83.3.3 PerfCurve() [3/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::PerfCurve< PredResultsT >::PerfCurve (
            PerfCurve< PredResultsT > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.83.3.4 PerfCurve() [4/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::PerfCurve< PredResultsT >::PerfCurve (
            PerfCurve< PredResultsT > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.83.3.5 ∼PerfCurve()

```
template<typename PredResultsT = PredResults<>>
virtual LinkPred::PerfCurve< PredResultsT >::∼PerfCurve ( )  [virtual], [default]
```

Destructor.

9.83.4 Member Function Documentation

9.83.4.1 eval() [1/2]

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::PerfCurve< PredResultsT >::eval (
             ScoresItT posScoresBegin,
             ScoresItT posScoresEnd,
             ScoresItT negScoresBegin,
             ScoresItT negScoresEnd,
             SortOrder & posSortOrder,
             SortOrder & negSortOrder,
             PerfResults & results )  [pure virtual]
```

Computes the performance measure.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
posSortOrder	The sorting order of positive scores. This may be modified by the method.
negSortOrder	The sorting order of negative scores. This may be modified by the method.
results	To write results.

9.83.4.2 eval() [2/2]

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::PerfCurve< PredResultsT >::eval (
             std::shared_ptr< PredResultsT > & predResults,
             PerfResults & results )  [pure virtual]
```

Computes the performance measure (typically the area under the curve or AUC).

Parameters

predResults	The prediction results.
results	To write results.

9.83.4.3 getCurve() [1/2]

```
template<typename PredResultsT = PredResults<>>
virtual std::vector<std::pair<double, double> > LinkPred::PerfCurve< PredResultsT >::get←
Curve (
             ScoresItT posScoresBegin,
             ScoresItT posScoresEnd,
             ScoresItT negScoresBegin,
             ScoresItT negScoresEnd,
             SortOrder & posSortOrder,
             SortOrder & negSortOrder )  [pure virtual]
```

Computes the performance curve.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
posSortOrder	The sorting order of positive scores. This may be modified by the method.
negSortOrder	The sorting order of negative scores. This may be modified by the method.

Returns

A curve in the form of an std::vector of pairs representing the x and y coordinates.

9.83.4.4 getCurve() [2/2]

```
template<typename PredResultsT = PredResults<>>
virtual std::vector<std::pair<double, double> > LinkPred::PerfCurve< PredResultsT >::get↩
Curve (
            std::shared_ptr< PredResultsT > & predResults )  [pure virtual]
```

Computes the performance curve.

Parameters

predResults	The prediction results.

Returns

A curve in the form of an std::vector of pairs representing the x and y coordinates.

9.83.4.5 operator=() [1/2]

```
template<typename PredResultsT = PredResults<>>
PerfCurve& LinkPred::PerfCurve< PredResultsT >::operator= (
            PerfCurve< PredResultsT > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.83.4.6 operator=() [2/2]

```
template<typename PredResultsT = PredResults<>>
PerfCurve& LinkPred::PerfCurve< PredResultsT >::operator= (
            PerfCurve< PredResultsT > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

The documentation for this class was generated from the following file:

- include/linkpred/perf/perfmeasure.hpp

9.84 LinkPred::PerfeEvalExpDescp< Network > Struct Template Reference

Structure storing experiment description.

```
#include <perfevaluator.hpp>
```

Public Attributes

- bool timingEnabled = false
- std::ostream ∗ out = &std::cout
- std::size_t nbTestRuns = 1
- std::shared_ptr< Network > refNet
- bool keepConnected = false
- double fnRatio = 1
- double tnRatio = 1
- double ratioStart = 0.1
- double ratioEnd = 0.1
- double ratioStep = 0.1
- long int seed = 0

9.84.1 Detailed Description

template<typename Network = UNetwork<>>
struct LinkPred::PerfeEvalExpDescp< Network >

Structure storing experiment description.

9.84.2 Member Data Documentation

9.84.2.1 fnRatio

```
template<typename Network = UNetwork<>>
double LinkPred::PerfeEvalExpDescp< Network >::fnRatio = 1
```

Ratio of false negatives used in the test set.

9.84.2.2 keepConnected

```
template<typename Network = UNetwork<>>
bool LinkPred::PerfeEvalExpDescp< Network >::keepConnected = false
```

Whether to keep the network connected.

9.84.2.3 nbTestRuns

```
template<typename Network = UNetwork<>>
std::size_t LinkPred::PerfeEvalExpDescp< Network >::nbTestRuns = 1
```

Number of test runs.

9.84.2.4 out

```
template<typename Network = UNetwork<>>
std::ostream* LinkPred::PerfeEvalExpDescp< Network >::out = &std::cout
```

Output file.

9.84.2.5 ratioEnd

```
template<typename Network = UNetwork<>>
double LinkPred::PerfeEvalExpDescp< Network >::ratioEnd = 0.1
```

End value of the ratio of removed edges. This is adjusted if keepConnected is set to true.

9.84.2.6 ratioStart

```
template<typename Network = UNetwork<>>
double LinkPred::PerfeEvalExpDescp< Network >::ratioStart = 0.1
```

Start value of the ratio of removed edges.

9.84.2.7 ratioStep

```
template<typename Network = UNetwork<>>
double LinkPred::PerfeEvalExpDescp< Network >::ratioStep = 0.1
```

Step size of the ratio of removed edges.

9.84.2.8 refNet

```
template<typename Network = UNetwork<>>
std::shared_ptr<Network> LinkPred::PerfeEvalExpDescp< Network >::refNet
```

Reference network.

9.84.2.9 seed

```
template<typename Network = UNetwork<>>
long int LinkPred::PerfeEvalExpDescp< Network >::seed = 0
```

Seed for the random number generator.

9.84.2.10 timingEnabled

```
template<typename Network = UNetwork<>>
bool LinkPred::PerfeEvalExpDescp< Network >::timingEnabled = false
```

Enable/disable timing.

9.84.2.11 tnRatio

```
template<typename Network = UNetwork<>>
double LinkPred::PerfeEvalExpDescp< Network >::tnRatio = 1
```

Ratio of true negatives used in the test set.

The documentation for this struct was generated from the following file:

- include/linkpred/perf/perfevaluator.hpp

9.85 LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT > Class Template Reference

Performance evaluation experiment.

```
#include <perfevaluator.hpp>
```

Public Member Functions

- PerfEvalExp (PerfeEvalExpDescp< Network > const &ped, std::shared_ptr< PEFactory< Network, L↵ PredictorT, TestDataT, PerfMeasureT >> const &factory)
- PerfEvalExp (PerfEvalExp const &that)=default
- PerfEvalExp & operator= (PerfEvalExp const &that)=default
- PerfEvalExp (PerfEvalExp &&that)=default
- PerfEvalExp & operator= (PerfEvalExp &&that)=default
- void run ()
- void runNoTiming ()
- void runTiming ()
- auto resultsBegin () const
- auto resultsEnd () const
- const std::shared_ptr< PEFactory< Network, LPredictorT, TestDataT, PerfMeasureT > > & getFactory () const
- int getOutPrec () const
- void setOutPrec (int outPrec)
- const PerfeEvalExpDescp< Network > & getPed () const
- virtual ∼PerfEvalExp ()=default

9.85.1 Detailed Description

template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<PredResultsT>> class LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >

Performance evaluation experiment.

Template Parameters

Network	The network data type.
TestDataT	The test data type.
PredResultsT	The prediction results type.
PerfMeasureT	The performance measure type.

9.85.2 Constructor & Destructor Documentation

9.85.2.1 PerfEvalExp() [1/3]

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↵
MeasureT = PerfMeasure<PredResultsT>>
LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::PerfEvalExp
(
            PerfeEvalExpDescp< Network > const & ped,
            std::shared_ptr< PEFactory< Network, LPredictorT, TestDataT, PerfMeasureT >>
const & factory )  [inline]
```

Constructor.

Parameters

ped	The experiment description.
factory	Factory bject to create link predictor and performance measures.

9.85.2.2 PerfEvalExp() [2/3]

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::PerfEvalExp
(
             PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT > const
& that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.85.2.3 PerfEvalExp() [3/3]

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::PerfEvalExp
(
             PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT > &&
that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.85.2.4 ∼PerfEvalExp()

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
```

```
virtual LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >↩
::~PerfEvalExp ( ) [virtual], [default]
```

Destructor.

9.85.3 Member Function Documentation

9.85.3.1 getFactory()

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
const std::shared_ptr< PEFactory<Network, LPredictorT, TestDataT, PerfMeasureT> >& LinkPred::PerfEvalExp<
Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::getFactory ( ) const [inline]
```

Returns

The fatory.

9.85.3.2 getOutPrec()

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
int LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >↩
::getOutPrec ( ) const [inline]
```

Returns

Output precision (for double).

9.85.3.3 getPed()

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
const PerfeEvalExpDescp<Network>& LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT,
PredResultsT, PerfMeasureT >::getPed ( ) const [inline]
```

Returns

The experience descriptor.

9.85.3.4 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
PerfEvalExp& LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, Perf↩
MeasureT >::operator= (
            PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT > &&
that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.85.3.5 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
PerfEvalExp& LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, Perf↩
MeasureT >::operator= (
            PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT > const
& that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.85.3.6 resultsBegin()

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
auto LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >↩
::resultsBegin ( ) const  [inline]
```

Returns

An iterator to the first performance result.

9.85.3.7 resultsEnd()

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
auto LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >↩
::resultsEnd ( ) const  [inline]
```

Returns

An iterator to one-past-the-last first performance result.

9.85.3.8 run()

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
void LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::run
( )
```

Run the performance evaluation experiment.

9.85.3.9 runNoTiming()

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
void LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >↩
::runNoTiming ( )
```

Runs the performance evaluation without timing.

9.85.3.10 runTiming()

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
void LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >↩
::runTiming ( )
```

Runs the performance evaluation with timing.

9.85.3.11 setOutPrec()

```
template<typename Network = UNetwork<>, typename TestDataT = TestData<>, typename LPredictorT
= ULPredictor<>, typename PredResultsT = PredResults<TestDataT, LPredictorT>, typename Perf↩
MeasureT = PerfMeasure<PredResultsT>>
void LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >↩
::setOutPrec (
             int outPrec )  [inline]
```

Parameters

outPrec	Output precision (for double).

The documentation for this class was generated from the following file:

- include/linkpred/perf/perfevaluator.hpp

9.86 LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT > Class Template Reference

Performance evaluator.

```
#include <perfevaluator.hpp>
```

Public Member Functions

- PerfEvaluator (TestDataT testData)
- PerfEvaluator (PerfEvaluator const &that)=default
- PerfEvaluator & operator= (PerfEvaluator const &that)=default
- PerfEvaluator (PerfEvaluator &&that)=default
- PerfEvaluator & operator= (PerfEvaluator &&that)=default
- std::size_t addPredictor (std::shared_ptr< LPredictorT > predictor)
- std::size_t addPerfMeasure (std::shared_ptr< PerfMeasureT > measure)
- std::size_t getNbPredictors () const
- std::size_t getNbPerfMeasures () const
- auto getPredictor (std::size_t i) const
- void eval ()
- void evalNoTiming ()
- void evalTiming ()
- bool isTimingEnabled () const
- void setTimingEnabled (bool timingEnabled)
- auto resultsBegin () const
- auto resultsEnd () const
- virtual ~PerfEvaluator ()=default

9.86.1 Detailed Description

template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename PredResultsT = Pred↩ Results<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<PredResultsT>> class LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >

Performance evaluator.

Template Parameters

TestDataT	The test data type.
PredResultsT	The prediction results type.
PerfMeasureT	The performance measure type.

9.86.2 Constructor & Destructor Documentation

9.86.2.1 PerfEvaluator() [1/3]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::PerfEvaluator (
            TestDataT testData )  [inline]
```

Constructor.

Parameters

testData	The test data.

9.86.2.2 PerfEvaluator() [2/3]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::PerfEvaluator (
            PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT > const & that
)  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.86.2.3 PerfEvaluator() [3/3]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::PerfEvaluator (
            PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT > && that )
[default]
```

Move constructor.

Parameters

that	The object to move.

9.86.2.4 ∼PerfEvaluator()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<←
PredResultsT>>
virtual LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::∼PerfEvaluator
( )  [virtual], [default]
```

Destructor.

9.86.3 Member Function Documentation

9.86.3.1 addPerfMeasure()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<←
PredResultsT>>
std::size_t LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >←
::addPerfMeasure (
            std::shared_ptr< PerfMeasureT > measure )  [inline]
```

Add a performance measure.

Parameters

measure	A performanmce measure.

Returns

An ID.

9.86.3.2 addPredictor()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<←
PredResultsT>>
```

```
std::size_t LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >↩
::addPredictor (
            std::shared_ptr< LPredictorT > predictor )  [inline]
```

Add a predictor.

Parameters

predictor	A link predictor.

Returns

An ID.

9.86.3.3 eval()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
void LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::eval ( )
[inline]
```

Run the performance evaluation.

9.86.3.4 evalNoTiming()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
void LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::evalNo↩
Timing ( )
```

Runs the performance evaluation without timing.

9.86.3.5 evalTiming()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
void LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::evalTiming
( )
```

Runs the performance evaluation with timing.

9.86.3.6 getNbPerfMeasures()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
std::size_t LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >↩
::getNbPerfMeasures ( ) const [inline]
```

Returns

The number of performance measures.

9.86.3.7 getNbPredictors()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
std::size_t LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >↩
::getNbPredictors ( ) const  [inline]
```

Returns

Ther number of predictors.

9.86.3.8 getPredictor()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
auto LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::get↩
Predictor (
            std::size_t i ) const  [inline]
```

Parameters

i	Index of the predictor.

Returns

The predictor of index i.

9.86.3.9 isTimingEnabled()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
bool LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::isTiming↩
Enabled ( ) const  [inline]
```

Returns

Whether timing is enabled.

9.86.3.10 operator=() [1/2]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
PerfEvaluator& LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >↩
::operator= (
            PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT > && that )
[default]
```

Move assignment operator.

Parameters

that	The object to move.

9.86.3.11 operator=() [2/2]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
PerfEvaluator& LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >↩
::operator= (
            PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT > const & that
)  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.86.3.12 resultsBegin()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
auto LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::results↩
Begin ( ) const  [inline]
```

Returns

An iterator to the first performance result.

9.86.3.13 resultsEnd()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
auto LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::resultsEnd
( ) const  [inline]
```

Returns

An iterator to one-past-the-last first performance result.

9.86.3.14 setTimingEnabled()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
PredResultsT = PredResults<TestDataT, LPredictorT>, typename PerfMeasureT = PerfMeasure<↩
PredResultsT>>
void LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >::set↩
TimingEnabled (
            bool timingEnabled )  [inline]
```

Enable/disable timing.

Parameters

timingEnabled	The new value.

The documentation for this class was generated from the following file:

- include/linkpred/perf/perfevaluator.hpp

9.87 LinkPred::PerfMeasure< PredResultsT > Class Template Reference

Abstract performance measure.

```
#include <perfmeasure.hpp>
```

Public Types

- using ScoresItT = typename PredResultsT::ScoresItT

Public Member Functions

- PerfMeasure ()=default
- PerfMeasure (std::string const &name)
- PerfMeasure (PerfMeasure const &that)=default
- PerfMeasure & operator= (PerfMeasure const &that)=default
- PerfMeasure (PerfMeasure &&that)=default
- PerfMeasure & operator= (PerfMeasure &&that)=default
- const std::string & getName () const
- void setName (std::string const &name)
- virtual bool requiresPos () const
- virtual bool requiresNeg () const
- virtual bool requiresShuffling () const
- virtual void eval (std::shared_ptr< PredResultsT > &predResults, PerfResults &results)=0
- virtual void eval (ScoresItT posScoresBegin, ScoresItT posScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, SortOrder &posSortOrder, SortOrder &negSortOrder, PerfResults &results)=0
- virtual ∼PerfMeasure ()=default

9.87.1 Detailed Description

template<typename PredResultsT = PredResults<>>
class LinkPred::PerfMeasure< PredResultsT >

Abstract performance measure.

Template Parameters

PredResultsT	The prediction results type.

9.87.2 Member Typedef Documentation

9.87.2.1 ScoresItT

```
template<typename PredResultsT = PredResults<>>
using LinkPred::PerfMeasure< PredResultsT >::ScoresItT = typename PredResultsT::ScoresItT
```

Scores iterator type.

9.87.3 Constructor & Destructor Documentation

9.87.3.1 PerfMeasure() [1/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::PerfMeasure< PredResultsT >::PerfMeasure ( )  [default]
```

Constructor.

9.87.3.2 PerfMeasure() [2/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::PerfMeasure< PredResultsT >::PerfMeasure (
             std::string const & name )  [inline]
```

Constructor.

Parameters

name	The name of the performance measure.

9.87.3.3 PerfMeasure() [3/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::PerfMeasure< PredResultsT >::PerfMeasure (
             PerfMeasure< PredResultsT > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.87.3.4 PerfMeasure() [4/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::PerfMeasure< PredResultsT >::PerfMeasure (
             PerfMeasure< PredResultsT > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.87.3.5 ∼PerfMeasure()

```
template<typename PredResultsT = PredResults<>>
virtual LinkPred::PerfMeasure< PredResultsT >::∼PerfMeasure ( )  [virtual], [default]
```

Destructor.

9.87.4 Member Function Documentation

9.87.4.1 eval() [1/2]

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::PerfMeasure< PredResultsT >::eval (
             ScoresItT posScoresBegin,
             ScoresItT posScoresEnd,
             ScoresItT negScoresBegin,
             ScoresItT negScoresEnd,
             SortOrder & posSortOrder,
             SortOrder & negSortOrder,
             PerfResults & results )  [pure virtual]
```

Computes the performance measure.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
posSortOrder	The sorting order of positive scores. This may be modified by the method.
negSortOrder	The sorting order of negative scores. This may be modified by the method.
results	To write results.

Implemented in LinkPred::PerfCurve< PredResults<> >.

9.87.4.2 eval() [2/2]

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::PerfMeasure< PredResultsT >::eval (
             std::shared_ptr< PredResultsT > & predResults,
             PerfResults & results )  [pure virtual]
```

Computes the performance measure.

Parameters

predResults	The prediction results.
results	To write results.

Implemented in LinkPred::PerfCurve< PredResults<> >.

9.87.4.3 getName()

```
template<typename PredResultsT = PredResults<>>
const std::string& LinkPred::PerfMeasure< PredResultsT >::getName ( ) const  [inline]
```

Returns

The name of the performance measure.

9.87.4.4 operator=() [1/2]

```
template<typename PredResultsT = PredResults<>>
PerfMeasure& LinkPred::PerfMeasure< PredResultsT >::operator= (
            PerfMeasure< PredResultsT > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.87.4.5 operator=() [2/2]

```
template<typename PredResultsT = PredResults<>>
PerfMeasure& LinkPred::PerfMeasure< PredResultsT >::operator= (
            PerfMeasure< PredResultsT > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.87.4.6 requiresNeg()

```
template<typename PredResultsT = PredResults<>>
virtual bool LinkPred::PerfMeasure< PredResultsT >::requiresNeg ( ) const  [inline], [virtual]
```

Returns

Whether the performance measure requires the generation of negative set. The default value is true.

9.87.4.7 requiresPos()

```
template<typename PredResultsT = PredResults<>>
virtual bool LinkPred::PerfMeasure< PredResultsT >::requiresPos ( ) const  [inline], [virtual]
```

Returns

Whether the performance measure requires the generation of positive set. The default value is true.

9.87.4.8 requiresShuffling()

```
template<typename PredResultsT = PredResults<>>
virtual bool LinkPred::PerfMeasure< PredResultsT >::requiresShuffling ( ) const  [inline],
[virtual]
```

Returns

Whether the performance measure requires network shuffling.

9.87.4.9 setName()

```
template<typename PredResultsT = PredResults<>>
void LinkPred::PerfMeasure< PredResultsT >::setName (
             std::string const & name )  [inline]
```

Parameters

name	The name of the performance measure.

The documentation for this class was generated from the following file:

- include/linkpred/perf/perfmeasure.hpp

9.88 LinkPred::Simp::PerfRes Struct Reference

A structure to store performance results.

```
#include <perfres.hpp>
```

Public Attributes

- std::string name
- double res

9.88.1 Detailed Description

A structure to store performance results.

9.88.2 Member Data Documentation

9.88.2.1 name

```
std::string LinkPred::Simp::PerfRes::name
```

Concatenation of the name of the performance mneasure and that of the predictor.

9.88.2.2 res

```
double LinkPred::Simp::PerfRes::res
```

The result.

The documentation for this struct was generated from the following file:

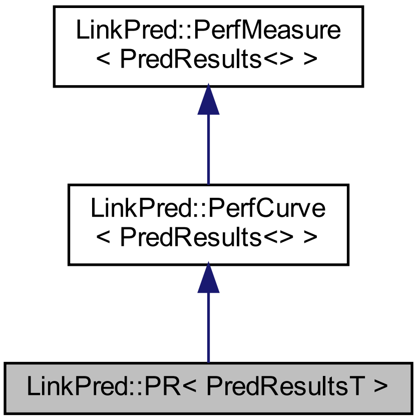
- include/linkpred/simp/perfres.hpp

9.89 LinkPred::PR< PredResultsT > Class Template Reference

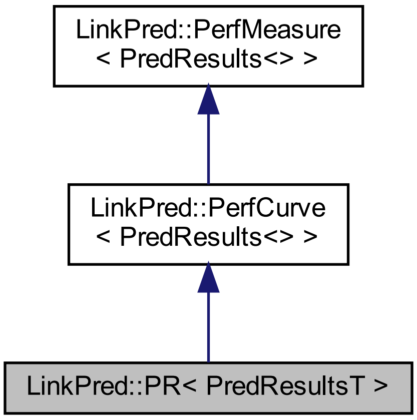
The precision recall curve.

```
#include <perfmeasure.hpp>
```

Inheritance diagram for LinkPred::PR< PredResultsT >:



Collaboration diagram for LinkPred::PR< PredResultsT >:



Public Types

- enum InterpolMethod { LIN, DGI }
  Interpolation methods used for the computation of the PR-AUC.
- using ScoresItT = typename PerfMeasure< PredResultsT >::ScoresItT

Public Member Functions

- PR ()
- PR (std::string name)
- PR (PR const &that)=default
- PR & operator= (PR const &that)=default
- PR (PR &&that)=default
- PR & operator= (PR &&that)=default
- virtual void eval (std::shared_ptr< PredResultsT > &predResults, PerfResults &results)
- virtual void eval (ScoresItT posScoresBegin, ScoresItT posScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, SortOrder &posSortOrder, SortOrder &negSortOrder, PerfResults &results)
- virtual std::vector< std::pair< double, double > > getCurve (std::shared_ptr< PredResultsT > &pred↩ Results)
- virtual std::vector< std::pair< double, double > > getCurve (ScoresItT posScoresBegin, ScoresItT pos↩ ScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, SortOrder &posSortOrder, SortOrder &negSortOrder)
- InterpolMethod getInterpolMethod () const
- void setInterpolMethod (InterpolMethod interpolMethod)
- virtual ∼PR ()=default

Static Public Member Functions

- template<typename CountItT >
  static double getPRAucLIN (CountItT tpsBegin, CountItT tpsEnd, CountItT fpsBegin, CountItT fpsEnd, std↩ ::size_t P, bool bcz, bool parallel=false)
- template<typename CountItT >
  static double getPRAucDGI (CountItT tpsBegin, CountItT tpsEnd, CountItT fpsBegin, CountItT fpsEnd, std↩ ::size_t P, bool bcz, bool parallel=false)
- template<typename ScoresItT >
  static double getPRAuc (ScoresItT posScoresBegin, ScoresItT posScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, InterpolMethod interpolMethod, bool parallel=false)
- template<typename ScoresItT >
  static std::vector< double > getThresholds (ScoresItT posScoresBegin, ScoresItT posScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd)
- template<typename ScoresItT >
  static std::vector< std::pair< double, double > > getPRCurve (ScoresItT posScoresBegin, ScoresItT pos↩ ScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, bool parallel=false)

9.89.1 Detailed Description

template<typename PredResultsT = PredResults<>>
class LinkPred::PR< PredResultsT >

The precision recall curve.

Template Parameters

PredResultsT	The prediction results type.

9.89.2 Member Typedef Documentation

9.89.2.1 ScoresItT

```
template<typename PredResultsT = PredResults<>>
using LinkPred::PR< PredResultsT >::ScoresItT = typename PerfMeasure<PredResultsT>::ScoresItT
```

Scores iterator type.

9.89.3 Member Enumeration Documentation

9.89.3.1 InterpolMethod

```
template<typename PredResultsT = PredResults<>>
enum LinkPred::PR::InterpolMethod
```

Interpolation methods used for the computation of the PR-AUC.

< The name of the performance measure.

Enumerator

LIN	Linear interpolation (Trapezoidal rule).
DGI	Davis-Goadrich nonlinear interpolation.

9.89.4 Constructor & Destructor Documentation

9.89.4.1 PR() [1/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::PR< PredResultsT >::PR ( )  [inline]
```

Constructor.

9.89.4.2 PR() [2/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::PR< PredResultsT >::PR (
             std::string name )  [inline]
```

Constructor.

Parameters

name	The name of the performance measure.

9.89.4.3 PR() [3/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::PR< PredResultsT >::PR (
             PR< PredResultsT > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.89.4.4 PR() [4/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::PR< PredResultsT >::PR (
             PR< PredResultsT > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.89.4.5 ∼PR()

```
template<typename PredResultsT = PredResults<>>
virtual LinkPred::PR< PredResultsT >::~PR ( )  [virtual], [default]
```

Destructor.

9.89.5 Member Function Documentation

9.89.5.1 eval() [1/2]

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::PR< PredResultsT >::eval (
            ScoresItT posScoresBegin,
            ScoresItT posScoresEnd,
            ScoresItT negScoresBegin,
            ScoresItT negScoresEnd,
            SortOrder & posSortOrder,
            SortOrder & negSortOrder,
            PerfResults & results )  [inline], [virtual]
```

Computes the area under the PR curve.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
posSortOrder	The sorting order of positive scores. This may be modified by the method.
negSortOrder	The sorting order of negative scores. This may be modified by the method.
results	To write results.

9.89.5.2 eval() [2/2]

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::PR< PredResultsT >::eval (
            std::shared_ptr< PredResultsT > & predResults,
            PerfResults & results )  [inline], [virtual]
```

Computes the performance measure.

Parameters

predResults	The prediction results.
results	Iterator to write results.

9.89.5.3 getCurve() [1/2]

```
template<typename PredResultsT = PredResults<>>
virtual std::vector<std::pair<double, double> > LinkPred::PR< PredResultsT >::getCurve (
            ScoresItT posScoresBegin,
            ScoresItT posScoresEnd,
            ScoresItT negScoresBegin,
            ScoresItT negScoresEnd,
            SortOrder & posSortOrder,
            SortOrder & negSortOrder )  [inline], [virtual]
```

Compute the PR curve.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
posSortOrder	The sorting order of positive scores. This may be modified by the method.
negSortOrder	The sorting order of negative scores. This may be modified by the method.

Returns

A curve in the form of an std::vector of pairs representing the x and y coordinates.

9.89.5.4 getCurve() [2/2]

```
template<typename PredResultsT = PredResults<>>
virtual std::vector<std::pair<double, double> > LinkPred::PR< PredResultsT >::getCurve (
            std::shared_ptr< PredResultsT > & predResults )  [inline], [virtual]
```

Compute the PR curve.

Parameters

predResults	The prediction results.

Returns

A curve in the form of an std::vector of pairs representing the x and y coordinates.

9.89.5.5 getInterpolMethod()

```
template<typename PredResultsT = PredResults<>>
InterpolMethod LinkPred::PR< PredResultsT >::getInterpolMethod ( ) const  [inline]
```

Returns

The interpolation method.

9.89.5.6 getPRAuc()

```
template<typename PredResultsT = PredResults<>>
template<typename ScoresItT >
static double LinkPred::PR< PredResultsT >::getPRAuc (
             ScoresItT posScoresBegin,
             ScoresItT posScoresEnd,
             ScoresItT negScoresBegin,
             ScoresItT negScoresEnd,
             InterpolMethod interpolMethod,
             bool parallel = false )  [inline], [static]
```

Compute the area under the Precision-Recall Curve. Ranges must be sorted in increasing order.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
interpolMethod	Interpolation method used in the integral.
parallel	Whether to run in parallel.

9.89.5.7 getPRAucDGI()

```
template<typename PredResultsT = PredResults<>>
template<typename CountItT >
static double LinkPred::PR< PredResultsT >::getPRAucDGI (
             CountItT tpsBegin,
             CountItT tpsEnd,
             CountItT fpsBegin,
             CountItT fpsEnd,
             std::size_t P,
             bool bcz,
             bool parallel = false )  [inline], [static]
```

Compute the area under the Precision-Recall Curve using Davis-Goadrich nonlinear interpolation. See: Jesse Davis and Mark Goadrich (2006) The relationship between Precision-Recall and ROC curves. Proceedings of the 23rd international conference on Machine learning. pp.233–240

Parameters

tpsBegin	Iterator to the first true positive count.
tpsEnd	Iterator to one-past-the-last true positive count.
fpsBegin	Iterator to the first false positive count.
fpsEnd	Iterator to one-past-the-last false positive count.
P	The number of positive instances.
bcz	Whether the boundary value of precision is zero.
parallel	Whether to run in parallel.

9.89.5.8 getPRAucLIN()

```
template<typename PredResultsT = PredResults<>>
template<typename CountItT >
static double LinkPred::PR< PredResultsT >::getPRAucLIN (
             CountItT tpsBegin,
             CountItT tpsEnd,
             CountItT fpsBegin,
             CountItT fpsEnd,
             std::size_t P,
             bool bcz,
             bool parallel = false ) [inline], [static]
```

Compute the area under the Precision-Recall Curve using linear interpolation (trapezoidal rule). Notice that this method may over-estimate the actual area especially when the points on the curve are distant from one-another.

Parameters

tpsBegin	Iterator to the first true positive count.
tpsEnd	Iterator to one-past-the-last true positive count.
fpsBegin	Iterator to the first false positive count.
fpsEnd	Iterator to one-past-the-last false positive count.
P	The number of positive instances.
bcz	Whether the boundary value of precision is zero.
parallel	Whether to run in parallel.

9.89.5.9 getPRCurve()

```
template<typename PredResultsT = PredResults<>>
template<typename ScoresItT >
static std::vector<std::pair<double, double> > LinkPred::PR< PredResultsT >::getPRCurve (
             ScoresItT posScoresBegin,
             ScoresItT posScoresEnd,
             ScoresItT negScoresBegin,
             ScoresItT negScoresEnd,
             bool parallel = false ) [inline], [static]
```

Compute the Precision-Recall Curve. Ranges must sorted in increasing order.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
parallel	Whether to run in parallel.

9.89.5.10 getThresholds()

```
template<typename PredResultsT = PredResults<>>
template<typename ScoresItT >
static std::vector<double> LinkPred::PR< PredResultsT >::getThresholds (
            ScoresItT posScoresBegin,
            ScoresItT posScoresEnd,
            ScoresItT negScoresBegin,
            ScoresItT negScoresEnd )  [inline], [static]
```

Compute the threshold of the Precision-Recall Curve. Ranges must be sorted in increasing order.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.

9.89.5.11 operator=() [1/2]

```
template<typename PredResultsT = PredResults<>>
PR& LinkPred::PR< PredResultsT >::operator= (
            PR< PredResultsT > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.89.5.12 operator=() [2/2]

```
template<typename PredResultsT = PredResults<>>
PR& LinkPred::PR< PredResultsT >::operator= (
            PR< PredResultsT > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.89.5.13 setInterpolMethod()

```
template<typename PredResultsT = PredResults<>>
void LinkPred::PR< PredResultsT >::setInterpolMethod (
            InterpolMethod interpolMethod )  [inline]
```

Set the interpolation method.

Parameters

interpolMethod	The new value of the interpolation method.

The documentation for this class was generated from the following file:

- include/linkpred/perf/perfmeasure.hpp

9.90 LinkPred::Simp::Predictor Class Reference

A class that simplifies the use of link prediction algorithms.

```
#include <predictor.hpp>
```

Public Member Functions

- Predictor ()=default
- Predictor (Predictor const &that)=default
- virtual ∼Predictor ()=default
- int getNbNodes () const
- std::string getLabel (int i) const
- int getID (std::string const &i) const
- bool isEdgeByID (int i, int j) const
- bool isEdgeByLabel (std::string const &i, std::string const &j) const
- void loadnet (std::string fileName)
- std::vector< EdgeScore > predAllADA ()
- void predADA (std::vector< EdgeScore > &edgeScores)
- std::vector< EdgeScore > predTopADA (int k)
- std::vector< EdgeScore > predAllCNE ()
- void predCNE (std::vector< EdgeScore > &edgeScores)
- std::vector< EdgeScore > predTopCNE (int k)
- std::vector< EdgeScore > predAllCRA ()
- void predCRA (std::vector< EdgeScore > &edgeScores)
- std::vector< EdgeScore > predTopCRA (int k)
- std::vector< EdgeScore > predAllECL (std::string encoderName="N2V", std::string classifierName="LGR", int dim=0, double posRatio=1.0, double negRatio=1.0, long int seed=0)
- void predECL (std::vector< EdgeScore > &edgeScores, std::string encoderName="N2V", std::string classifierName="LGR", int dim=0, double posRatio=1.0, double negRatio=1.0, long int seed=0)

- std::vector< EdgeScore > predTopECL (int k, std::string encoderName="N2V", std::string classifier↩Name="LGR", int dim=0, double posRatio=1.0, double negRatio=1.0, long int seed=0)
- std::vector< EdgeScore > predAllESM (std::string encoderName="N2V", std::string simMeasureName="L2", int dim=0, long int seed=0)
- void predESM (std::vector< EdgeScore > &edgeScores, std::string encoderName="N2V", std::string sim↩MeasureName="L2", int dim=0, long int seed=0)
- std::vector< EdgeScore > predTopESM (int k, std::string encoderName="N2V", std::string simMeasure↩Name="L2", int dim=0, long int seed=0)
- std::vector< EdgeScore > predAllFBM (int maxIter=50, long int seed=0)
- void predFBM (std::vector< EdgeScore > &edgeScores, int maxIter=50, long int seed=0)
- std::vector< EdgeScore > predTopFBM (int k, int maxIter=50, long int seed=0)
- std::vector< EdgeScore > predAllHDI ()
- void predHDI (std::vector< EdgeScore > &edgeScores)
- std::vector< EdgeScore > predTopHDI (int k)
- std::vector< EdgeScore > predAllHPI ()
- void predHPI (std::vector< EdgeScore > &edgeScores)
- std::vector< EdgeScore > predTopHPI (int k)
- std::vector< EdgeScore > predAllHRG (int nbBeans=25, int nbSamples=10000, long int seed=0)
- void predHRG (std::vector< EdgeScore > &edgeScores, int nbBeans=25, int nbSamples=10000, long int seed=0)
- std::vector< EdgeScore > predTopHRG (int k, int nbBeans=25, int nbSamples=10000, long int seed=0)
- std::vector< EdgeScore > predAllHYP (double m=1.5, double L=1, double gamma=2.1, double zeta=1, double T=0.8, long int seed=0)
- void predHYP (std::vector< EdgeScore > &edgeScores, double m=1.5, double L=1, double gamma=2.1, double zeta=1, double T=0.8, long int seed=0)
- std::vector< EdgeScore > predTopHYP (int k, double m=1.5, double L=1, double gamma=2.1, double zeta=1, double T=0.8, long int seed=0)
- std::vector< EdgeScore > predAllJID ()
- void predJID (std::vector< EdgeScore > &edgeScores)
- std::vector< EdgeScore > predTopJID (int k)
- std::vector< EdgeScore > predAllKAB (int horizLim=2)
- void predKAB (std::vector< EdgeScore > &edgeScores, int horizLim=2)
- std::vector< EdgeScore > predTopKAB (int k, int horizLim=2)
- std::vector< EdgeScore > predAllLCP (double epsilon=0.001)
- void predLCP (std::vector< EdgeScore > &edgeScores, double epsilon=0.001)
- std::vector< EdgeScore > predTopLCP (int k, double epsilon=0.001)
- std::vector< EdgeScore > predAllLHN ()
- void predLHN (std::vector< EdgeScore > &edgeScores)
- std::vector< EdgeScore > predTopLHN (int k)
- std::vector< EdgeScore > predAllPAT ()
- void predPAT (std::vector< EdgeScore > &edgeScores)
- std::vector< EdgeScore > predTopPAT (int k)
- std::vector< EdgeScore > predAllRAL ()
- void predRAL (std::vector< EdgeScore > &edgeScores)
- std::vector< EdgeScore > predTopRAL (int k)
- std::vector< EdgeScore > predAllRND (long int seed=0)
- void predRND (std::vector< EdgeScore > &edgeScores, long int seed=0)
- std::vector< EdgeScore > predTopRND (int k, long int seed=0)
- std::vector< EdgeScore > predAllSAI ()
- void predSAI (std::vector< EdgeScore > &edgeScores)
- std::vector< EdgeScore > predTopSAI (int k)
- std::vector< EdgeScore > predAllSBM (int maxIter=1000, long int seed=0)
- void predSBM (std::vector< EdgeScore > &edgeScores, int maxIter=1000, long int seed=0)
- std::vector< EdgeScore > predTopSBM (int k, int maxIter=1000, long int seed=0)
- std::vector< EdgeScore > predAllSHP (long int seed=0)

- void predSHP (std::vector< EdgeScore > &edgeScores, long int seed=0)
- std::vector< EdgeScore > predTopSHP (int k, long int seed=0)
- std::vector< EdgeScore > predAllSOI ()
- void predSOI (std::vector< EdgeScore > &edgeScores)
- std::vector< EdgeScore > predTopSOI (int k)
- std::vector< EdgeScoreByID > predAllADAByID ()
- std::vector< EdgeScoreByID > predAllCNEByID ()
- std::vector< EdgeScoreByID > predAllCRAByID ()
- std::vector< EdgeScoreByID > predAllECLByID (std::string encoderName="N2V", std::string classifier←Name="LGR", int dim=0, double posRatio=1.0, double negRatio=1.0, long int seed=0)
- std::vector< EdgeScoreByID > predAllESMByID (std::string encoderName="N2V", std::string simMeasure←Name="L2", int dim=0, long int seed=0)
- std::vector< EdgeScoreByID > predAllFBMByID (int maxIter=50, long int seed=0)
- std::vector< EdgeScoreByID > predAllHDIByID ()
- std::vector< EdgeScoreByID > predAllHPIByID ()
- std::vector< EdgeScoreByID > predAllHRGByID (int nbBeans=25, int nbSamples=10000, long int seed=0)
- std::vector< EdgeScoreByID > predAllHYPByID (double m=1.5, double L=1, double gamma=2.1, double zeta=1, double T=0.8, long int seed=0)
- std::vector< EdgeScoreByID > predAllJIDByID ()
- std::vector< EdgeScoreByID > predAllKABByID (int horizLim=2)
- std::vector< EdgeScoreByID > predAllLCPByID (double epsilon=0.001)
- std::vector< EdgeScoreByID > predAllLHNByID ()
- std::vector< EdgeScoreByID > predAllPATByID ()
- std::vector< EdgeScoreByID > predAllRALByID ()
- std::vector< EdgeScoreByID > predAllRNDByID (long int seed=0)
- std::vector< EdgeScoreByID > predAllSAIByID ()
- std::vector< EdgeScoreByID > predAllSBMByID (int maxIter=1000, long int seed=0)
- std::vector< EdgeScoreByID > predAllSHPByID (long int seed=0)
- std::vector< EdgeScoreByID > predAllSOIByID ()

9.90.1 Detailed Description

A class that simplifies the use of link prediction algorithms.

9.90.2 Constructor & Destructor Documentation

9.90.2.1 Predictor() [1/2]

```
LinkPred::Simp::Predictor::Predictor ( )  [default]
```

Parameters

net	The network.

9.90.2.2 Predictor() [2/2]

```
LinkPred::Simp::Predictor::Predictor (
            Predictor const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.90.2.3 ∼Predictor()

```
virtual LinkPred::Simp::Predictor::∼Predictor ( )  [virtual], [default]
```

Destructor.

9.90.3 Member Function Documentation

9.90.3.1 getID()

```
int LinkPred::Simp::Predictor::getID (
            std::string const & i ) const
```

Translate node label to ID.

Parameters

i	Node label.

Returns

The node ID.

9.90.3.2 getLabel()

```
std::string LinkPred::Simp::Predictor::getLabel (
            int i ) const
```

Translate node ID to label.

Parameters

i	Node internal ID (sequential from 0 to nbNodes-1).

Returns

The node label.

9.90.3.3 getNbNodes()

```
int LinkPred::Simp::Predictor::getNbNodes ( ) const
```

Returns the number of nodes in the network.

Returns

The number of nodes in the network.

9.90.3.4 isEdgeByID()

```
bool LinkPred::Simp::Predictor::isEdgeByID (
             int i,
             int j ) const
```

Check if an edge exists using internal node IDs.

Parameters

i	ID of start node.
j	ID of end node.

Returns

True if (i, j) is an edge, false otherwise.

9.90.3.5 isEdgeByLabel()

```
bool LinkPred::Simp::Predictor::isEdgeByLabel (
             std::string const & i,
             std::string const & j ) const
```

Check if an edge exists using internal node IDs.

Parameters

i	ID of start node.
j	ID of end node.

Returns

True if (i, j) is an edge, false otherwise.

9.90.3.6 loadnet()

```
void LinkPred::Simp::Predictor::loadnet (
            std::string fileName )
```

Load network from file. The format is list of edges. Comments must be on separate lines and start with #.

Parameters

fileName	The file name.

9.90.3.7 predADA()

```
void LinkPred::Simp::Predictor::predADA (
            std::vector< EdgeScore > & edgeScores )
```

Adamic Adar predictor.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.

9.90.3.8 predAllADA()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllADA ( )
```

Adamic Adar predictor.

Returns

The score of all negative edges.

9.90.3.9 predAllADAById()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllADAById ( )
```

Adamic Adar predictor.

Returns

The score of all negative edges.

9.90.3.10 predAllCNE()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllCNE ( )
```

Common neighbors.

Returns

The score of all negative edges.

9.90.3.11 predAllCNEById()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllCNEById ( )
```

Common neighbors.

Returns

The score of all negative edges.

9.90.3.12 predAllCRA()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllCRA ( )
```

Cannistraci resource allocation.

Returns

The score of all negative edges.

9.90.3.13 predAllCRAByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllCRAByID ( )
```

Cannistraci resource allocation.

Returns

The score of all negative edges.

9.90.3.14 predAllECL()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllECL (
            std::string encoderName = "N2V",
            std::string classifierName = "LGR",
            int dim = 0,
            double posRatio = 1.0,
            double negRatio = 1.0,
            long int seed = 0 )
```

Encoder-classifier link predictor.

Parameters

encoderName	The name of the encoder. Possible values are: DPW (DeepWalk), HMSM (Hidden Metric Space Model), LVS (LargeVis), LEM (Laplacian Eigenmaps), LIN (LINE), LLE (Locally Linear Embedding), MFC (Matrix Factorization), and N2V (Node2Vec).
classifierName	The name of the classifier. Possible values are: FFN (feed-forward neural network withn default architecture), LSVM (linear SVM), LGR (logistic regression), NVB (naive Bayes). All classifiers except logistic regression requirte compilation with mlpack.
dim	The dimension of the embedding space. If set to zero, the default value is used (the default dimension depends on the ecnoder).
posRatio	Ratio of positive edges used in the training of the classifier.
negRatio	Ratio of negative edges used in the training of the classifier.
seed	Seed of the random number generator.

Returns

The score of all negative edges.

9.90.3.15 predAllECLByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllECLByID (
            std::string encoderName = "N2V",
            std::string classifierName = "LGR",
            int dim = 0,
            double posRatio = 1.0,
            double negRatio = 1.0,
            long int seed = 0 )
```

Encoder-classifier link predictor.

Parameters

encoderName	The name of the encoder. Possible values are: DPW (DeepWalk), HMSM (Hidden Metric Space Model), LVS (LargeVis), LEM (Laplacian Eigenmaps), LIN (LINE), LLE (Locally Linear Embedding), MFC (Matrix Factorization), and N2V (Node2Vec).
classifierName	The name of the classifier. Possible values are: FFN (feed-forward neural network withn default architecture), LSVM (linear SVM), LGR (logistic regression), NVB (naive Bayes). All classifiers except logistic regression requirte compilation with mlpack.
dim	The dimension of the embedding space. If set to zero, the default value is used (the default dimension depends on the ecnoder).
posRatio	Ratio of positive edges used in the training of the classifier.
negRatio	Ratio of negative edges used in the training of the classifier.
seed	Seed of the random number generator.

Returns

The score of all negative edges.

9.90.3.16 predAllESM()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllESM (
            std::string encoderName = "N2V",
            std::string simMeasureName = "L2",
            int dim = 0,
            long int seed = 0 )
```

Encoder-similarity measure link predictor.

Parameters

encoderName	The name of the encoder. Possible values are: DPW (DeepWalk), HMSM (Hidden Metric Space Model), LVS (LargeVis), LEM (Laplacian Eigenmaps), LIN (LINE), LLE (Locally Linear Embedding), MFC (Matrix Factorization), and N2V (Node2Vec).
simMeasureName	The name of the similarity measure. Possible values are: CSM (cosine similarity), DTP (dot product), L1 (L1 similarity), L2 (L2 similarity), PRS (Pearson similarity).
dim	The dimension of the embedding space. If set to zero, the default value is used (the default dimension depends on the ecnoder).
seed	Seed of the random number generator.

Returns

The score of all negative edges.

9.90.3.17 predAllESMByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllESMByID (
            std::string encoderName = "N2V",
            std::string simMeasureName = "L2",
            int dim = 0,
            long int seed = 0 )
```

Encoder-similarity measure link predictor.

Parameters

encoderName	The name of the encoder. Possible values are: DPW (DeepWalk), HMSM (Hidden Metric Space Model), LVS (LargeVis), LEM (Laplacian Eigenmaps), LIN (LINE), LLE (Locally Linear Embedding), MFC (Matrix Factorization), and N2V (Node2Vec).
simMeasureName	The name of the similarity measure. Possible values are: CSM (cosine similarity), DTP (dot product), L1 (L1 similarity), L2 (L2 similarity), PRS (Pearson similarity).
dim	The dimension of the embedding space. If set to zero, the default value is used (the default dimension depends on the ecnoder).
seed	Seed of the random number generator.

Returns

The score of all negative edges.

9.90.3.18 predAllFBM()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllFBM (
            int maxIter = 50,
            long int seed = 0 )
```

Fast blocking model.

Parameters

maxIter	Maximum number of iterations.
seed	Seed of the random number generator.

Returns

The score of all negative edges.

9.90.3.19 predAllFBMByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllFBMByID (
            int maxIter = 50,
            long int seed = 0 )
```

Fast blocking model.

Parameters

maxIter	Maximum number of iterations.
seed	Seed of the random number generator.

Returns

The score of all negative edges.

9.90.3.20 predAllHDI()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllHDI ( )
```

Hub depromoted index.

Returns

The score of all negative edges.

9.90.3.21 predAllHDIByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllHDIByID ( )
```

Hub depromoted index.

Returns

The score of all negative edges.

9.90.3.22 predAllHPI()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllHPI ( )
```

Hub promoted index.

Returns

The score of all negative edges.

9.90.3.23 predAllHPIByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllHPIByID ( )
```

Hub promoted index.

Returns

The score of all negative edges.

9.90.3.24 predAllHRG()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllHRG (
            int nbBeans = 25,
            int nbSamples = 10000,
            long int seed = 0 )
```

Hierarchical random graph.

Parameters

nbBeans	Number of bins in edge statistics histogram.
nbSamples	Number of samples to take for predictions.
seed	Seed of the random number generator.

Returns

The score of all negative edges.

9.90.3.25 predAllHRGByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllHRGByID (
            int nbBeans = 25,
            int nbSamples = 10000,
            long int seed = 0 )
```

Hierarchical random graph.

Parameters

nbBeans	Number of bins in edge statistics histogram.
nbSamples	Number of samples to take for predictions.
seed	Seed of the random number generator.

Returns

The score of all negative edges.

9.90.3.26 predAllHYP()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllHYP (
             double m = 1.5,
             double L = 1,
             double gamma = 2.1,
             double zeta = 1,
             double T = 0.8,
             long int seed = 0 )
```

Hypermap.

Parameters

m	The parameter m (see the algorithm description).
L	The parameter L (see the algorithm description).
gamma	The power law exponent gamma (see the algorithm description).
zeta	The parameter zeta (see the algorithm description).
T	The parameter T (see the algorithm description).
seed	The random number generator seed.

Returns

The score of all negative edges.

9.90.3.27 predAllHYPByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllHYPByID (
             double m = 1.5,
             double L = 1,
             double gamma = 2.1,
             double zeta = 1,
             double T = 0.8,
             long int seed = 0 )
```

Hypermap.

Parameters

m	The parameter m (see the algorithm description).
L	The parameter L (see the algorithm description).
gamma	The power law exponent gamma (see the algorithm description).
zeta	The parameter zeta (see the algorithm description).
T	The parameter T (see the algorithm description).
seed	The random number generator seed.

Returns

The score of all negative edges.

9.90.3.28 predAllJID()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllJID ( )
```

Jackard index.

Returns

The score of all negative edges.

9.90.3.29 predAllJIDByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllJIDByID ( )
```

Jackard index.

Returns

The score of all negative edges.

9.90.3.30 predAllKAB()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllKAB (
             int horizLim = 2 )
```

A scalable popularity similarity link predictor proposed in: "Kerrache, S., Alharbi, R. & Benhidour, H. A Scalable Similarity-Popularity Link Prediction Method. Sci Rep 10, 6394 (2020)".

Parameters

horizLim	Horizon limit.

Returns

The score of all negative edges.

9.90.3.31 predAllKABByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllKABByID (
            int horizLim = 2 )
```

A scalable popularity similarity link predictor proposed in: "Kerrache, S., Alharbi, R. & Benhidour, H. A Scalable Similarity-Popularity Link Prediction Method. Sci Rep 10, 6394 (2020)".

Parameters

horizLim	Horizon limit.

Returns

The score of all negative edges.

9.90.3.32 predAllLCP()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllLCP (
            double epsilon = 0.001 )
```

Local path.

Parameters

epsilon	The weight of paths of length 3.

Returns

The score of all negative edges.

9.90.3.33 predAllLCPByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllLCPByID (
            double epsilon = 0.001 )
```

Local path.

Parameters

epsilon	The weight of paths of length 3.

Returns

The score of all negative edges.

9.90.3.34 predAllLHN()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllLHN ( )
```

Leicht-Holme-Newman index.

Returns

The score of all negative edges.

9.90.3.35 predAllLHNByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllLHNByID ( )
```

Leicht-Holme-Newman index.

Returns

The score of all negative edges.

9.90.3.36 predAllPAT()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllPAT ( )
```

Preferential attachment index.

Returns

The score of all negative edges.

9.90.3.37 predAllPATByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllPATByID ( )
```

Preferential attachment index.

Returns

The score of all negative edges.

9.90.3.38 predAllRAL()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllRAL ( )
```

Resource allocation index.

Returns

The score of all negative edges.

9.90.3.39 predAllRALByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllRALByID ( )
```

Resource allocation index.

Returns

The score of all negative edges.

9.90.3.40 predAllRND()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllRND (
            long int seed = 0 )
```

Random predictor.

Parameters

seed	The random number generator seed.

Returns

The score of all negative edges.

9.90.3.41 predAllRNDByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllRNDByID (
            long int seed = 0 )
```

Random predictor.

Parameters

seed	The random number generator seed.

Returns

The score of all negative edges.

9.90.3.42 predAllSAI()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllSAI ( )
```

Salton index.

Returns

The score of all negative edges.

9.90.3.43 predAllSAIByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllSAIByID ( )
```

Salton index.

Returns

The score of all negative edges.

9.90.3.44 predAllSBM()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllSBM (
             int maxIter = 1000,
             long int seed = 0 )
```

Stochastic blocking model.

Parameters

maxIter	Maximum number of iterations.
seed	Seed of the random number generator.

Returns

The score of all negative edges.

9.90.3.45 predAllSBMByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllSBMByID (
            int maxIter = 1000,
            long int seed = 0 )
```

Stochastic blocking model.

Parameters

maxIter	Maximum number of iterations.
seed	Seed of the random number generator.

Returns

The score of all negative edges.

9.90.3.46 predAllSHP()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllSHP (
            long int seed = 0 )
```

Shortest path predictor.

Parameters

seed	The random number generator seed.

Returns

The score of all negative edges.

9.90.3.47 predAllSHPByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllSHPByID (
            long int seed = 0 )
```

Shortest path predictor.

Parameters

seed	The random number generator seed.

Returns

The score of all negative edges.

9.90.3.48 predAllSOI()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predAllSOI ( )
```

Sorensen index.

Returns

The score of all negative edges.

9.90.3.49 predAllSOIByID()

```
std::vector<EdgeScoreByID> LinkPred::Simp::Predictor::predAllSOIByID ( )
```

Sorensen index.

Returns

The score of all negative edges.

9.90.3.50 predCNE()

```
void LinkPred::Simp::Predictor::predCNE (
            std::vector< EdgeScore > & edgeScores )
```

Common neighbors.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.

9.90.3.51 predCRA()

```
void LinkPred::Simp::Predictor::predCRA (
            std::vector< EdgeScore > & edgeScores )
```

Cannistraci resource allocation.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.

9.90.3.52 predECL()

```
void LinkPred::Simp::Predictor::predECL (
            std::vector< EdgeScore > & edgeScores,
            std::string encoderName = "N2V",
            std::string classifierName = "LGR",
            int dim = 0,
            double posRatio = 1.0,
            double negRatio = 1.0,
            long int seed = 0 )
```

Encoder-classifier link predictor.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.
encoderName	The name of the encoder. Possible values are: DPW (DeepWalk), HMSM (Hidden Metric Space Model), LVS (LargeVis), LEM (Laplacian Eigenmaps), LIN (LINE), LLE (Locally Linear Embedding), MFC (Matrix Factorization), and N2V (Node2Vec).
classifierName	The name of the classifier. Possible values are: FFN (feed-forward neural network withn default architecture), LSVM (linear SVM), LGR (logistic regression), NVB (naive Bayes). All classifiers except logistic regression requirte compilation with mlpack.
dim	The dimension of the embedding space. If set to zero, the default value is used (the default dimension depends on the ecnoder).
posRatio	Ratio of positive edges used in the training of the classifier.
negRatio	Ratio of negative edges used in the training of the classifier.
seed	Seed of the random number generator.

9.90.3.53 predESM()

```
void LinkPred::Simp::Predictor::predESM (
            std::vector< EdgeScore > & edgeScores,
            std::string encoderName = "N2V",
            std::string simMeasureName = "L2",
            int dim = 0,
            long int seed = 0 )
```

Encoder-similarity measure link predictor.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.
encoderName	The name of the encoder. Possible values are: DPW (DeepWalk), HMSM (Hidden Metric Space Model), LVS (LargeVis),LEM (Laplacian Eigenmaps), LIN (LINE), LLE (Locally Linear Embedding), MFC (Matrix Factorization), and N2V (Node2Vec).
simMeasureName	The name of the similarity measure. Possible values are: CSM (cosine similarity), DTP (dot product), L1 (L1 similarity), L2 (L2 similarity), PRS (Pearson similarity).
dim	The dimension of the embedding space. If set to zero, the default value is used (the default dimension depends on the ecnoder).
seed	Seed of the random number generator.

9.90.3.54 predFBM()

```
void LinkPred::Simp::Predictor::predFBM (
            std::vector< EdgeScore > & edgeScores,
            int maxIter = 50,
            long int seed = 0 )
```

Fast blocking model.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.
maxIter	Maximum number of iterations.
seed	Seed of the random number generator.

9.90.3.55 predHDI()

```
void LinkPred::Simp::Predictor::predHDI (
            std::vector< EdgeScore > & edgeScores )
```

Hub depromoted index.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.

9.90.3.56 predHPI()

```
void LinkPred::Simp::Predictor::predHPI (
            std::vector< EdgeScore > & edgeScores )
```

Hub promoted index.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.

9.90.3.57 predHRG()

```
void LinkPred::Simp::Predictor::predHRG (
            std::vector< EdgeScore > & edgeScores,
            int nbBeans = 25,
            int nbSamples = 10000,
            long int seed = 0 )
```

Hierarchical random graph.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.
nbBeans	Number of bins in edge statistics histogram.
nbSamples	Number of samples to take for predictions.
seed	Seed of the random number generator.

9.90.3.58 predHYP()

```
void LinkPred::Simp::Predictor::predHYP (
            std::vector< EdgeScore > & edgeScores,
            double m = 1.5,
            double L = 1,
            double gamma = 2.1,
            double zeta = 1,
            double T = 0.8,
            long int seed = 0 )
```

Hypermap.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.
m	The parameter m (see the algorithm description).
L	The parameter L (see the algorithm description).

Parameters

gamma	The power law exponent gamma (see the algorithm description).
zeta	The parameter zeta (see the algorithm description).
T	The parameter T (see the algorithm description).
seed	The random number generator seed.

9.90.3.59 predJID()

```
void LinkPred::Simp::Predictor::predJID (
            std::vector< EdgeScore > & edgeScores )
```

Jackard index.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.

9.90.3.60 predKAB()

```
void LinkPred::Simp::Predictor::predKAB (
            std::vector< EdgeScore > & edgeScores,
            int horizLim = 2 )
```

A scalable popularity similarity link predictor proposed in: "Kerrache, S., Alharbi, R. & Benhidour, H. A Scalable Similarity-Popularity Link Prediction Method. Sci Rep 10, 6394 (2020)".

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.
horizLim	Horizon limit.

9.90.3.61 predLCP()

```
void LinkPred::Simp::Predictor::predLCP (
            std::vector< EdgeScore > & edgeScores,
            double epsilon = 0.001 )
```

Local path.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.
epsilon	The weight of paths of length 3.

9.90.3.62 predLHN()

```
void LinkPred::Simp::Predictor::predLHN (
            std::vector< EdgeScore > & edgeScores )
```

Leicht-Holme-Newman index.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.

9.90.3.63 predPAT()

```
void LinkPred::Simp::Predictor::predPAT (
            std::vector< EdgeScore > & edgeScores )
```

Preferential attachment index.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.

9.90.3.64 predRAL()

```
void LinkPred::Simp::Predictor::predRAL (
            std::vector< EdgeScore > & edgeScores )
```

Resource allocation index.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.

9.90.3.65 predRND()

```
void LinkPred::Simp::Predictor::predRND (
            std::vector< EdgeScore > & edgeScores,
            long int seed = 0 )
```

Random predictor.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.
seed	The random number generator seed.

9.90.3.66 predSAI()

```
void LinkPred::Simp::Predictor::predSAI (
            std::vector< EdgeScore > & edgeScores )
```

Salton index.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.

9.90.3.67 predSBM()

```
void LinkPred::Simp::Predictor::predSBM (
            std::vector< EdgeScore > & edgeScores,
            int maxIter = 1000,
            long int seed = 0 )
```

Stochastic blocking model.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.
maxIter	Maximum number of iterations.
seed	Seed of the random number generator.

9.90.3.68 predSHP()

```
void LinkPred::Simp::Predictor::predSHP (
            std::vector< EdgeScore > & edgeScores,
            long int seed = 0 )
```

Shortest path predictor.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.
seed	The random number generator seed.

9.90.3.69 predSOI()

```
void LinkPred::Simp::Predictor::predSOI (
            std::vector< EdgeScore > & edgeScores )
```

Sorensen index.

Parameters

edgeScores	A input vector of negative edges. The score of each edge will be written in the member score.

9.90.3.70 predTopADA()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopADA (
            int k )
```

Adamic Adar predictor.

Parameters

k	Number of edges to be returned (the actual number may be smaller).

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.71 predTopCNE()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopCNE (
            int k )
```

Common neighbors.

Parameters

k	Number of edges to be returned (the actual number may be smaller).

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.72 predTopCRA()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopCRA (
             int k )
```

Cannistraci resource allocation.

Parameters

k	Number of edges to be returned (the actual number may be smaller).

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.73 predTopECL()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopECL (
             int k,
             std::string encoderName = "N2V",
             std::string classifierName = "LGR",
             int dim = 0,
             double posRatio = 1.0,
             double negRatio = 1.0,
             long int seed = 0 )
```

Encoder-classifier link predictor.

Parameters

k	Number of edges to be returned (the actual number may be smaller).
encoderName	The name of the encoder. Possible values are: DPW (DeepWalk), HMSM (Hidden Metric Space Model), LVS (LargeVis),LEM (Laplacian Eigenmaps), LIN (LINE), LLE (Locally Linear Embedding), MFC (Matrix Factorization), and N2V (Node2Vec).
classifierName	The name of the classifier. Possible values are: FFN (feed-forward neural network withn default architecture), LSVM (linear SVM), LGR (logistic regression), NVB (naive Bayes). All classifiers except logistic regression requirte compilation with mlpack.

Parameters

dim	The dimension of the embedding space. If set to zero, the default value is used (the default dimension depends on the ecnoder).
posRatio	Ratio of positive edges used in the training of the classifier.
negRatio	Ratio of negative edges used in the training of the classifier.
seed	Seed of the random number generator.

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.74 predTopESM()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopESM (
            int k,
            std::string encoderName = "N2V",
            std::string simMeasureName = "L2",
            int dim = 0,
            long int seed = 0 )
```

Encoder-similarity measure link predictor.

Parameters

k	Number of edges to be returned (the actual number may be smaller).
encoderName	The name of the encoder. Possible values are: DPW (DeepWalk), HMSM (Hidden Metric Space Model), LVS (LargeVis), LEM (Laplacian Eigenmaps), LIN (LINE), LLE (Locally Linear Embedding), MFC (Matrix Factorization), and N2V (Node2Vec).
simMeasureName	The name of the similarity measure. Possible values are: CSM (cosine similarity), DTP (dot product), L1 (L1 similarity), L2 (L2 similarity), PRS (Pearson similarity).
dim	The dimension of the embedding space. If set to zero, the default value is used (the default dimension depends on the ecnoder).
seed	Seed of the random number generator.

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.75 predTopFBM()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopFBM (
            int k,
            int maxIter = 50,
            long int seed = 0 )
```

Fast blocking model.

Parameters

k	Number of edges to be returned (the actual number may be smaller).
maxIter	Maximum number of iterations.
seed	Seed of the random number generator.

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.76 predTopHDI()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopHDI (
              int k )
```

Hub depromoted index.

Parameters

k	Number of edges to be returned (the actual number may be smaller).

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.77 predTopHPI()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopHPI (
              int k )
```

Hub promoted index.

Parameters

k	Number of edges to be returned (the actual number may be smaller).

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.78 predTopHRG()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopHRG (
             int k,
             int nbBeans = 25,
             int nbSamples = 10000,
             long int seed = 0 )
```

Hierarchical random graph.

Parameters

k	Number of edges to be returned (the actual number may be smaller).
nbBeans	Number of bins in edge statistics histogram.
nbSamples	Number of samples to take for predictions.
seed	Seed of the random number generator.

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.79 predTopHYP()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopHYP (
             int k,
             double m = 1.5,
             double L = 1,
             double gamma = 2.1,
             double zeta = 1,
             double T = 0.8,
             long int seed = 0 )
```

Hypermap.

Parameters

k	Number of edges to be returned (the actual number may be smaller).
m	The parameter m (see the algorithm description).
L	The parameter L (see the algorithm description).
gamma	The power law exponent gamma (see the algorithm description).
zeta	The parameter zeta (see the algorithm description).
T	The parameter T (see the algorithm description).
seed	The random number generator seed.

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.80 predTopJID()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopJID (
            int k )
```

Jackard index.

Parameters

k	Number of edges to be returned (the actual number may be smaller).

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.81 predTopKAB()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopKAB (
            int k,
            int horizLim = 2 )
```

A scalable popularity similarity link predictor proposed in: "Kerrache, S., Alharbi, R. & Benhidour, H. A Scalable Similarity-Popularity Link Prediction Method. Sci Rep 10, 6394 (2020)".

Parameters

k	Number of edges to be returned (the actual number may be smaller).
horizLim	Horizon limit.

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.82 predTopLCP()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopLCP (
            int k,
            double epsilon = 0.001 )
```

Local path.

Parameters

k	Number of edges to be returned (the actual number may be smaller).
epsilon	The weight of paths of length 3.

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.83 predTopLHN()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopLHN (
              int k )
```

Leicht-Holme-Newman index.

Parameters

k	Number of edges to be returned (the actual number may be smaller).

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.84 predTopPAT()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopPAT (
              int k )
```

Preferential attachment index.

Parameters

k	Number of edges to be returned (the actual number may be smaller).

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.85 predTopRAL()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopRAL (
              int k )
```

Resource allocation index.

Parameters

k	Number of edges to be returned (the actual number may be smaller).

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.86 predTopRND()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopRND (
            int k,
            long int seed = 0 )
```

Random predictor.

Parameters

k	Number of edges to be returned (the actual number may be smaller).
seed	The random number generator seed.

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.87 predTopSAI()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopSAI (
            int k )
```

Salton index.

Parameters

k	Number of edges to be returned (the actual number may be smaller).

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.88 predTopSBM()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopSBM (
              int k,
              int maxIter = 1000,
              long int seed = 0 )
```

Stochastic blocking model.

Parameters

k	Number of edges to be returned (the actual number may be smaller).
maxIter	Maximum number of iterations.
seed	Seed of the random number generator.

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.89 predTopSHP()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopSHP (
              int k,
              long int seed = 0 )
```

Shortest path predictor.

Parameters

k	Number of edges to be returned (the actual number may be smaller).
seed	The random number generator seed.

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

9.90.3.90 predTopSOI()

```
std::vector<EdgeScore> LinkPred::Simp::Predictor::predTopSOI (
              int k )
```

Sorensen index.

Parameters

k	Number of edges to be returned (the actual number may be smaller).

Returns

The top k negative edge scores (the actual size may of the output be smaller than k).

The documentation for this class was generated from the following file:

- include/linkpred/simp/predictor.hpp

9.91 LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT > Class Template Reference

A class to store and manage prediction results.

```
#include <predresults.hpp>
```

Classes

- class ScoreIterator

  Score iterator.

Public Types

- using ScoresItT = typename ScoresContainerT::iterator

Public Member Functions

- PredResults (TestDataT testData, std::shared_ptr< LPredictorT > const &predictor)
- PredResults (PredResults const &that)=default
- PredResults & operator= (PredResults const &that)=default
- PredResults (PredResults &&that)=default
- PredResults & operator= (PredResults &&that)=default
- void compPosScores ()
- void compNegScores ()
- void compTopScores (std::size_t l)
- auto posBegin () const
- auto posEnd () const
- auto negBegin () const
- auto negEnd () const
- auto posStrmBegin () const
- auto posStrmEnd () const
- auto negStrmBegin () const
- auto negStrmEnd () const
- auto topBegin () const

- auto topEnd () const
- auto topEdgesBegin () const
- auto topEdgesEnd () const
- bool isNegComputed () const
- SortOrder getNegSortOrder () const
- void sortNeg (SortOrder negSortOrder)
- bool isPosComputed () const
- SortOrder getPosSortOrder () const
- void sortPos (SortOrder posSortOrder)
- bool isTopComputed () const
- const std::shared_ptr< LPredictorT > & getPredictor () const
- TestDataT & getTestData ()
- std::size_t getNbTop () const
- virtual ∼PredResults ()=default

9.91.1 Detailed Description

template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename ScoresContainerT = std↩ ::vector<double>>
class LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >

A class to store and manage prediction results.

Template Parameters

TestDataT	The test data type.
LPredictorT	The link predictor type.
ScoresContainerT	The type of container storing scores.

9.91.2 Member Typedef Documentation

9.91.2.1 ScoresItT

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
using LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoresItT = typename
ScoresContainerT::iterator
```

Scores iterator type.

9.91.3 Constructor & Destructor Documentation

9.91.3.1 PredResults() [1/3]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::PredResults (
            TestDataT testData,
            std::shared_ptr< LPredictorT > const & predictor )  [inline]
```

Constructor.

Parameters

testData	The test data.
predictor	Link predictor.

9.91.3.2 PredResults() [2/3]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::PredResults (
            PredResults< TestDataT, LPredictorT, ScoresContainerT > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.91.3.3 PredResults() [3/3]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::PredResults (
            PredResults< TestDataT, LPredictorT, ScoresContainerT > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.91.3.4 ∼PredResults()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
```

```
ScoresContainerT = std::vector<double>>
virtual LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::~PredResults ( )
[virtual], [default]
```

Destructor.

9.91.4 Member Function Documentation

9.91.4.1 compNegScores()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
void LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::compNegScores ( )
[inline]
```

Compute scores for negative links.

9.91.4.2 compPosScores()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
void LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::compPosScores ( )
[inline]
```

Compute scores for positive links.

9.91.4.3 compTopScores()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
void LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::compTopScores (
             std::size_t l )  [inline]
```

Compute top scores. This method finds the negative edges with the highest scores.

Parameters

l	Number of top links to compute.

9.91.4.4 getNbTop()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
std::size_t LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::getNbTop ( )
const  [inline]
```

Returns

The number of computed top edges.

9.91.4.5 getNegSortOrder()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
SortOrder LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::getNegSortOrder (
) const  [inline]
```

Returns

The sorting order of the negative scores.

9.91.4.6 getPosSortOrder()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
SortOrder LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::getPosSortOrder (
) const  [inline]
```

Returns

The sorting order of the positive scores. }

9.91.4.7 getPredictor()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
const std::shared_ptr<LPredictorT>& LinkPred::PredResults< TestDataT, LPredictorT, Scores↩
ContainerT >::getPredictor ( ) const  [inline]
```

Returns

The link predictor.

9.91.4.8 getTestData()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
TestDataT& LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::getTestData ( )
[inline]
```

Returns

The test data.

9.91.4.9 isNegComputed()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
bool LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::isNegComputed ( )
const  [inline]
```

Returns

Whether the negative scores have been computed.

9.91.4.10 isPosComputed()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
bool LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::isPosComputed ( )
const  [inline]
```

Returns

Whether the positive scores have been computed.

9.91.4.11 isTopComputed()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
bool LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::isTopComputed ( )
const  [inline]
```

Returns

Whether the top scores have been computed.

9.91.4.12 negBegin()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
auto LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::negBegin ( ) const
[inline]
```

Returns

Iterator to the first element in the scores of negative links.

9.91.4.13 negEnd()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
auto LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::negEnd ( ) const
[inline]
```

Returns

Iterator to one-past the last element in the scores of negative links.

9.91.4.14 negStrmBegin()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
auto LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::negStrmBegin ( ) const
[inline]
```

Returns

Iterator to the first element in the scores of negative links. The scores here may be streamed and not pre-computed.

9.91.4.15 negStrmEnd()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
auto LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::negStrmEnd ( ) const
[inline]
```

Returns

Iterator to one-past the last element in the scores of negative links. The scores here may be streamed and not pre-computed.

9.91.4.16 operator=() [1/2]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
PredResults& LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::operator= (
            PredResults< TestDataT, LPredictorT, ScoresContainerT > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.91.4.17 operator=() [2/2]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
PredResults& LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::operator= (
             PredResults< TestDataT, LPredictorT, ScoresContainerT > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.91.4.18 posBegin()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
auto LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::posBegin ( ) const
[inline]
```

Returns

Iterator to the first element in the scores of positive links.

9.91.4.19 posEnd()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
auto LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::posEnd ( ) const
[inline]
```

Returns

Iterator to one-past the last element in the scores of positive links.

9.91.4.20 posStrmBegin()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
auto LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::posStrmBegin ( ) const
[inline]
```

Returns

Iterator to the first element in the scores of positive links. The scores here may be streamed and not pre-computed.

9.91.4.21 posStrmEnd()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
auto LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::posStrmEnd ( ) const
[inline]
```

Returns

Iterator to one-past the last element in the scores of positive links. The scores here may be streamed and not pre-computed.

9.91.4.22 sortNeg()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
void LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::sortNeg (
            SortOrder negSortOrder )  [inline]
```

Sort the negative scores.

Parameters

negSortOrder	The request sorting order.

9.91.4.23 sortPos()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
void LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::sortPos (
            SortOrder posSortOrder )  [inline]
```

Sort the positive scores.

Parameters

posSortOrder	The request sorting order.

9.91.4.24 topBegin()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
auto LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::topBegin ( ) const
[inline]
```

Returns

Iterator to the first element in the top scores.

9.91.4.25 topEdgesBegin()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
auto LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::topEdgesBegin ( )
const  [inline]
```

Returns

Iterator to the first element in the top edges.

9.91.4.26 topEdgesEnd()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
auto LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::topEdgesEnd ( ) const
[inline]
```

Returns

Iterator to one-past the last element in the top edges.

9.91.4.27 topEnd()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
auto LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::topEnd ( ) const
[inline]
```

Returns

Iterator to one-past the last element in the top scores.

The documentation for this class was generated from the following file:

- include/linkpred/perf/predresults.hpp

9.92 LinkPred::Simp::Evaluator::Factory::PSTParams Struct Reference

Parameters of PST.

```
#include <evaluator.hpp>
```

Public Attributes

- std::string fileName

9.92.1 Detailed Description

Parameters of PST.

9.92.2 Member Data Documentation

9.92.2.1 fileName

```
std::string LinkPred::Simp::Evaluator::Factory::PSTParams::fileName
```

File containing the scores of all non-exisityng links in the training network.

The documentation for this struct was generated from the following file:

- include/linkpred/simp/evaluator.hpp

9.93 LinkPred::RandomGen Class Reference

A random number generator.

```
#include <randomgen.hpp>
```

Public Member Functions

- RandomGen ()
- RandomGen (long int seed)
- RandomGen (RandomGen const &that)=default
- RandomGen & operator= (RandomGen const &that)=default
- RandomGen (RandomGen &&that)=default
- RandomGen & operator= (RandomGen &&that)=default
- auto getSeed ()
- auto getInt ()
- std::size_t getUInt (std::size_t low, std::size_t high)
- int getSInt (int low, int high)
- double getDouble (double low, double high)
- bool getBool ()
- double getPL (double minV, double maxV, double gamma)
- unsigned long int getGeo (double p)
- virtual ∼RandomGen ()=default

9.93.1 Detailed Description

A random number generator.

This is mainly a wrapper that simplifies access to C++11 random generating classes/methods.

9.93.2 Constructor & Destructor Documentation

9.93.2.1 RandomGen() [1/4]

```
LinkPred::RandomGen::RandomGen ( )  [inline]
```

Constructor.

9.93.2.2 RandomGen() [2/4]

```
LinkPred::RandomGen::RandomGen (
              long int seed )  [inline]
```

Constructor with seed.

Parameters

seed	The seed.

9.93.2.3 RandomGen() [3/4]

```
LinkPred::RandomGen::RandomGen (
            RandomGen const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.93.2.4 RandomGen() [4/4]

```
LinkPred::RandomGen::RandomGen (
            RandomGen && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.93.2.5 ∼RandomGen()

```
virtual LinkPred::RandomGen::∼RandomGen ( )  [virtual], [default]
```

Destructor.

9.93.3 Member Function Documentation

9.93.3.1 getBool()

```
bool LinkPred::RandomGen::getBool ( )  [inline]
```

Returns

A uniformly distributed boolean (a fair coin toss).

9.93.3.2 getDouble()

```
double LinkPred::RandomGen::getDouble (
            double low,
            double high )  [inline]
```

Generate a uniformly distributed double in the specified interval.

Parameters

low	The left limit of the interval.
high	The right limit of the interval.

Returns

A double uniformly distributed in the interval [low, high).

9.93.3.3 getGeo()

```
unsigned long int LinkPred::RandomGen::getGeo (
            double p )  [inline]
```

Parameters

p	The probability of success of the associated Bernouli distribution.

Returns

A sample from a geometric distribution.

9.93.3.4 getInt()

```
auto LinkPred::RandomGen::getInt ( )  [inline]
```

Returns

A random integer.

9.93.3.5 getPL()

```
double LinkPred::RandomGen::getPL (
             double minV,
             double maxV,
             double gamma )  [inline]
```

Returns

Sample from a power law distribution.

Parameters

minV	The minimum value.
maxV	The maximum value.
gamma	The exponent of the power law.

9.93.3.6 getSeed()

```
auto LinkPred::RandomGen::getSeed ( )  [inline]
```

Returns

The seed.

9.93.3.7 getSInt()

```
int LinkPred::RandomGen::getSInt (
             int low,
             int high )  [inline]
```

Returns

A random signed integer in the interval [low, high] (inclusive of the boundaries).

Parameters

low	The lower bound of the interval.
high	The upper bound of the interval.

9.93.3.8 getUInt()

```
std::size_t LinkPred::RandomGen::getUInt (
            std::size_t low,
            std::size_t high )  [inline]
```

Returns

A random unsigned integer in the interval [low, high] (inclusive of the boundaries).

Parameters

low	The lower bound of the interval.
high	The upper bound of the interval.

9.93.3.9 operator=() [1/2]

```
RandomGen& LinkPred::RandomGen::operator= (
            RandomGen && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.93.3.10 operator=() [2/2]

```
RandomGen& LinkPred::RandomGen::operator= (
            RandomGen const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

The documentation for this class was generated from the following file:

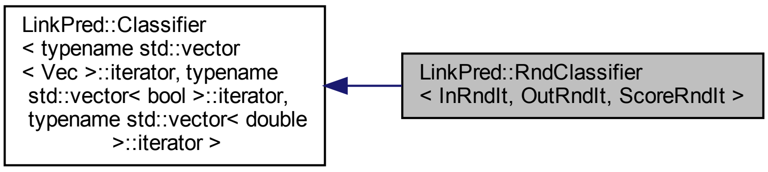
- include/linkpred/utils/randomgen.hpp

9.94 LinkPred::RndClassifier< InRndIt, OutRndIt, ScoreRndIt > Class Template Reference

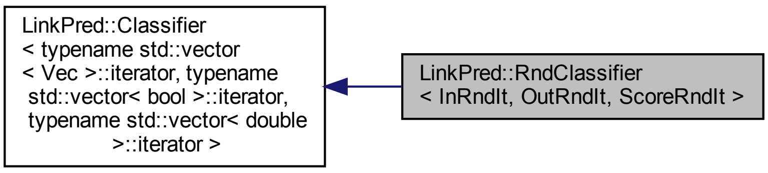
Random classifier.

`#include <rndclassifier.hpp>`

Inheritance diagram for LinkPred::RndClassifier< InRndIt, OutRndIt, ScoreRndIt >:


LinkPred::Classifier < typename std::vector < Vec >::iterator, typename std::vector< bool >::iterator, typename std::vector< double >::iterator >
LinkPred::RndClassifier < InRndIt, OutRndIt, ScoreRndIt >

Collaboration diagram for LinkPred::RndClassifier< InRndIt, OutRndIt, ScoreRndIt >:


LinkPred::Classifier < typename std::vector < Vec >::iterator, typename std::vector< bool >::iterator, typename std::vector< double >::iterator >
LinkPred::RndClassifier < InRndIt, OutRndIt, ScoreRndIt >

Public Member Functions

- RndClassifier (long int seed)
- RndClassifier (RndClassifier const &that)=default
- RndClassifier & operator= (RndClassifier const &that)=default
- RndClassifier (RndClassifier &&that)=default
- RndClassifier & operator= (RndClassifier &&that)=default
- virtual void learn (InRndIt trInBegin, InRndIt trInEnd, OutRndIt trOutBegin, OutRndIt trOutEnd)
- virtual void predict (InRndIt inBegin, InRndIt inEnd, ScoreRndIt scoresBegin)
- virtual ∼RndClassifier ()=default

9.94.1 Detailed Description

template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename std::vector<bool>↩ ::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
class LinkPred::RndClassifier< InRndIt, OutRndIt, ScoreRndIt >

Random classifier.

Template Parameters

InRndIt	Input (features) iterator type.
OutRndIt	Output (class) iterator type.
Score↩ RndIt	Classification scores iterator type.

9.94.2 Constructor & Destructor Documentation

9.94.2.1 RndClassifier() [1/3]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
LinkPred::RndClassifier< InRndIt, OutRndIt, ScoreRndIt >::RndClassifier (
            long int seed )  [inline]
```

Constructor.

Parameters

seed	The random number generator's seed.

9.94.2.2 RndClassifier() [2/3]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
LinkPred::RndClassifier< InRndIt, OutRndIt, ScoreRndIt >::RndClassifier (
            RndClassifier< InRndIt, OutRndIt, ScoreRndIt > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.94.2.3 RndClassifier() [3/3]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
```

```
LinkPred::RndClassifier< InRndIt, OutRndIt, ScoreRndIt >::RndClassifier (
            RndClassifier< InRndIt, OutRndIt, ScoreRndIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.94.2.4 ∼RndClassifier()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
virtual LinkPred::RndClassifier< InRndIt, OutRndIt, ScoreRndIt >::∼RndClassifier ( )  [virtual],
[default]
```

Destructor.

9.94.3 Member Function Documentation

9.94.3.1 learn()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
virtual void LinkPred::RndClassifier< InRndIt, OutRndIt, ScoreRndIt >::learn (
            InRndIt trInBegin,
            InRndIt trInEnd,
            OutRndIt trOutBegin,
            OutRndIt trOutEnd )  [virtual]
```

Learn from data.

Parameters

trInBegin	Iterator to the first example features (input).
trInEnd	Iterator to one-past-the-last example features (input).
trOutBegin	Iterator to the first example class (output).
trOutEnd	Iterator to one-past-the-last example class (output).

9.94.3.2 operator=() [1/2]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
RndClassifier& LinkPred::RndClassifier< InRndIt, OutRndIt, ScoreRndIt >::operator= (
            RndClassifier< InRndIt, OutRndIt, ScoreRndIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.94.3.3 operator=() [2/2]

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
RndClassifier& LinkPred::RndClassifier< InRndIt, OutRndIt, ScoreRndIt >::operator= (
            RndClassifier< InRndIt, OutRndIt, ScoreRndIt > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.94.3.4 predict()

```
template<typename InRndIt = typename std::vector<Vec>::iterator, typename OutRndIt = typename
std::vector<bool>::iterator, typename ScoreRndIt = typename std::vector<double>::iterator>
virtual void LinkPred::RndClassifier< InRndIt, OutRndIt, ScoreRndIt >::predict (
            InRndIt inBegin,
            InRndIt inEnd,
            ScoreRndIt scoresBegin )  [virtual]
```

Predict.

Parameters

inBegin	Iterator to the first instance features (input).
inEnd	Iterator to one-past-the-last instance features (input).
scoresBegin	Iterator to the first location where to store prediction scores.

The documentation for this class was generated from the following file:

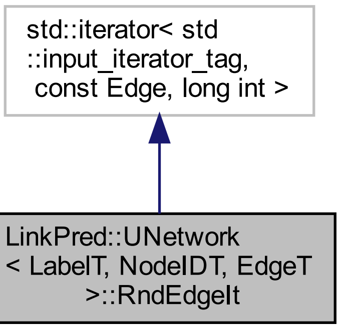
- include/linkpred/ml/classifiers/rndclassifier/rndclassifier.hpp

9.95 LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt Class Reference

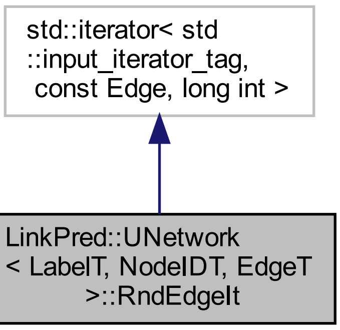
Randomized edges iterator.

```
#include <unetwork.hpp>
```

Inheritance diagram for LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt:


std::iterator< std ::input_iterator_tag, const Edge, long int >
LinkPred::UNetwork < LabelT, NodeIDT, EdgeT >::RndEdgeIt

Collaboration diagram for LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt:


std::iterator< std ::input_iterator_tag, const Edge, long int >
LinkPred::UNetwork < LabelT, NodeIDT, EdgeT >::RndEdgeIt

Public Types

- using pointer = typename std::iterator< std::input_iterator_tag, const Edge, long int >::pointer
- using reference = typename std::iterator< std::input_iterator_tag, const Edge, long int >::reference

Public Member Functions

- RndEdgeIt (RndEdgeIt const &that)=default
- RndEdgeIt & operator= (RndEdgeIt const &that)=default
- RndEdgeIt (RndEdgeIt &&that)=default
- RndEdgeIt & operator= (RndEdgeIt &&that)=default

- reference operator∗ () const
- pointer operator-> () const
- RndEdgeIt & operator++ ()
- RndEdgeIt operator++ (int)
- bool operator== (const RndEdgeIt &that) const
- bool operator!= (const RndEdgeIt &that) const

Friends

- class **UNetwork**

9.95.1 Detailed Description

**template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt**

Randomized edges iterator.

This is forward iterator that can be used to randomly sample a subset of the edges.

9.95.2 Member Typedef Documentation

9.95.2.1 pointer

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::pointer = typename std::iterator<std↩
::input_iterator_tag, const Edge, long int>::pointer
```

The pointer type associated with the iterator.

9.95.2.2 reference

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::reference = typename std↩
::iterator<std::input_iterator_tag, const Edge, long int>::reference
```

The reference type associated with the iterator.

9.95.3 Constructor & Destructor Documentation

9.95.3.1 RndEdgeIt() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::RndEdgeIt (
            RndEdgeIt const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.95.3.2 RndEdgeIt() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::RndEdgeIt (
             RndEdgeIt && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.95.4 Member Function Documentation

9.95.4.1 operator"!=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator!= (
             const RndEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.95.4.2 operator∗()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
reference LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator∗ ( ) const  [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.95.4.3 operator++() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndEdgeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator++ ( )  [inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.95.4.4 operator++() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndEdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator++ (
             int  )  [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.95.4.5 operator->()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
pointer LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator-> ( ) const  [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.95.4.6 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndEdgeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator= (
             RndEdgeIt && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.95.4.7 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndEdgeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator= (
             RndEdgeIt const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.95.4.8 operator==()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator== (
             const RndEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

The documentation for this class was generated from the following file:

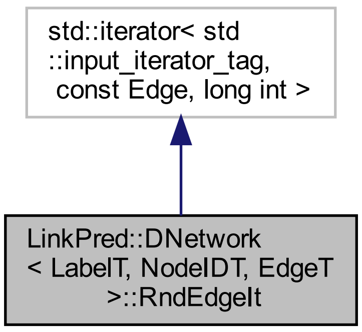
- include/linkpred/core/unetwork/unetwork.hpp

9.96 LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt Class Reference

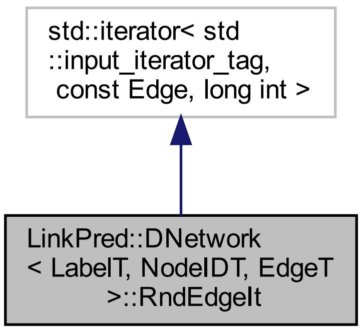
Randomized edges iterator.

```
#include <dnetwork.hpp>
```

Inheritance diagram for LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt:


std::iterator< std ::input_iterator_tag, const Edge, long int >
LinkPred::DNetwork < LabelT, NodeIDT, EdgeT >::RndEdgeIt

Collaboration diagram for LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt:


std::iterator< std ::input_iterator_tag, const Edge, long int >
LinkPred::DNetwork < LabelT, NodeIDT, EdgeT >::RndEdgeIt

Public Types

- using pointer = typename std::iterator< std::input_iterator_tag, const Edge, long int >::pointer
- using reference = typename std::iterator< std::input_iterator_tag, const Edge, long int >::reference

Public Member Functions

- RndEdgeIt (RndEdgeIt const &that)=default
- RndEdgeIt & operator= (RndEdgeIt const &that)=default
- RndEdgeIt (RndEdgeIt &&that)=default
- RndEdgeIt & operator= (RndEdgeIt &&that)=default
- reference operator* () const
- pointer operator-> () const
- RndEdgeIt & operator++ ()
- RndEdgeIt operator++ (int)
- bool operator== (const RndEdgeIt &that) const
- bool operator!= (const RndEdgeIt &that) const

Friends

- class **DNetwork**

9.96.1 Detailed Description

template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int> class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt

Randomized edges iterator.

This is forward iterator that can be used to randomly sample a subset of the edges.

9.96.2 Member Typedef Documentation

9.96.2.1 pointer

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::pointer = typename std::iterator<std↩
::input_iterator_tag, const Edge, long int>::pointer
```

The pointer type associated with the iterator.

9.96.2.2 reference

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::reference = typename std↩
::iterator<std::input_iterator_tag, const Edge, long int>::reference
```

The reference type associated with the iterator.

9.96.3 Constructor & Destructor Documentation

9.96.3.1 RndEdgeIt() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::RndEdgeIt (
            RndEdgeIt const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.96.3.2 RndEdgeIt() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::RndEdgeIt (
            RndEdgeIt && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.96.4 Member Function Documentation

9.96.4.1 operator"!=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator!= (
            const RndEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.96.4.2 operator*()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
reference LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator* ( ) const  [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.96.4.3 operator++() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndEdgeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator++ ( )  [inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.96.4.4 operator++() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndEdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator++ (
             int  )  [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.96.4.5 operator->()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
pointer LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator-> ( ) const  [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.96.4.6 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndEdgeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator= (
             RndEdgeIt && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.96.4.7 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndEdgeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator= (
            RndEdgeIt const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.96.4.8 operator==()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt::operator== (
            const RndEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

The documentation for this class was generated from the following file:

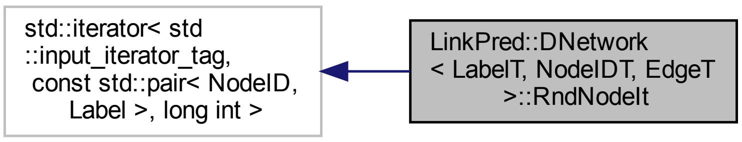
- include/linkpred/core/dnetwork/dnetwork.hpp

9.97 LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt Class Reference

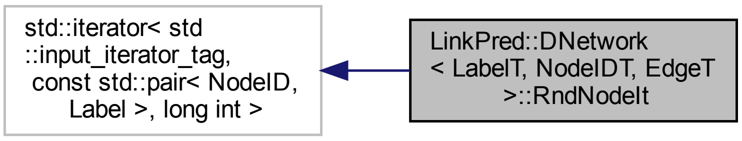
Randomized Nodes iterator.

```
#include <dnetwork.hpp>
```

Inheritance diagram for LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt:


std::iterator< std ::input_iterator_tag, const std::pair< NodeID, Label >, long int >
LinkPred::DNetwork < LabelT, NodeIDT, EdgeT >::RndNodeIt

Collaboration diagram for LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt:


std::iterator< std ::input_iterator_tag, const std::pair< NodeID, Label >, long int >
LinkPred::DNetwork < LabelT, NodeIDT, EdgeT >::RndNodeIt

Public Types

- using pointer = typename std::iterator< std::input_iterator_tag, const std::pair< NodeID, Label >, long int >::pointer
- using reference = typename std::iterator< std::input_iterator_tag, const std::pair< NodeID, Label >, long int >::reference

Public Member Functions

- RndNodeIt (RndNodeIt const &that)=default
- RndNodeIt & operator= (RndNodeIt const &that)=default
- RndNodeIt (RndNodeIt &&that)=default
- RndNodeIt & operator= (RndNodeIt &&that)=default
- reference operator∗ () const
- pointer operator-> () const
- RndNodeIt & operator++ ()
- RndNodeIt operator++ (int)
- bool operator== (const RndNodeIt &that) const
- bool operator!= (const RndNodeIt &that) const

Friends

- class **DNetwork**

9.97.1 Detailed Description

template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int> class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt

Randomized Nodes iterator.

This is forward iterator that can be used to randomly sample a subset of the nodes.

9.97.2 Member Typedef Documentation

9.97.2.1 pointer

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::pointer = typename std::iterator<std↩
::input_iterator_tag, const std::pair<NodeID, Label>, long int>::pointer
```

The pointer type associated with the iterator.

9.97.2.2 reference

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::reference = typename std↩
::iterator<std::input_iterator_tag, const std::pair<NodeID, Label>, long int>::reference
```

The reference type associated with the iterator.

9.97.3 Constructor & Destructor Documentation

9.97.3.1 RndNodeIt() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::RndNodeIt (
             RndNodeIt const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.97.3.2 RndNodeIt() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::RndNodeIt (
            RndNodeIt && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.97.4 Member Function Documentation

9.97.4.1 operator"!=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator!= (
            const RndNodeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.97.4.2 operator∗()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
reference LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator∗ ( ) const  [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.97.4.3 operator++() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNodeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator++ ( )  [inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.97.4.4 operator++() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNodeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator++ (
            int  )  [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.97.4.5 operator->()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
pointer LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator-> ( ) const  [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.97.4.6 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNodeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator= (
            RndNodeIt && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.97.4.7 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNodeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator= (
             RndNodeIt const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.97.4.8 operator==()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator== (
             const RndNodeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

The documentation for this class was generated from the following file:

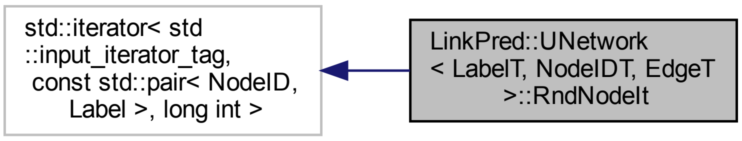
- include/linkpred/core/dnetwork/dnetwork.hpp

9.98 LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt Class Reference

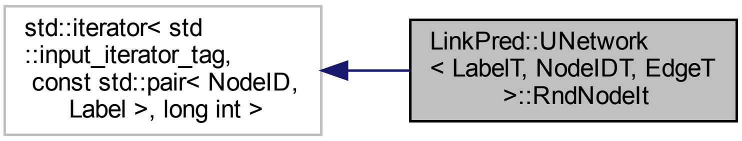
Randomized Nodes iterator.

```
#include <unetwork.hpp>
```

Inheritance diagram for LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt:


std::iterator< std ::input_iterator_tag, const std::pair< NodeID, Label >, long int >
LinkPred::UNetwork < LabelT, NodeIDT, EdgeT >::RndNodeIt

Collaboration diagram for LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt:


std::iterator< std ::input_iterator_tag, const std::pair< NodeID, Label >, long int >
LinkPred::UNetwork < LabelT, NodeIDT, EdgeT >::RndNodeIt

Public Types

- using pointer = typename std::iterator< std::input_iterator_tag, const std::pair< NodeID, Label >, long int >::pointer
- using reference = typename std::iterator< std::input_iterator_tag, const std::pair< NodeID, Label >, long int >::reference

Public Member Functions

- RndNodeIt (RndNodeIt const &that)=default
- RndNodeIt & operator= (RndNodeIt const &that)=default
- RndNodeIt (RndNodeIt &&that)=default
- RndNodeIt & operator= (RndNodeIt &&that)=default
- reference operator* () const
- pointer operator-> () const
- RndNodeIt & operator++ ()
- RndNodeIt operator++ (int)
- bool operator== (const RndNodeIt &that) const
- bool operator!= (const RndNodeIt &that) const

Friends

- class **UNetwork**

9.98.1 Detailed Description

**template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt**

Randomized Nodes iterator.

This is forward iterator that can be used to randomly sample a subset of the nodes.

9.98.2 Member Typedef Documentation

9.98.2.1 pointer

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::pointer = typename std::iterator<std↩
::input_iterator_tag, const std::pair<NodeID, Label>, long int>::pointer
```

The pointer type associated with the iterator.

9.98.2.2 reference

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::reference = typename std↩
::iterator<std::input_iterator_tag, const std::pair<NodeID, Label>, long int>::reference
```

The reference type associated with the iterator.

9.98.3 Constructor & Destructor Documentation

9.98.3.1 RndNodeIt() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::RndNodeIt (
            RndNodeIt const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.98.3.2 RndNodeIt() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::RndNodeIt (
            RndNodeIt && that ) [default]
```

Move constructor.

Parameters

that	The object to move.

9.98.4 Member Function Documentation

9.98.4.1 operator"!=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator!= (
            const RndNodeIt & that ) const [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.98.4.2 operator∗()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
reference LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator* ( ) const [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.98.4.3 operator++() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNodeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator++ ( )  [inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.98.4.4 operator++() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNodeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator++ (
             int  )  [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.98.4.5 operator->()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
pointer LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator-> ( ) const  [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.98.4.6 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNodeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator= (
             RndNodeIt && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.98.4.7 operator=() `[2/2]`

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNodeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator= (
            RndNodeIt const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.98.4.8 operator==()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt::operator== (
            const RndNodeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

The documentation for this class was generated from the following file:

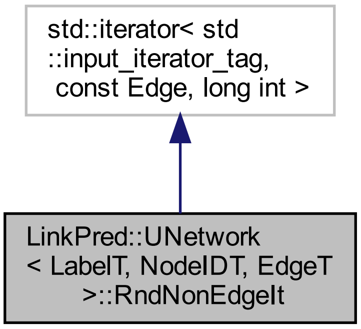
- include/linkpred/core/unetwork/unetwork.hpp

9.99 LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt Class Reference

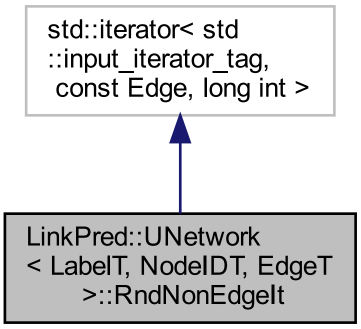
Randomized nonedges iterator.

```
#include <unetwork.hpp>
```

Inheritance diagram for LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt:


std::iterator< std ::input_iterator_tag, const Edge, long int >
LinkPred::UNetwork < LabelT, NodeIDT, EdgeT >::RndNonEdgeIt

Collaboration diagram for LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt:


std::iterator< std ::input_iterator_tag, const Edge, long int >
LinkPred::UNetwork < LabelT, NodeIDT, EdgeT >::RndNonEdgeIt

Public Types

- using pointer = typename std::iterator< std::input_iterator_tag, const Edge, long int >::pointer
- using reference = typename std::iterator< std::input_iterator_tag, const Edge, long int >::reference

Public Member Functions

- RndNonEdgeIt (RndNonEdgeIt const &that)=default
- RndNonEdgeIt & operator= (RndNonEdgeIt const &that)=default
- RndNonEdgeIt (RndNonEdgeIt &&that)=default
- RndNonEdgeIt & operator= (RndNonEdgeIt &&that)=default
- reference operator∗ ()
- pointer operator-> ()
- RndNonEdgeIt & operator++ ()
- RndNonEdgeIt operator++ (int)
- bool operator== (const RndNonEdgeIt &that) const
- bool operator!= (const RndNonEdgeIt &that) const

Friends

- class **UNetwork**

9.99.1 Detailed Description

**template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt**

Randomized nonedges iterator.

This is forward iterator that can be used to randomly sample a subset of the negative edges.

9.99.2 Member Typedef Documentation

9.99.2.1 pointer

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::pointer = typename std↩
::iterator<std::input_iterator_tag, const Edge, long int>::pointer
```

The pointer type associated with the iterator.

9.99.2.2 reference

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::reference = typename std↩
::iterator<std::input_iterator_tag, const Edge, long int>::reference
```

The reference type associated with the iterator.

9.99.3 Constructor & Destructor Documentation

9.99.3.1 RndNonEdgeIt() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::RndNonEdgeIt (
             RndNonEdgeIt const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.99.3.2 RndNonEdgeIt() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::RndNonEdgeIt (
             RndNonEdgeIt && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.99.4 Member Function Documentation

9.99.4.1 operator"!=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator!= (
             const RndNonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.99.4.2 operator∗()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
reference LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator* ( )  [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.99.4.3 operator++() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNonEdgeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator++ ( )
[inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.99.4.4 operator++() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNonEdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator++ (
             int  )  [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.99.4.5 operator->()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
pointer LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator-> ( )  [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.99.4.6 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNonEdgeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator= (
             RndNonEdgeIt && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.99.4.7 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNonEdgeIt& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator= (
             RndNonEdgeIt const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.99.4.8 operator==()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator== (
             const RndNonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

The documentation for this class was generated from the following file:

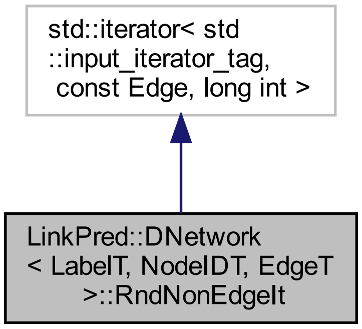
- include/linkpred/core/unetwork/unetwork.hpp

9.100 LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt Class Reference

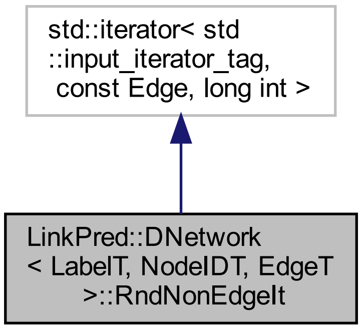
Randomized nonedges iterator.

`#include <dnetwork.hpp>`

Inheritance diagram for LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt:


std::iterator< std ::input_iterator_tag, const Edge, long int >
LinkPred::DNetwork < LabelT, NodeIDT, EdgeT >::RndNonEdgeIt

Collaboration diagram for LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt:


std::iterator< std ::input_iterator_tag, const Edge, long int >
LinkPred::DNetwork < LabelT, NodeIDT, EdgeT >::RndNonEdgeIt

Public Types

- using pointer = typename std::iterator< std::input_iterator_tag, const Edge, long int >::pointer
- using reference = typename std::iterator< std::input_iterator_tag, const Edge, long int >::reference

Public Member Functions

- RndNonEdgeIt (RndNonEdgeIt const &that)=default
- RndNonEdgeIt & operator= (RndNonEdgeIt const &that)=default
- RndNonEdgeIt (RndNonEdgeIt &&that)=default
- RndNonEdgeIt & operator= (RndNonEdgeIt &&that)=default
- reference operator∗ ()
- pointer operator-> ()
- RndNonEdgeIt & operator++ ()
- RndNonEdgeIt operator++ (int)
- bool operator== (const RndNonEdgeIt &that) const
- bool operator!= (const RndNonEdgeIt &that) const

Friends

- class **DNetwork**

9.100.1 Detailed Description

**template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt**

Randomized nonedges iterator.

This is forward iterator that can be used to randomly sample a subset of the negative edges.

9.100.2 Member Typedef Documentation

9.100.2.1 pointer

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::pointer = typename std↩
::iterator<std::input_iterator_tag, const Edge, long int>::pointer
```

The pointer type associated with the iterator.

9.100.2.2 reference

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::reference = typename std↩
::iterator<std::input_iterator_tag, const Edge, long int>::reference
```

The reference type associated with the iterator.

9.100.3 Constructor & Destructor Documentation

9.100.3.1 RndNonEdgeIt() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::RndNonEdgeIt (
             RndNonEdgeIt const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.100.3.2 RndNonEdgeIt() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::RndNonEdgeIt (
             RndNonEdgeIt && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.100.4 Member Function Documentation

9.100.4.1 operator"!=()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator!= (
             const RndNonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.100.4.2 operator∗()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
reference LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator∗ ( )  [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.100.4.3 operator++() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNonEdgeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator++ ( )
[inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.100.4.4 operator++() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNonEdgeIt LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator++ (
             int  )  [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.100.4.5 operator->()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
pointer LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator-> ( )  [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.100.4.6 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNonEdgeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator= (
             RndNonEdgeIt && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.100.4.7 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNonEdgeIt& LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator= (
             RndNonEdgeIt const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.100.4.8 operator==()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt::operator== (
             const RndNonEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

The documentation for this class was generated from the following file:

- include/linkpred/core/dnetwork/dnetwork.hpp

9.101 LinkPred::Simp::Evaluator::Factory::RNDParams Struct Reference

Parameters of RND.

```
#include <evaluator.hpp>
```

Public Attributes

- long int seed = 0

9.101.1 Detailed Description

Parameters of RND.

9.101.2 Member Data Documentation

9.101.2.1 seed

```
long int LinkPred::Simp::Evaluator::Factory::RNDParams::seed = 0
```

The random number generator seed for RND.

The documentation for this struct was generated from the following file:

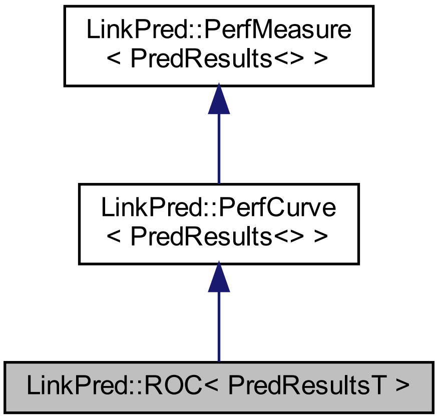
- include/linkpred/simp/evaluator.hpp

9.102 LinkPred::ROC< PredResultsT > Class Template Reference

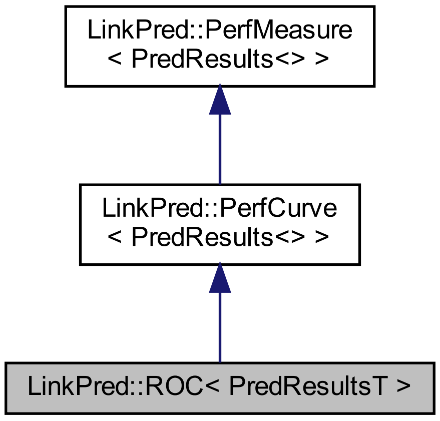
Receiver Operating Characteristic curve.

```
#include <perfmeasure.hpp>
```

Inheritance diagram for LinkPred::ROC< PredResultsT >:



Collaboration diagram for LinkPred::ROC< PredResultsT >:


LinkPred::PerfMeasure < PredResults<> >
LinkPred::PerfCurve < PredResults<> >
LinkPred::ROC< PredResultsT >

Public Types

- using ScoresItT = typename PerfMeasure< PredResultsT >::ScoresItT

Public Member Functions

- ROC ()
- ROC (std::string name)
- ROC (ROC const &that)=default
- ROC & operator= (ROC const &that)=default
- ROC (ROC &&that)=default
- ROC & operator= (ROC &&that)=default
- bool isStrmEnabled () const
- void setStrmEnabled (bool strmEnabled)
- bool isStrmNeg () const
- void setStrmNeg (bool strmNeg)
- virtual void eval (ScoresItT posScoresBegin, ScoresItT posScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, SortOrder &posSortOrder, SortOrder &negSortOrder, PerfResults &results)
- virtual void eval (std::shared_ptr< PredResultsT > &predResults, PerfResults &results)
- virtual void evalNoStream (std::shared_ptr< PredResultsT > &predResults, PerfResults &results)
- template<typename StrmScoresItT , typename StoredScoresItT >
  double getROCAucStrm (StrmScoresItT strmBegin, StrmScoresItT strmEnd, StoredScoresItT strdBegin, StoredScoresItT strdEnd)
- virtual void evalStream (std::shared_ptr< PredResultsT > &predResults, PerfResults &results)
- virtual std::vector< std::pair< double, double > > getCurve (std::shared_ptr< PredResultsT > &pred↩ Results)
- virtual std::vector< std::pair< double, double > > getCurve (ScoresItT posScoresBegin, ScoresItT pos↩ ScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, SortOrder &posSortOrder, SortOrder &negSortOrder)
- virtual ∼ROC ()=default

Static Public Member Functions

- template<typename ScoresItT >
  static double getROCAuc (ScoresItT posScoresBegin, ScoresItT posScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, bool parallel=false)
- template<typename ScoresItT >
  static std::vector< double > getThresholds (ScoresItT posScoresBegin, ScoresItT posScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd)
- template<typename ScoresItT >
  static std::vector< std::pair< double, double > > getROCCurve (ScoresItT posScoresBegin, ScoresItT posScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, bool parallel=false)

9.102.1 Detailed Description

template<typename PredResultsT = PredResults<>>
class LinkPred::ROC< PredResultsT >

Receiver Operating Characteristic curve.

Template Parameters

PredResultsT	The prediction results type.

9.102.2 Member Typedef Documentation

9.102.2.1 ScoresItT

```
template<typename PredResultsT = PredResults<>>
using LinkPred::ROC< PredResultsT >::ScoresItT = typename PerfMeasure<PredResultsT>::ScoresItT
```

Scores iterator type.

9.102.3 Constructor & Destructor Documentation

9.102.3.1 ROC() [1/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::ROC< PredResultsT >::ROC ( )  [inline]
```

< The name of the performance measure. Constructor.

9.102.3.2 ROC() [2/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::ROC< PredResultsT >::ROC (
            std::string name )  [inline]
```

Constructor.

Parameters

name	The name of the performance measure.

9.102.3.3 ROC() [3/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::ROC< PredResultsT >::ROC (
            ROC< PredResultsT > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.102.3.4 ROC() [4/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::ROC< PredResultsT >::ROC (
            ROC< PredResultsT > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.102.3.5 ∼ROC()

```
template<typename PredResultsT = PredResults<>>
virtual LinkPred::ROC< PredResultsT >::∼ROC ( )  [virtual], [default]
```

Destructor.

9.102.4 Member Function Documentation

9.102.4.1 eval() [1/2]

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::ROC< PredResultsT >::eval (
             ScoresItT posScoresBegin,
             ScoresItT posScoresEnd,
             ScoresItT negScoresBegin,
             ScoresItT negScoresEnd,
             SortOrder & posSortOrder,
             SortOrder & negSortOrder,
             PerfResults & results )  [inline], [virtual]
```

Computes the area under the ROC curve.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
posSortOrder	The sorting order of positive scores. This may be modified by the method.
negSortOrder	The sorting order of negative scores. This may be modified by the method.
results	To write results.

9.102.4.2 eval() [2/2]

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::ROC< PredResultsT >::eval (
             std::shared_ptr< PredResultsT > & predResults,
             PerfResults & results )  [inline], [virtual]
```

Computes the area under the ROC curve.

Parameters

predResults	The prediction results.
results	Iterator to write results.

9.102.4.3 evalNoStream()

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::ROC< PredResultsT >::evalNoStream (
             std::shared_ptr< PredResultsT > & predResults,
             PerfResults & results )  [inline], [virtual]
```

Computes the area under the ROC curve.

Parameters

predResults	The prediction results.
results	Iterator to write results.

9.102.4.4 evalStream()

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::ROC< PredResultsT >::evalStream (
              std::shared_ptr< PredResultsT > & predResults,
              PerfResults & results )  [inline], [virtual]
```

Computes the area under the ROC curve with streaming scores.

Parameters

predResults	The prediction results.
results	Iterator to write results.

9.102.4.5 getCurve() [1/2]

```
template<typename PredResultsT = PredResults<>>
virtual std::vector<std::pair<double, double> > LinkPred::ROC< PredResultsT >::getCurve (
              ScoresItT posScoresBegin,
              ScoresItT posScoresEnd,
              ScoresItT negScoresBegin,
              ScoresItT negScoresEnd,
              SortOrder & posSortOrder,
              SortOrder & negSortOrder )  [inline], [virtual]
```

Computes the ROC curve.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
posSortOrder	The sorting order of positive scores. This may be modified by the method.
negSortOrder	The sorting order of negative scores. This may be modified by the method.

Returns

A curve in the form of an std::vector of pairs representing the x and y coordinates.

9.102.4.6 getCurve() [2/2]

```
template<typename PredResultsT = PredResults<>>
virtual std::vector<std::pair<double, double> > LinkPred::ROC< PredResultsT >::getCurve (
            std::shared_ptr< PredResultsT > & predResults )  [inline], [virtual]
```

Computes the ROC curve.

Parameters

predResults	The prediction results.

Returns

A curve in the form of an std::vector of pairs representing the x and y coordinates.

9.102.4.7 getROCAuc()

```
template<typename PredResultsT = PredResults<>>
template<typename ScoresItT >
static double LinkPred::ROC< PredResultsT >::getROCAuc (
            ScoresItT posScoresBegin,
            ScoresItT posScoresEnd,
            ScoresItT negScoresBegin,
            ScoresItT negScoresEnd,
            bool parallel = false )  [inline], [static]
```

Compute the area under the ROC curve. The smallest range must be sorted in increasing order (in case of a tie, the false negative ranges must be sorted).

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
parallel	Whether to run in parallel.

Returns

The area under the ROC curve.

9.102.4.8 getROCAucStrm()

```
template<typename PredResultsT = PredResults<>>
template<typename StrmScoresItT , typename StoredScoresItT >
```

```
double LinkPred::ROC< PredResultsT >::getROCAucStrm (
            StrmScoresItT strmBegin,
            StrmScoresItT strmEnd,
            StoredScoresItT strdBegin,
            StoredScoresItT strdEnd )  [inline]
```

Compute the area under the ROC curve with streaming. The smallest range must be sorted in increasing order (in case of a tie, the false negative ranges must be sorted).

Parameters

strmBegin	Iterator to the first streamed score.
strmEnd	Iterator to one-past-the-last streamed score.
strdBegin	Iterator to the first stored score.
strdEnd	Iterator to one-past-the-last stored score.

Returns

The area under the ROC curve.

9.102.4.9 getROCCurve()

```
template<typename PredResultsT = PredResults<>>
template<typename ScoresItT >
static std::vector<std::pair<double, double> > LinkPred::ROC< PredResultsT >::getROCCurve (
            ScoresItT posScoresBegin,
            ScoresItT posScoresEnd,
            ScoresItT negScoresBegin,
            ScoresItT negScoresEnd,
            bool parallel = false )  [inline], [static]
```

Compute the ROC curve. Both ranges must be sorted.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
parallel	Whether to run in parallel.

9.102.4.10 getThresholds()

```
template<typename PredResultsT = PredResults<>>
template<typename ScoresItT >
```

```
static std::vector<double> LinkPred::ROC< PredResultsT >::getThresholds (
            ScoresItT posScoresBegin,
            ScoresItT posScoresEnd,
            ScoresItT negScoresBegin,
            ScoresItT negScoresEnd )  [inline], [static]
```

Compute the threshold of the ROC curve. Ranges must be sorted in increasing order.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.

9.102.4.11 isStrmEnabled()

```
template<typename PredResultsT = PredResults<>>
bool LinkPred::ROC< PredResultsT >::isStrmEnabled ( ) const  [inline]
```

Returns

Whether streaming is enabled.

9.102.4.12 isStrmNeg()

```
template<typename PredResultsT = PredResults<>>
bool LinkPred::ROC< PredResultsT >::isStrmNeg ( ) const  [inline]
```

Returns

Which class to stream. If true negative scores are streamed, else positive scores are. Only used if enableStrm is true.

9.102.4.13 operator=() [1/2]

```
template<typename PredResultsT = PredResults<>>
ROC& LinkPred::ROC< PredResultsT >::operator= (
            ROC< PredResultsT > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.102.4.14 operator=() [2/2]

```
template<typename PredResultsT = PredResults<>>
ROC& LinkPred::ROC< PredResultsT >::operator= (
             ROC< PredResultsT > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.102.4.15 setStrmEnabled()

```
template<typename PredResultsT = PredResults<>>
void LinkPred::ROC< PredResultsT >::setStrmEnabled (
             bool strmEnabled )  [inline]
```

Parameters

strmEnabled	Whether to enable streaming.

9.102.4.16 setStrmNeg()

```
template<typename PredResultsT = PredResults<>>
void LinkPred::ROC< PredResultsT >::setStrmNeg (
             bool strmNeg )  [inline]
```

Set which class to stream. If true negative scores are streamed, else positive scores are. Only used if enableStrm is true.

Parameters

strmNeg	If true negative scores are streamed, else positive scores are. Only used if enableStrm is true.

The documentation for this class was generated from the following file:

- include/linkpred/perf/perfmeasure.hpp

9.103 LinkPred::Simp::Evaluator::Factory::SBMParams Struct Reference

Parameters of SBM.

```
#include <evaluator.hpp>
```

Public Attributes

- int maxIter = 1000
- long int seed = 0

9.103.1 Detailed Description

Parameters of SBM.

9.103.2 Member Data Documentation

9.103.2.1 maxIter

```
int LinkPred::Simp::Evaluator::Factory::SBMParams::maxIter = 1000
```

Max iterations for SBM.

9.103.2.2 seed

```
long int LinkPred::Simp::Evaluator::Factory::SBMParams::seed = 0
```

Seed for SBM.

The documentation for this struct was generated from the following file:

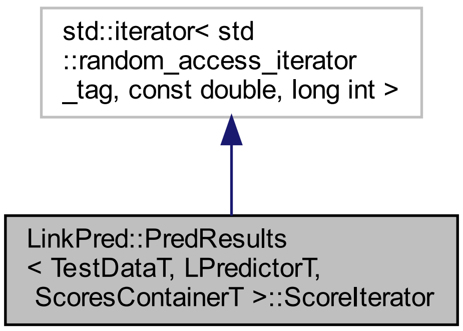
- include/linkpred/simp/evaluator.hpp

9.104 LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator Class Reference

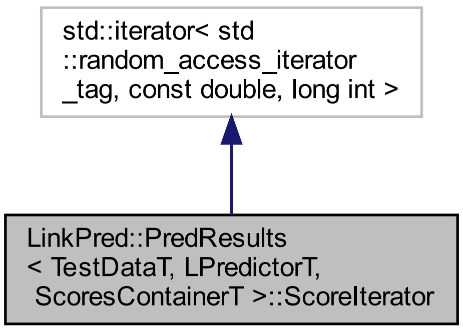
Score iterator.

`#include <predresults.hpp>`

Inheritance diagram for LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator:


std::iterator< std ::random_access_iterator _tag, const double, long int >
LinkPred::PredResults < TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator

Collaboration diagram for LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator:


std::iterator< std ::random_access_iterator _tag, const double, long int >
LinkPred::PredResults < TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator

Public Types

- using pointer = typename std::iterator< std::random_access_iterator_tag, const std::pair< typename Test←DataT::Edge, double >, long int >::pointer
- using reference = typename std::iterator< std::random_access_iterator_tag, const std::pair< typename TestDataT::Edge, double >, long int >::reference
- using difference_type = typename std::iterator< std::random_access_iterator_tag, const std::pair< typename TestDataT::Edge, double >, long int >::difference_type

Public Member Functions

- ScoreIterator (std::shared_ptr< LPredictorT > const &predictor, typename TestDataT::TestEdgeIt const &eit)
- ScoreIterator (ScoreIterator const &that)=default
- ScoreIterator & operator= (ScoreIterator const &that)=default
- ScoreIterator (ScoreIterator &&that)=default
- ScoreIterator & operator= (ScoreIterator &&that)=default
- reference operator∗ ()
- pointer operator-> ()
- ScoreIterator & operator++ ()
- ScoreIterator & operator-- ()
- ScoreIterator operator++ (int)
- ScoreIterator operator-- (int)
- ScoreIterator operator+ (const difference_type &n) const
- ScoreIterator & operator+= (const difference_type &n)
- ScoreIterator operator- (const difference_type &n) const
- ScoreIterator & operator-= (const difference_type &n)
- difference_type operator- (const ScoreIterator &that) const
- bool operator== (const ScoreIterator &that) const
- bool operator!= (const ScoreIterator &that) const
- bool operator< (const ScoreIterator &that) const
- bool operator> (const ScoreIterator &that) const
- bool operator<= (const ScoreIterator &that) const
- bool operator>= (const ScoreIterator &that) const

Friends

- class PredResults

9.104.1 Detailed Description

**template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename ScoresContainerT = std↩
::vector<double>>
class LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator**

Score iterator.

9.104.2 Member Typedef Documentation

9.104.2.1 difference_type

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
using LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator::difference_type
= typename std::iterator<std::random_access_iterator_tag, const std::pair<typename TestDataT↩
::Edge, double>, long int>::difference_type
```

The difference type associated with the iterator.

9.104.2.2 pointer

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
using LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator::pointer
= typename std::iterator<std::random_access_iterator_tag, const std::pair<typename TestDataT↩
::Edge, double>, long int>::pointer
```

The pointer type associated with the iterator.

9.104.2.3 reference

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
using LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator::reference
= typename std::iterator<std::random_access_iterator_tag, const std::pair<typename TestDataT↩
::Edge, double>, long int>::reference
```

The reference type associated with the iterator.

9.104.3 Constructor & Destructor Documentation

9.104.3.1 ScoreIterator() [1/3]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator::Score↩
Iterator (
            std::shared_ptr< LPredictorT > const & predictor,
            typename TestDataT::TestEdgeIt const & eit )  [inline]
```

Constructor.

Parameters

predictor	The link predictor.
eit	Test edge iterator.

9.104.3.2 ScoreIterator() [2/3]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator::Score↩
Iterator (
            ScoreIterator const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.104.3.3 ScoreIterator() [3/3]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator::Score←
Iterator (
            ScoreIterator && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.104.4 Member Function Documentation

9.104.4.1 operator"!=()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
bool LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator::operator!=
(
            const ScoreIterator & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.104.4.2 operator∗()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
reference LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator←
::operator∗ ( )  [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.104.4.3 operator+()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
ScoreIterator LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator↩
::operator+ (
             const difference_type & n ) const  [inline]
```

Arithmetic + operator.

Parameters

n	Increment value.

Returns

The new iterator.

9.104.4.4 operator++() [1/2]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
ScoreIterator& LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::Score↩
Iterator::operator++ ( )  [inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.104.4.5 operator++() [2/2]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
ScoreIterator LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator↩
::operator++ (
             int  )  [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.104.4.6 operator+=()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
ScoreIterator& LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::Score↩
Iterator::operator+= (
             const difference_type & n )  [inline]
```

Arithmetic += operator.

Parameters

n	Increment value.

Returns

A reference to the new iterator.

9.104.4.7 operator-() [1/2]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
ScoreIterator LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator↩
::operator- (
             const difference_type & n ) const  [inline]
```

Arithmetic - operator.

Parameters

n	Decrement value.

Returns

The new iterator.

9.104.4.8 operator-() [2/2]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
difference_type LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::Score↩
Iterator::operator- (
             const ScoreIterator & that ) const  [inline]
```

Difference between the present iterator and the one passed as parameter.

Parameters

that	The other iterator.

Returns

The difference between the current and that iterator.

9.104.4.9 operator--() [1/2]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
ScoreIterator& LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::Score↩
Iterator::operator-- ( )  [inline]
```

Pre-decrement operator.

Returns

A reference to the new iterator.

9.104.4.10 operator--() [2/2]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
ScoreIterator LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator↩
::operator-- (
             int  )  [inline]
```

Post-decrement operator.

Returns

A reference to the new iterator.

9.104.4.11 operator-=()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
ScoreIterator& LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::Score↩
Iterator::operator-= (
             const difference_type & n )  [inline]
```

Arithmetic -= operator.

Parameters

n	Decrement value.

Returns

A reference to the new iterator.

9.104.4.12 operator->()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
pointer LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator↩
::operator-> ( ) [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.104.4.13 operator<()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
bool LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator::operator<
(
            const ScoreIterator & that ) const [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less than that.

9.104.4.14 operator<=()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
bool LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator::operator<=
(
            const ScoreIterator & that ) const [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater or equal to that.

9.104.4.15 operator=() [1/2]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
ScoreIterator& LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::Score↩
Iterator::operator= (
            ScoreIterator && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.104.4.16 operator=() [2/2]

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
ScoreIterator& LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::Score↩
Iterator::operator= (
            ScoreIterator const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.104.4.17 operator==()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
bool LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator::operator==
(
            const ScoreIterator & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

9.104.4.18 operator>()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
bool LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator::operator>
(
            const ScoreIterator & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater that.

9.104.4.19 operator>=()

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
bool LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator::operator>=
(
            const ScoreIterator & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less or equal to that.

9.104.5 Friends And Related Function Documentation

9.104.5.1 PredResults

```
template<typename TestDataT = TestData<>, typename LPredictorT = ULPredictor<>, typename
ScoresContainerT = std::vector<double>>
friend class PredResults  [friend]
```

PredResults is a friend.

The documentation for this class was generated from the following file:

- include/linkpred/perf/predresults.hpp

9.105 LinkPred::Simp::Evaluator::Factory::SHPParams Struct Reference

Parameters of SHP.

```
#include <evaluator.hpp>
```

Public Attributes

- long int seed = 0

9.105.1 Detailed Description

Parameters of SHP.

9.105.2 Member Data Documentation

9.105.2.1 seed

```
long int LinkPred::Simp::Evaluator::Factory::SHPParams::seed = 0
```

The random number generator seed for SHP.

The documentation for this struct was generated from the following file:

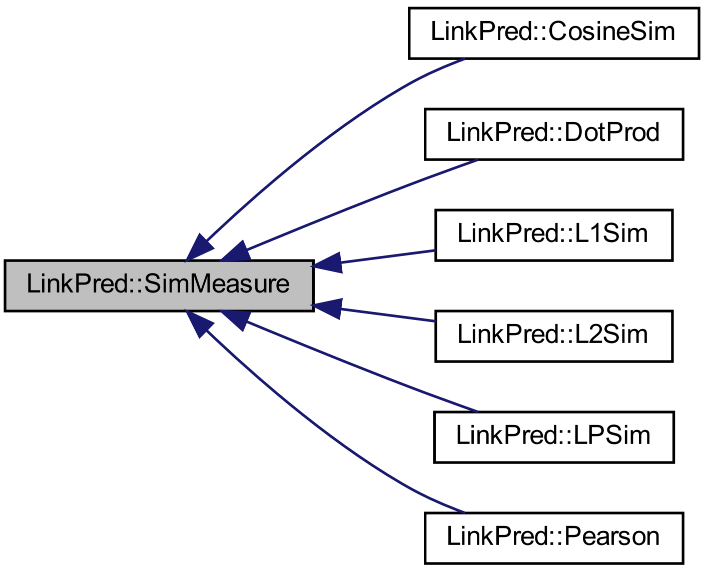
- include/linkpred/simp/evaluator.hpp

9.106 LinkPred::SimMeasure Class Reference

Interface of a similarity measure.

`#include <simmeasure.hpp>`

Inheritance diagram for LinkPred::SimMeasure:



Public Member Functions

- SimMeasure ()=default
- SimMeasure (SimMeasure const &that)=default
- SimMeasure & operator= (SimMeasure const &that)=default
- SimMeasure (SimMeasure &&that)=default
- SimMeasure & operator= (SimMeasure &&that)=default
- virtual double sim (Vec const &v1, Vec const &v2)=0
- const std::string & getName () const
- void setName (const std::string &name)
- virtual ~SimMeasure ()=default

9.106.1 Detailed Description

Interface of a similarity measure.

9.106.2 Constructor & Destructor Documentation

9.106.2.1 SimMeasure() [1/3]

```
LinkPred::SimMeasure::SimMeasure ( )  [default]
```

Default constructor.

9.106.2.2 SimMeasure() [2/3]

```
LinkPred::SimMeasure::SimMeasure (
            SimMeasure const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.106.2.3 SimMeasure() [3/3]

```
LinkPred::SimMeasure::SimMeasure (
            SimMeasure && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.106.2.4 ∼SimMeasure()

```
virtual LinkPred::SimMeasure::∼SimMeasure ( )  [virtual], [default]
```

Destructor.

9.106.3 Member Function Documentation

9.106.3.1 getName()

```
const std::string& LinkPred::SimMeasure::getName ( ) const  [inline]
```

Returns

The name of the SimMeasure.

9.106.3.2 operator=() [1/2]

```
SimMeasure& LinkPred::SimMeasure::operator= (
             SimMeasure && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.106.3.3 operator=() [2/2]

```
SimMeasure& LinkPred::SimMeasure::operator= (
             SimMeasure const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.106.3.4 setName()

```
void LinkPred::SimMeasure::setName (
             const std::string & name )  [inline]
```

Set the name of the SimMeasure.

Parameters

name	The new name of the SimMeasure.

9.106.3.5 sim()

```
virtual double LinkPred::SimMeasure::sim (
             Vec const & v1,
             Vec const & v2 )  [pure virtual]
```

Compute the similarity between two vectors.

Parameters

v1	First vector.
v2	Second vector. Must be of the same dimension as v1.

Returns

The similarity between v1 and v2.

Implemented in LinkPred::LPSim, LinkPred::CosineSim, LinkPred::DotProd, LinkPred::L1Sim, LinkPred::L2Sim, and LinkPred::Pearson.

The documentation for this class was generated from the following file:

- include/linkpred/ml/simmeasures/simmeasure.hpp

9.107 LinkPred::TestData< Network, EdgeContT > Class Template Reference

Test data.

```
#include <networkmanipulator.hpp>
```

Classes

- class TestEdgeIt

  Test edges iterator.

Public Types

- enum IteratorType { ECEIT, TPEIT, TNEIT }

  Enumeration of iterator types.
- using NetworkSP = std::shared_ptr< Network >
- using NetworkCSP = std::shared_ptr< const Network >
- using Edge = typename Network::Edge
- using NonEdgeIt = typename Network::NonEdgeIt
- using EdgeIt = typename Network::EdgeIt

Public Member Functions

- TestData (NetworkCSP refNet, NetworkCSP obsNet, std::shared_ptr< EdgeContT > remLinks, std↩ ::shared_ptr< EdgeContT > addLinks, std::shared_ptr< EdgeContT > tpLinks, std::shared_ptr< Edge↩ ContT > tnLinks, LinkClass posClass, LinkClass negClass)
- TestData (NetworkCSP refNet, NetworkCSP obsNet, std::shared_ptr< EdgeContT > remLinks, std↩ ::shared_ptr< EdgeContT > addLinks, std::shared_ptr< TestEdgeGen< Network, EdgeContT >> eg, LinkClass posClass, LinkClass negClass)
- void lock ()
- void genPos ()
- void genNeg ()
- TestData (TestData const &that)=default
- TestData & operator= (TestData const &that)=default
- TestData (TestData &&that)=default
- TestData & operator= (TestData &&that)=default
- auto getObsNet () const
- auto getRefNet () const
- auto posBegin () const
- auto posEnd () const
- auto negBegin () const
- auto negEnd () const
- auto posStrmBegin () const
- auto posStrmEnd () const
- auto negStrmBegin () const
- auto negStrmEnd () const
- std::size_t getNbPos () const
- std::size_t getNbNeg () const
- std::shared_ptr< std::set< Edge > const > getRemLinksMap () const
- LinkClass getNegClass () const
- LinkClass getPosClass () const
- bool isTnGenerated () const
- bool isTpGenerated () const
- bool isLocked () const
- const std::shared_ptr< TestEdgeGen< Network, EdgeContT > > & getEg () const
- virtual ∼TestData ()=default

9.107.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network::Edge>>
class LinkPred::TestData< Network, EdgeContT >

Test data.

Template Parameters

Network	The network type.
EdgeContT	The container used to store edges.

9.107.2 Member Typedef Documentation

9.107.2.1 Edge

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestData< Network, EdgeContT >::Edge = typename Network::Edge
```

The edge type.

9.107.2.2 EdgeIt

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestData< Network, EdgeContT >::EdgeIt = typename Network::EdgeIt
```

Edge iterator type.

9.107.2.3 NetworkCSP

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestData< Network, EdgeContT >::NetworkCSP = std::shared_ptr<const Network>
```

Constant shared pointer to anetwork.

9.107.2.4 NetworkSP

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestData< Network, EdgeContT >::NetworkSP = std::shared_ptr<Network>
```

Shared pointer to a network.

9.107.2.5 NonEdgeIt

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestData< Network, EdgeContT >::NonEdgeIt = typename Network::NonEdgeIt
```

Negative edge iterator type.

9.107.3 Member Enumeration Documentation

9.107.3.1 IteratorType

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
enum LinkPred::TestData::IteratorType
```

Enumeration of iterator types.

Enumerator

ECEIT	Edge container iterator.
TPEIT	True negative edge iterator.
TNEIT	True positive edge iterator.

9.107.4 Constructor & Destructor Documentation

9.107.4.1 TestData() [1/4]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkPred::TestData< Network, EdgeContT >::TestData (
            NetworkCSP refNet,
            NetworkCSP obsNet,
            std::shared_ptr< EdgeContT > remLinks,
            std::shared_ptr< EdgeContT > addLinks,
            std::shared_ptr< EdgeContT > tpLinks,
            std::shared_ptr< EdgeContT > tnLinks,
            LinkClass posClass,
            LinkClass negClass )  [inline]
```

Parameters

refNet	The reference network.
obsNet	The network.
remLinks	Removed edges.
addLinks	Added edges.
tpLinks	True positive links.
tnLinks	True negative links.
posClass	The class of edges used as the positive instances in the test set.
negClass	The class of edges used as the negative instances in the test set.

9.107.4.2 TestData() [2/4]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkPred::TestData< Network, EdgeContT >::TestData (
            NetworkCSP refNet,
            NetworkCSP obsNet,
            std::shared_ptr< EdgeContT > remLinks,
            std::shared_ptr< EdgeContT > addLinks,
            std::shared_ptr< TestEdgeGen< Network, EdgeContT >> eg,
            LinkClass posClass,
            LinkClass negClass )  [inline]
```

Parameters

refNet	The reference network.
obsNet	The network.
remLinks	Removed edges.
addLinks	Added edges.
eg	Edge generator.
posClass	The class of edges used as the positive instances in the test set.
negClass	The class of edges used as the negative instances in the test set.

eg->template generateTP(std::back_inserter(∗tpLinks)); eg->template generateTN(std::back_inserter(∗tnLinks));

tpGenerated = true; tnGenerated = true;

9.107.4.3 TestData() `[3/4]`

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network←
::Edge>>
LinkPred::TestData< Network, EdgeContT >::TestData (
            TestData< Network, EdgeContT > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.107.4.4 TestData() `[4/4]`

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network←
::Edge>>
LinkPred::TestData< Network, EdgeContT >::TestData (
            TestData< Network, EdgeContT > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.107.4.5 ∼TestData()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network←
::Edge>>
virtual LinkPred::TestData< Network, EdgeContT >::∼TestData ( )  [virtual], [default]
```

Destructor.

9.107.5 Member Function Documentation

9.107.5.1 genNeg()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
void LinkPred::TestData< Network, EdgeContT >::genNeg ( ) [inline]
```

Generate negative instances.

9.107.5.2 genPos()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
void LinkPred::TestData< Network, EdgeContT >::genPos ( ) [inline]
```

Generate positive instances.

9.107.5.3 getEg()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
const std::shared_ptr<TestEdgeGen<Network, EdgeContT> >& LinkPred::TestData< Network, Edge↩
ContT >::getEg ( ) const [inline]
```

Returns

Edge generator.

9.107.5.4 getNbNeg()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
std::size_t LinkPred::TestData< Network, EdgeContT >::getNbNeg ( ) const [inline]
```

Returns

Number of negative links in the test set.

9.107.5.5 getNbPos()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
std::size_t LinkPred::TestData< Network, EdgeContT >::getNbPos ( ) const  [inline]
```

Returns

Number of positive links in the test set.

9.107.5.6 getNegClass()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkClass LinkPred::TestData< Network, EdgeContT >::getNegClass ( ) const  [inline]
```

Returns

negClass.

9.107.5.7 getObsNet()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestData< Network, EdgeContT >::getObsNet ( ) const  [inline]
```

Returns

The observed network.

9.107.5.8 getPosClass()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkClass LinkPred::TestData< Network, EdgeContT >::getPosClass ( ) const  [inline]
```

Returns

posClass.

9.107.5.9 getRefNet()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestData< Network, EdgeContT >::getRefNet ( ) const  [inline]
```

Returns

The reference network.

9.107.5.10 getRemLinksMap()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
std::shared_ptr<std::set<Edge> const> LinkPred::TestData< Network, EdgeContT >::getRem↩
LinksMap ( ) const  [inline]
```

Returns

The removed links in a set.

9.107.5.11 isLocked()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestData< Network, EdgeContT >::isLocked ( ) const  [inline]
```

Returns

Whether the test data is locked.

9.107.5.12 isTnGenerated()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestData< Network, EdgeContT >::isTnGenerated ( ) const  [inline]
```

Returns

tnGenerated.

9.107.5.13 isTpGenerated()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestData< Network, EdgeContT >::isTpGenerated ( ) const  [inline]
```

Returns

tpGenerated.

9.107.5.14 lock()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
void LinkPred::TestData< Network, EdgeContT >::lock ( )  [inline]
```

Lock the dataset. No modifications can be done on the object after calling this method.

9.107.5.15 negBegin()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestData< Network, EdgeContT >::negBegin ( ) const  [inline]
```

Returns

An iterator to the first negative link.

9.107.5.16 negEnd()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestData< Network, EdgeContT >::negEnd ( ) const  [inline]
```

Returns

An iterator to one-past-the-last negative link.

9.107.5.17 negStrmBegin()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestData< Network, EdgeContT >::negStrmBegin ( ) const  [inline]
```

Returns

An iterator to the first negative link. The edges here may be streamed and not pre-generated.

9.107.5.18 negStrmEnd()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestData< Network, EdgeContT >::negStrmEnd ( ) const  [inline]
```

Returns

An iterator to one-past-the-last negative link. The edges here may be streamed and not pre-generated.

9.107.5.19 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestData& LinkPred::TestData< Network, EdgeContT >::operator= (
             TestData< Network, EdgeContT > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.107.5.20 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestData& LinkPred::TestData< Network, EdgeContT >::operator= (
             TestData< Network, EdgeContT > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.107.5.21 posBegin()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestData< Network, EdgeContT >::posBegin ( ) const  [inline]
```

Returns

An iterator to the first positive link.

9.107.5.22 posEnd()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestData< Network, EdgeContT >::posEnd ( ) const  [inline]
```

Returns

An iterator to one-past-the-last positive link.

9.107.5.23 posStrmBegin()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestData< Network, EdgeContT >::posStrmBegin ( ) const  [inline]
```

Returns

An iterator to the first positive link. The edges here may be streamed and not pre-generated.

9.107.5.24 posStrmEnd()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestData< Network, EdgeContT >::posStrmEnd ( ) const  [inline]
```

Returns

An iterator to one-past-the-last positive link. The edges here may be streamed and not pre-generated.

The documentation for this class was generated from the following file:

- include/linkpred/perf/networkmanipulator.hpp

9.108 LinkPred::TestEdgeGen< Network, EdgeContT > Class Template Reference

Generate true positives and true negatives.

```
#include <networkmanipulator.hpp>
```

Classes

- class TNEdgeIt

  TN edges iterator.
- class TPEdgeIt

  TP edges iterator.

Public Member Functions

- TestEdgeGen (NetworkCSP refNet, NetworkCSP obsNet, std::shared_ptr< EdgeContT > remLinks, std↩ ::shared_ptr< EdgeContT > addLinks, bool aTP, double tpRatio, bool aTN, double tnRatio, long int seed)
- TestEdgeGen (TestEdgeGen const &that)=default
- TestEdgeGen & operator= (TestEdgeGen const &that)=default
- TestEdgeGen (TestEdgeGen &&that)=default
- TestEdgeGen & operator= (TestEdgeGen &&that)=default
- template<typename OutputEdgeItT = typename std::vector< typename Network::Edge>::iterator>
  void generateTP (OutputEdgeItT oit)
- template<typename OutputEdgeItT = typename std::vector< typename Network::Edge>::iterator>
  void generateTN (OutputEdgeItT oit)
- auto tpBegin () const
- auto tpEnd () const
- auto tnBegin () const
- auto tnEnd () const
- virtual ∼TestEdgeGen ()=default

9.108.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network::Edge>>
class LinkPred::TestEdgeGen< Network, EdgeContT >

Generate true positives and true negatives.

Template Parameters

Network	Network type.
EdgeContT	The container used to store edges.

9.108.2 Constructor & Destructor Documentation

9.108.2.1 TestEdgeGen() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkPred::TestEdgeGen< Network, EdgeContT >::TestEdgeGen (
            NetworkCSP refNet,
            NetworkCSP obsNet,
            std::shared_ptr< EdgeContT > remLinks,
            std::shared_ptr< EdgeContT > addLinks,
            bool aTP,
            double tpRatio,
            bool aTN,
            double tnRatio,
            long int seed )  [inline]
```

Parameters

refNet	The reference network.
obsNet	The network.
remLinks	Removed edges.
addLinks	Added edges.
aTP	Whether to use all true positive links in the test set.
tpRatio	Ratio of true positive inks to e used in the test set. This parameter is only relevant when aTP is false.
aTN	Whether to use all true negative links in the test set.
tnRatio	Ratio of true negative inks to e used in the test set. This parameter is only relevant when aTN is false.
seed	The random number generator's seed.

9.108.2.2 TestEdgeGen() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkPred::TestEdgeGen< Network, EdgeContT >::TestEdgeGen (
            TestEdgeGen< Network, EdgeContT > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.108.2.3 TestEdgeGen() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkPred::TestEdgeGen< Network, EdgeContT >::TestEdgeGen (
            TestEdgeGen< Network, EdgeContT > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.108.2.4 ∼TestEdgeGen()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
virtual LinkPred::TestEdgeGen< Network, EdgeContT >::∼TestEdgeGen ( )  [virtual], [default]
```

Destructor.

9.108.3 Member Function Documentation

9.108.3.1 generateTN()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
template<typename OutputEdgeItT = typename std::vector< typename Network::Edge>::iterator>
void LinkPred::TestEdgeGen< Network, EdgeContT >::generateTN (
            OutputEdgeItT oit )  [inline]
```

Generate true negative links.

Template Parameters

OutputEdgeItT	Iterator write edges.

Parameters

oit	Output edge iterator.

9.108.3.2 generateTP()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
template<typename OutputEdgeItT = typename std::vector< typename Network::Edge>::iterator>
void LinkPred::TestEdgeGen< Network, EdgeContT >::generateTP (
            OutputEdgeItT oit )  [inline]
```

Generate true positive links.

Template Parameters

OutputEdgeItT	Iterator write edges.

Parameters

oit	Output edge iterator.

9.108.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestEdgeGen& LinkPred::TestEdgeGen< Network, EdgeContT >::operator= (
            TestEdgeGen< Network, EdgeContT > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.108.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestEdgeGen& LinkPred::TestEdgeGen< Network, EdgeContT >::operator= (
            TestEdgeGen< Network, EdgeContT > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.108.3.5 tnBegin()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestEdgeGen< Network, EdgeContT >::tnBegin ( ) const  [inline]
```

Returns

Iterator to the first true positive link.

9.108.3.6 tnEnd()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestEdgeGen< Network, EdgeContT >::tnEnd ( ) const  [inline]
```

Returns

Iterator to one-past the last true positive link.

9.108.3.7 tpBegin()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestEdgeGen< Network, EdgeContT >::tpBegin ( ) const  [inline]
```

Returns

Iterator to the first true positive link.

9.108.3.8 tpEnd()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
auto LinkPred::TestEdgeGen< Network, EdgeContT >::tpEnd ( ) const  [inline]
```

Returns

Iterator to one-past the last true positive link.

The documentation for this class was generated from the following file:

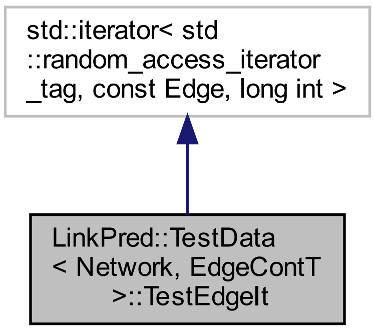
- include/linkpred/perf/networkmanipulator.hpp

9.109 LinkPred::TestData< Network, EdgeContT >::TestEdgeIt Class Reference

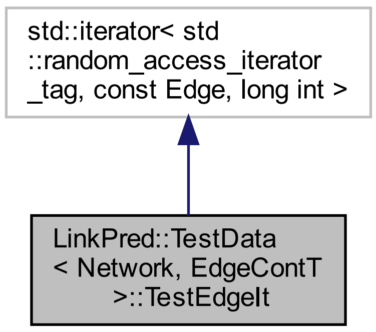
Test edges iterator.

```
#include <networkmanipulator.hpp>
```

Inheritance diagram for LinkPred::TestData< Network, EdgeContT >::TestEdgeIt:


std::iterator< std ::random_access_iterator _tag, const Edge, long int >
LinkPred::TestData < Network, EdgeContT >::TestEdgeIt

Collaboration diagram for LinkPred::TestData< Network, EdgeContT >::TestEdgeIt:


std::iterator< std ::random_access_iterator _tag, const Edge, long int >
LinkPred::TestData < Network, EdgeContT >::TestEdgeIt

Public Types

- using pointer = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >::pointer
- using reference = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >↩ ::reference
- using difference_type = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >↩ ::difference_type

Public Member Functions

- TestEdgeIt (IteratorType const &itType, typename EdgeContT::const_iterator const &eceit, typename TestEdgeGen< Network, EdgeContT >::TPEdgeIt const &tpeit, typename TestEdgeGen< Network, Edge↩ ContT >::TNEdgeIt const &tneit)
- TestEdgeIt (TestEdgeIt const &that)=default
- TestEdgeIt & operator= (TestEdgeIt const &that)=default
- TestEdgeIt (TestEdgeIt &&that)=default
- TestEdgeIt & operator= (TestEdgeIt &&that)=default
- reference operator∗ ()
- pointer operator-> ()
- TestEdgeIt & operator++ ()
- TestEdgeIt & operator-- ()
- TestEdgeIt operator++ (int)
- TestEdgeIt operator-- (int)
- TestEdgeIt operator+ (const difference_type &n) const
- TestEdgeIt & operator+= (const difference_type &n)
- TestEdgeIt operator- (const difference_type &n) const
- TestEdgeIt & operator-= (const difference_type &n)
- difference_type operator- (const TestEdgeIt &that) const
- bool operator== (const TestEdgeIt &that) const
- bool operator!= (const TestEdgeIt &that) const
- bool operator< (const TestEdgeIt &that) const
- bool operator> (const TestEdgeIt &that) const
- bool operator<= (const TestEdgeIt &that) const
- bool operator>= (const TestEdgeIt &that) const

Friends

- class TestData

9.109.1 Detailed Description

**template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network::Edge>>
class LinkPred::TestData< Network, EdgeContT >::TestEdgeIt**

Test edges iterator.

9.109.2 Member Typedef Documentation

9.109.2.1 difference_type

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::difference_type = typename std↩
::iterator<std::random_access_iterator_tag, const Edge, long int>::difference_type
```

The difference type associated with the iterator.

9.109.2.2 pointer

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::pointer = typename std::iterator<std↩
::random_access_iterator_tag, const Edge, long int>::pointer
```

The pointer type associated with the iterator.

9.109.2.3 reference

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::reference = typename std::iterator<std↩
::random_access_iterator_tag, const Edge, long int>::reference
```

The reference type associated with the iterator.

9.109.3 Constructor & Destructor Documentation

9.109.3.1 TestEdgeIt() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::TestEdgeIt (
             IteratorType const & itType,
             typename EdgeContT::const_iterator const & eceit,
             typename TestEdgeGen< Network, EdgeContT >::TPEdgeIt const & tpeit,
             typename TestEdgeGen< Network, EdgeContT >::TNEdgeIt const & tneit )  [inline]
```

Constructor.

Parameters

itType	The iterator type.
eceit	Edge container iterator.
tpeit	True positive edge iterator.
tneit	True negative edge iterator.

9.109.3.2 TestEdgeIt() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::TestEdgeIt (
            TestEdgeIt const & that ) [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.109.3.3 TestEdgeIt() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::TestEdgeIt (
            TestEdgeIt && that ) [default]
```

Move constructor.

Parameters

that	The object to move.

9.109.4 Member Function Documentation

9.109.4.1 operator"!=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator!= (
            const TestEdgeIt & that ) const [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.109.4.2 operator∗()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
reference LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator* ( )  [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.109.4.3 operator+()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestEdgeIt LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator+ (
             const difference_type & n ) const  [inline]
```

Arithmetic + operator.

Parameters

n	Increment value.

Returns

The new iterator.

9.109.4.4 operator++() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestEdgeIt& LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator++ ( )  [inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.109.4.5 operator++() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestEdgeIt LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator++ (
             int  )  [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.109.4.6 operator+=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestEdgeIt& LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator+= (
             const difference_type & n )  [inline]
```

Arithmetic += operator.

Parameters

n	Increment value.

Returns

A reference to the new iterator.

9.109.4.7 operator-() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestEdgeIt LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator- (
             const difference_type & n ) const  [inline]
```

Arithmetic - operator.

Parameters

n	Decrement value.

Returns

The new iterator.

9.109.4.8 operator-() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
difference_type LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator- (
             const TestEdgeIt & that ) const  [inline]
```

Difference between the present iterator and the one passed as parameter.

Parameters

that	The other iterator.

Returns

The difference between the current and that iterator.

9.109.4.9 operator--() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestEdgeIt& LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator-- ( )  [inline]
```

Pre-decrement operator.

Returns

A reference to the new iterator.

9.109.4.10 operator--() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestEdgeIt LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator-- (
             int  )  [inline]
```

Post-decrement operator.

Returns

A reference to the new iterator.

9.109.4.11 operator-=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestEdgeIt& LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator-= (
            const difference_type & n ) [inline]
```

Arithmetic -= operator.

Parameters

n	Decrement value.

Returns

A reference to the new iterator.

9.109.4.12 operator->()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
pointer LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator-> ( ) [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.109.4.13 operator<()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator< (
            const TestEdgeIt & that ) const [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less than that.

9.109.4.14 operator<=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator<= (
            const TestEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater or equal to that.

9.109.4.15 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestEdgeIt& LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator= (
            TestEdgeIt && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.109.4.16 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TestEdgeIt& LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator= (
            TestEdgeIt const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.109.4.17 operator==()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator== (
            const TestEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

9.109.4.18 operator>()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator> (
            const TestEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater that.

9.109.4.19 operator>=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestData< Network, EdgeContT >::TestEdgeIt::operator>= (
            const TestEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less or equal to that.

9.109.5 Friends And Related Function Documentation

9.109.5.1 TestData

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
friend class TestData  [friend]
```

TestData is a friend.

The documentation for this class was generated from the following file:

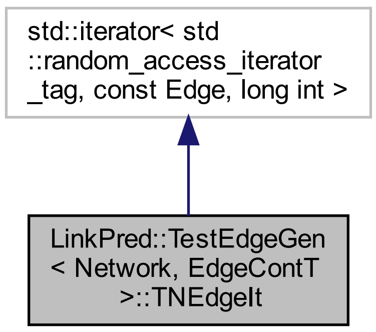
- include/linkpred/perf/networkmanipulator.hpp

9.110 LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt Class Reference

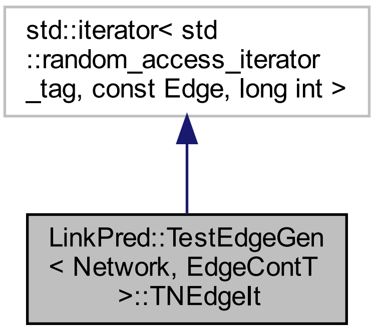
TN edges iterator.

```
#include <networkmanipulator.hpp>
```

Inheritance diagram for LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt:


std::iterator< std ::random_access_iterator _tag, const Edge, long int >
LinkPred::TestEdgeGen < Network, EdgeContT >::TNEdgeIt

Collaboration diagram for LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt:



Public Types

- using pointer = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >::pointer
- using reference = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >↩ ::reference
- using difference_type = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >↩ ::difference_type

Public Member Functions

- TNEdgeIt (TNEdgeIt const &that)=default
- TNEdgeIt & operator= (TNEdgeIt const &that)=default
- TNEdgeIt (TNEdgeIt &&that)=default
- TNEdgeIt & operator= (TNEdgeIt &&that)=default
- reference operator∗ ()
- pointer operator-> ()
- TNEdgeIt & operator++ ()
- TNEdgeIt & operator-- ()
- TNEdgeIt operator++ (int)
- TNEdgeIt operator-- (int)
- TNEdgeIt operator+ (const difference_type &n) const
- TNEdgeIt & operator+= (const difference_type &n)
- TNEdgeIt operator- (const difference_type &n) const
- TNEdgeIt & operator-= (const difference_type &n)
- difference_type operator- (const TNEdgeIt &that) const
- bool operator== (const TNEdgeIt &that) const
- bool operator!= (const TNEdgeIt &that) const
- bool operator< (const TNEdgeIt &that) const
- bool operator> (const TNEdgeIt &that) const
- bool operator<= (const TNEdgeIt &that) const
- bool operator>= (const TNEdgeIt &that) const

Friends

- class TestEdgeGen

9.110.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network::Edge>>
class LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt

TN edges iterator.

9.110.2 Member Typedef Documentation

9.110.2.1 difference_type

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::difference_type = typename std↩
::iterator<std::random_access_iterator_tag, const Edge, long int>::difference_type
```

The difference type associated with the iterator.

9.110.2.2 pointer

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::pointer = typename std::iterator<std↩
::random_access_iterator_tag, const Edge, long int>::pointer
```

The pointer type associated with the iterator.

9.110.2.3 reference

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::reference = typename std::iterator<std↩
::random_access_iterator_tag, const Edge, long int>::reference
```

The reference type associated with the iterator.

9.110.3 Constructor & Destructor Documentation

9.110.3.1 TNEdgeIt() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::TNEdgeIt (
            TNEdgeIt const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.110.3.2 TNEdgeIt() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::TNEdgeIt (
            TNEdgeIt && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.110.4 Member Function Documentation

9.110.4.1 operator"!=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator!= (
            const TNEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.110.4.2 operator∗()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
reference LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator∗ ( )  [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.110.4.3 operator+()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TNEdgeIt LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator+ (
            const difference_type & n ) const [inline]
```

Arithmetic + operator.

Parameters

n	Increment value.

Returns

The new iterator.

9.110.4.4 operator++() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TNEdgeIt& LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator++ ( ) [inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.110.4.5 operator++() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TNEdgeIt LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator++ (
            int ) [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.110.4.6 operator+=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TNEdgeIt& LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator+= (
             const difference_type & n )  [inline]
```

Arithmetic += operator.

Parameters

n	Increment value.

Returns

A reference to the new iterator.

9.110.4.7 operator-() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TNEdgeIt LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator- (
             const difference_type & n ) const  [inline]
```

Arithmetic - operator.

Parameters

n	Decrement value.

Returns

The new iterator.

9.110.4.8 operator-() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
difference_type LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator- (
             const TNEdgeIt & that ) const  [inline]
```

Difference between the present iterator and the one passed as parameter.

Parameters

that	The other iterator.

Returns

The difference between the current and that iterator.

9.110.4.9 operator--() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TNEdgeIt& LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator-- ( )  [inline]
```

Pre-decrement operator.

Returns

A reference to the new iterator.

9.110.4.10 operator--() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TNEdgeIt LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator-- (
             int  )  [inline]
```

Post-decrement operator.

Returns

A reference to the new iterator.

9.110.4.11 operator-=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TNEdgeIt& LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator-= (
             const difference_type & n )  [inline]
```

Arithmetic -= operator.

Parameters

n	Decrement value.

Returns

A reference to the new iterator.

9.110.4.12 operator->()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
pointer LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator-> ( )  [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.110.4.13 operator<()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator< (
            const TNEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less than that.

9.110.4.14 operator<=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator<= (
            const TNEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater or equal to that.

9.110.4.15 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↵
::Edge>>
TNEdgeIt& LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator= (
             TNEdgeIt && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.110.4.16 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↵
::Edge>>
TNEdgeIt& LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator= (
             TNEdgeIt const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.110.4.17 operator==()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↵
::Edge>>
bool LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator== (
             const TNEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

9.110.4.18 operator>()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator> (
            const TNEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater that.

9.110.4.19 operator>=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt::operator>= (
            const TNEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less or equal to that.

9.110.5 Friends And Related Function Documentation

9.110.5.1 TestEdgeGen

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
friend class TestEdgeGen  [friend]
```

TestEdgeGen is a friend.

The documentation for this class was generated from the following file:

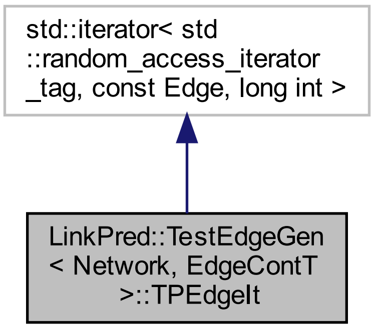
- include/linkpred/perf/networkmanipulator.hpp

9.111 LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt Class Reference

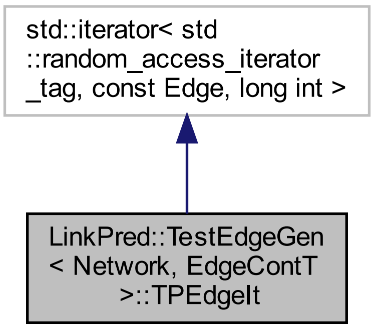
TP edges iterator.

```
#include <networkmanipulator.hpp>
```

Inheritance diagram for LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt:


std::iterator< std ::random_access_iterator _tag, const Edge, long int >
LinkPred::TestEdgeGen < Network, EdgeContT >::TPEdgeIt

Collaboration diagram for LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt:


std::iterator< std ::random_access_iterator _tag, const Edge, long int >
LinkPred::TestEdgeGen < Network, EdgeContT >::TPEdgeIt

Public Types

- using pointer = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >::pointer
- using reference = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >↩ ::reference
- using difference_type = typename std::iterator< std::random_access_iterator_tag, const Edge, long int >↩ ::difference_type

Public Member Functions

- TPEdgeIt (TPEdgeIt const &that)=default
- TPEdgeIt & operator= (TPEdgeIt const &that)=default
- TPEdgeIt (TPEdgeIt &&that)=default
- TPEdgeIt & operator= (TPEdgeIt &&that)=default
- reference operator* ()
- pointer operator-> ()
- TPEdgeIt & operator++ ()
- TPEdgeIt & operator-- ()
- TPEdgeIt operator++ (int)
- TPEdgeIt operator-- (int)
- TPEdgeIt operator+ (const difference_type &n) const
- TPEdgeIt & operator+= (const difference_type &n)
- TPEdgeIt operator- (const difference_type &n) const
- TPEdgeIt & operator-= (const difference_type &n)
- difference_type operator- (const TPEdgeIt &that) const
- bool operator== (const TPEdgeIt &that) const
- bool operator!= (const TPEdgeIt &that) const
- bool operator< (const TPEdgeIt &that) const
- bool operator> (const TPEdgeIt &that) const
- bool operator<= (const TPEdgeIt &that) const
- bool operator>= (const TPEdgeIt &that) const

Friends

- class TestEdgeGen

9.111.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network::Edge>>
class LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt

TP edges iterator.

9.111.2 Member Typedef Documentation

9.111.2.1 difference_type

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::difference_type = typename std↩
::iterator<std::random_access_iterator_tag, const Edge, long int>::difference_type
```

The difference type associated with the iterator.

9.111.2.2 pointer

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::pointer = typename std::iterator<std↩
::random_access_iterator_tag, const Edge, long int>::pointer
```

The pointer type associated with the iterator.

9.111.2.3 reference

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
using LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::reference = typename std::iterator<std↩
::random_access_iterator_tag, const Edge, long int>::reference
```

The reference type associated with the iterator.

9.111.3 Constructor & Destructor Documentation

9.111.3.1 TPEdgeIt() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::TPEdgeIt (
            TPEdgeIt const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.111.3.2 TPEdgeIt() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::TPEdgeIt (
            TPEdgeIt && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.111.4 Member Function Documentation

9.111.4.1 operator"!=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator!= (
            const TPEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is not equal to that.

9.111.4.2 operator∗()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
reference LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator∗ ( )  [inline]
```

Dereference operator.

Returns

A reference to the object to which the iterator points.

9.111.4.3 operator+()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TPEdgeIt LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator+ (
            const difference_type & n ) const  [inline]
```

Arithmetic + operator.

Parameters

n	Increment value.

Returns

The new iterator.

9.111.4.4 operator++() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TPEdgeIt& LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator++ ( )  [inline]
```

Pre-increment operator.

Returns

A reference to the new iterator.

9.111.4.5 operator++() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TPEdgeIt LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator++ (
             int   )  [inline]
```

Post-increment operator.

Returns

A reference to the new iterator.

9.111.4.6 operator+=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TPEdgeIt& LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator+= (
             const difference_type & n )  [inline]
```

Arithmetic += operator.

Parameters

n	Increment value.

Returns

A reference to the new iterator.

9.111.4.7 operator-() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TPEdgeIt LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator- (
            const difference_type & n ) const  [inline]
```

Arithmetic - operator.

Parameters

n	Decrement value.

Returns

The new iterator.

9.111.4.8 operator-() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
difference_type LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator- (
            const TPEdgeIt & that ) const  [inline]
```

Difference between the present iterator and the one passed as parameter.

Parameters

that	The other iterator.

Returns

The difference between the current and that iterator.

9.111.4.9 operator--() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TPEdgeIt& LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator-- ( )  [inline]
```

Pre-decrement operator.

Returns

A reference to the new iterator.

9.111.4.10 operator--() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TPEdgeIt LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator-- (
             int  )  [inline]
```

Post-decrement operator.

Returns

A reference to the new iterator.

9.111.4.11 operator-=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TPEdgeIt& LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator-= (
             const difference_type & n )  [inline]
```

Arithmetic -= operator.

Parameters

n	Decrement value.

Returns

A reference to the new iterator.

9.111.4.12 operator->()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
pointer LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator-> ( )  [inline]
```

Arrow operator.

Returns

A pointer to the object to which the iterator points.

9.111.4.13 operator<()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator< (
             const TPEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less than that.

9.111.4.14 operator<=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator<= (
             const TPEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater or equal to that.

9.111.4.15 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TPEdgeIt& LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator= (
             TPEdgeIt && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.111.4.16 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
TPEdgeIt& LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator= (
             TPEdgeIt const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.111.4.17 operator==()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator== (
             const TPEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this equals that.

9.111.4.18 operator>()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator> (
             const TPEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is greater that.

9.111.4.19 operator>=()

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
bool LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt::operator>= (
            const TPEdgeIt & that ) const  [inline]
```

Parameters

that	The other iterator.

Returns

True if this is less or equal to that.

9.111.5 Friends And Related Function Documentation

9.111.5.1 TestEdgeGen

```
template<typename Network = UNetwork<>, typename EdgeContT = std::vector< typename Network↩
::Edge>>
friend class TestEdgeGen  [friend]
```

TestEdgeGen is a friend.

The documentation for this class was generated from the following file:

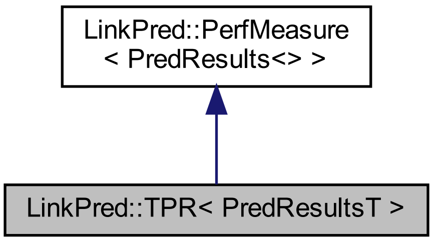
- include/linkpred/perf/networkmanipulator.hpp

9.112 LinkPred::TPR< PredResultsT > Class Template Reference

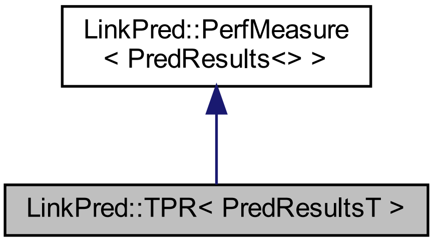
Compute top precision.

`#include <perfmeasure.hpp>`

Inheritance diagram for LinkPred::TPR< PredResultsT >:



Collaboration diagram for LinkPred::TPR< PredResultsT >:



Public Types

- using ScoresItT = typename PerfMeasure< PredResultsT >::ScoresItT

Public Member Functions

- TPR (std::size_t l)
- TPR (std::size_t l, std::string name)
- TPR (TPR const &that)=default
- TPR & operator= (TPR const &that)=default
- TPR (TPR &&that)=default
- TPR & operator= (TPR &&that)=default
- virtual void evalUsingTop (std::shared_ptr< PredResultsT > &predResults, PerfResults &results)
- virtual void evalUsingPredict (std::shared_ptr< PredResultsT > &predResults, PerfResults &results)
- virtual void eval (std::shared_ptr< PredResultsT > &predResults, PerfResults &results)
- virtual void eval (ScoresItT posScoresBegin, ScoresItT posScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, SortOrder &posSortOrder, SortOrder &negSortOrder, PerfResults &results)
- bool isUseTopMethod () const
- void setUseTopMethod (bool useTopMethod)
- virtual bool requiresNeg () const
- virtual bool requiresShuffling () const
- virtual ∼TPR ()=default

Static Public Member Functions

- template<typename ScoresItT >
  static double getTPR (ScoresItT posScoresBegin, ScoresItT posScoresEnd, ScoresItT negScoresBegin, ScoresItT negScoresEnd, std::size_t l)

9.112.1 Detailed Description

template<typename PredResultsT = PredResults<>>
class LinkPred::TPR< PredResultsT >

Compute top precision.

Template Parameters

PredResultsT	The prediction results type.

9.112.2 Member Typedef Documentation

9.112.2.1 ScoresItT

```
template<typename PredResultsT = PredResults<>>
using LinkPred::TPR< PredResultsT >::ScoresItT = typename PerfMeasure<PredResultsT>::ScoresItT
```

Scores iterator type.

9.112.3 Constructor & Destructor Documentation

9.112.3.1 TPR() [1/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::TPR< PredResultsT >::TPR (
             std::size_t l )  [inline]
```

Constructor.

Parameters

l	The number of links to consider.

9.112.3.2 TPR() [2/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::TPR< PredResultsT >::TPR (
             std::size_t l,
             std::string name )  [inline]
```

Constructor.

Parameters

l	The number of links to consider.
name	The name of the performance measure.

9.112.3.3 TPR() [3/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::TPR< PredResultsT >::TPR (
             TPR< PredResultsT > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.112.3.4 TPR() [4/4]

```
template<typename PredResultsT = PredResults<>>
LinkPred::TPR< PredResultsT >::TPR (
             TPR< PredResultsT > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.112.3.5 ∼TPR()

```
template<typename PredResultsT = PredResults<>>
virtual LinkPred::TPR< PredResultsT >::∼TPR ( )  [virtual], [default]
```

Destructor.

9.112.4 Member Function Documentation

9.112.4.1 eval() [1/2]

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::TPR< PredResultsT >::eval (
             ScoresItT posScoresBegin,
             ScoresItT posScoresEnd,
             ScoresItT negScoresBegin,
             ScoresItT negScoresEnd,
             SortOrder & posSortOrder,
             SortOrder & negSortOrder,
             PerfResults & results )  [inline], [virtual]
```

Computes the area under the PR curve.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
posSortOrder	The sorting order of positive scores. This may be modified by the method.
negSortOrder	The sorting order of negative scores. This may be modified by the method.
results	To write results.

9.112.4.2 eval() [2/2]

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::TPR< PredResultsT >::eval (
             std::shared_ptr< PredResultsT > & predResults,
             PerfResults & results )  [inline], [virtual]
```

Computes the performance measure.

Parameters

predResults	The prediction results.
results	Iterator to write results.

9.112.4.3 evalUsingPredict()

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::TPR< PredResultsT >::evalUsingPredict (
             std::shared_ptr< PredResultsT > & predResults,
             PerfResults & results )  [inline], [virtual]
```

Computes the TPR using the predict method.

Parameters

predResults	The prediction results.
results	Iterator to write results.

9.112.4.4 evalUsingTop()

```
template<typename PredResultsT = PredResults<>>
virtual void LinkPred::TPR< PredResultsT >::evalUsingTop (
             std::shared_ptr< PredResultsT > & predResults,
             PerfResults & results )  [inline], [virtual]
```

Computes the TPR using the top method.

Parameters

predResults	The prediction results.
results	Iterator to write results.

9.112.4.5 getTPR()

```
template<typename PredResultsT = PredResults<>>
template<typename ScoresItT >
static double LinkPred::TPR< PredResultsT >::getTPR (
             ScoresItT posScoresBegin,
             ScoresItT posScoresEnd,
             ScoresItT negScoresBegin,
             ScoresItT negScoresEnd,
             std::size_t l )  [inline], [static]
```

Ranges must be sorted in decreasing order.

Parameters

posScoresBegin	Iterator to the first positive score.
posScoresEnd	Iterator to one-past-the-last positive score.
negScoresBegin	Iterator to the first negative score.
negScoresEnd	Iterator to one-past-the-last negative score.
l	The number of links to consider.

9.112.4.6 isUseTopMethod()

```
template<typename PredResultsT = PredResults<>>
```

```
bool LinkPred::TPR< PredResultsT >::isUseTopMethod ( ) const  [inline]
```

Returns

True if the method top is used to compute TPR, false otherwise.

9.112.4.7 operator=() [1/2]

```
template<typename PredResultsT = PredResults<>>
TPR& LinkPred::TPR< PredResultsT >::operator= (
            TPR< PredResultsT > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.112.4.8 operator=() [2/2]

```
template<typename PredResultsT = PredResults<>>
TPR& LinkPred::TPR< PredResultsT >::operator= (
            TPR< PredResultsT > const & that )  [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.112.4.9 requiresNeg()

```
template<typename PredResultsT = PredResults<>>
virtual bool LinkPred::TPR< PredResultsT >::requiresNeg ( ) const  [inline], [virtual]
```

Returns

Whether the performance measure requires the generation of negative set. The default value is true.

9.112.4.10 requiresShuffling()

```
template<typename PredResultsT = PredResults<>>
virtual bool LinkPred::TPR< PredResultsT >::requiresShuffling ( ) const  [inline], [virtual]
```

Returns

Whether the performance measure requires network shuffling.

9.112.4.11 setUseTopMethod()

```
template<typename PredResultsT = PredResults<>>
void LinkPred::TPR< PredResultsT >::setUseTopMethod (
             bool useTopMethod )  [inline]
```

Enable/disable the use of the method top is used to compute TPR.

Parameters

useTopMethod	If true, enable the use of the method top, otherwise disable it.

The documentation for this class was generated from the following file:

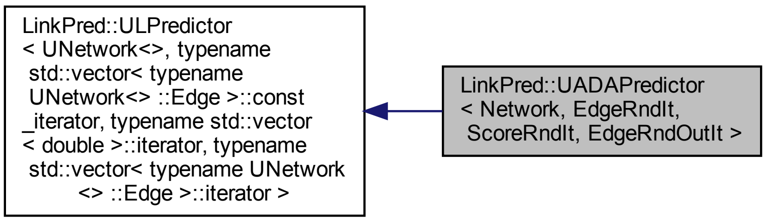
- include/linkpred/perf/perfmeasure.hpp

9.113 LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

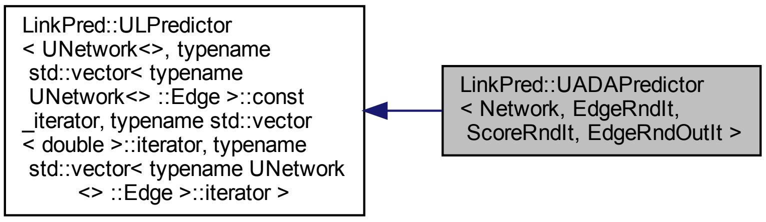
Adamic Adar index link predictor.

```
#include <uadapredictor.hpp>
```

Inheritance diagram for LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UADAPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor
< UNetwork<>, typename
std::vector< typename
UNetwork<> ::Edge >::const
_iterator, typename std::vector
< double >::iterator, typename
std::vector< typename UNetwork
<> ::Edge >::iterator >
LinkPred::UADAPredictor
< Network, EdgeRndIt,
ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UADAPredictor (std::shared_ptr< Network const > net)
- UADAPredictor (UADAPredictor const &that)=default
- UADAPredictor & operator= (UADAPredictor const &that)=default
- UADAPredictor (UADAPredictor &&that)=default
- UADAPredictor & operator= (UADAPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ∼UADAPredictor ()=default

Additional Inherited Members

9.113.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Adamic Adar index link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.113.2 Constructor & Destructor Documentation

9.113.2.1 UADAPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UADAPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.113.2.2 UADAPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UADAPredictor (
            UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.113.2.3 UADAPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UADAPredictor (
            UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.113.2.4 ∼UADAPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UADAPredictor
( ) [virtual], [default]
```

Destructor.

9.113.3 Member Function Documentation

9.113.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.113.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.113.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UADAPredictor& LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that ) [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.113.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UADAPredictor& LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.113.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.113.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.113.3.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

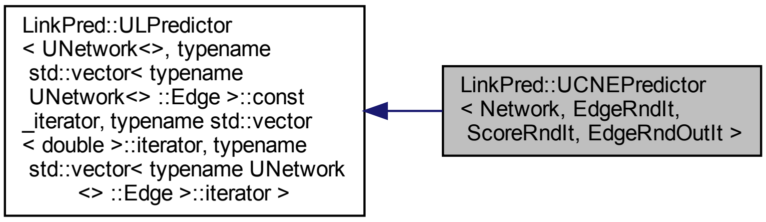
- include/linkpred/predictors/undirected/uadapredictor.hpp

9.114 LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

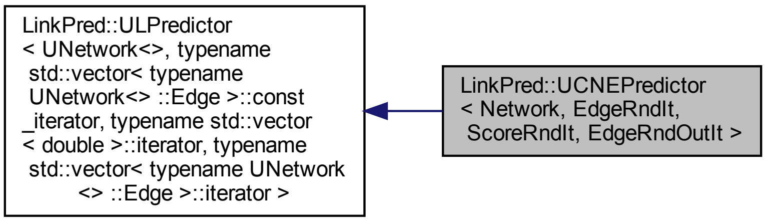
Common neighbor link predictor.

```
#include <ucnepredictor.hpp>
```

Inheritance diagram for LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UCNEPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UCNEPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UCNEPredictor (std::shared_ptr< Network const > net)
- UCNEPredictor (UCNEPredictor const &that)=default
- UCNEPredictor & operator= (UCNEPredictor const &that)=default
- UCNEPredictor (UCNEPredictor &&that)=default
- UCNEPredictor & operator= (UCNEPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ∼UCNEPredictor ()=default

Additional Inherited Members

9.114.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Common neighbor link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.114.2 Constructor & Destructor Documentation

9.114.2.1 UCNEPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UCNEPredictor (
              std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.114.2.2 UCNEPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UCNEPredictor (
              UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.114.2.3 UCNEPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UCNEPredictor (
            UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.114.2.4 ∼UCNEPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UCNEPredictor
( )  [virtual], [default]
```

Destructor.

9.114.3 Member Function Documentation

9.114.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.114.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learn.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.114.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UCNEPredictor& LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.114.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UCNEPredictor& LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.114.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.114.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.114.3.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
virtual std::size_t LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

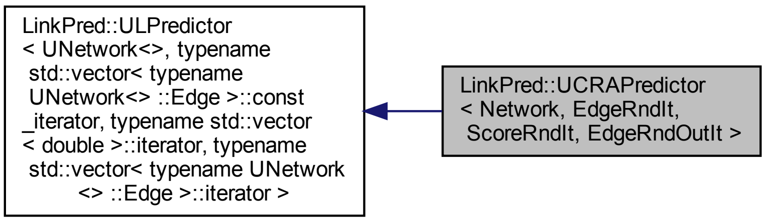
- include/linkpred/predictors/undirected/ucnepredictor.hpp

9.115 LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

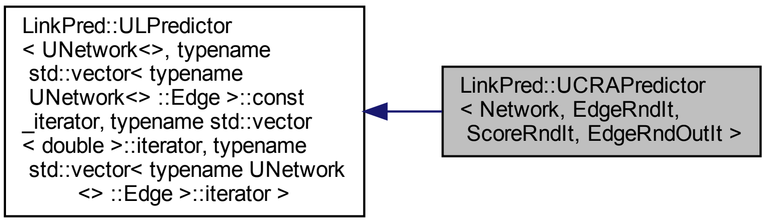
Local path link predictor.

```
#include <ucrapredictor.hpp>
```

Inheritance diagram for LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UCRAPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UCRAPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UCRAPredictor (std::shared_ptr< Network const > net)
- UCRAPredictor (UCRAPredictor const &that)=default
- UCRAPredictor & operator= (UCRAPredictor const &that)=default
- UCRAPredictor (UCRAPredictor &&that)=default
- UCRAPredictor & operator= (UCRAPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ~UCRAPredictor ()=default

Additional Inherited Members

9.115.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>←↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std←↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Local path link predictor.

Template Parameters

Network	The network type.
Edge←↩ RndIt	A random iterator type used to iterate on edges.
Score←↩ RndIt	A random iterator type used to iterate on scores.

9.115.2 Constructor & Destructor Documentation

9.115.2.1 UCRAPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UCRAPredictor (
            std::shared_ptr< Network const > net ) [inline]
```

Parameters

net	The network.

9.115.2.2 UCRAPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UCRAPredictor (
            UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.115.2.3 UCRAPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UCRAPredictor (
            UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that ) [default]
```

Move constructor.

Parameters

that	The object to move.

9.115.2.4 ∼UCRAPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UCRAPredictor
( )  [virtual], [default]
```

Destructor.

9.115.3 Member Function Documentation

9.115.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.115.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [inline], [virtual]
```

Learn.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.115.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UCRAPredictor& LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.115.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UCRAPredictor& LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.115.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.115.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
             Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.115.3.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
             std::size_t k,
             EdgeRndOutIt eit,
             ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randmly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

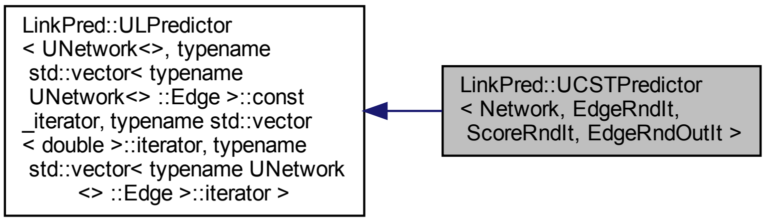
- include/linkpred/predictors/undirected/ucrapredictor.hpp

9.116 LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

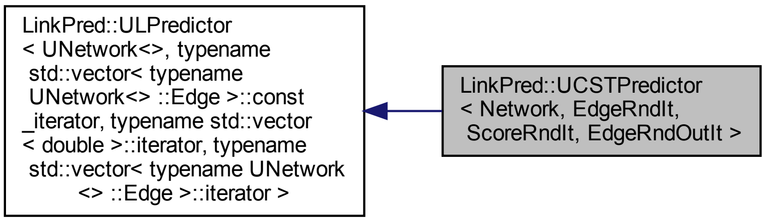
Constant link predictor.

```
#include <ucstpredictor.hpp>
```

Inheritance diagram for LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UCSTPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UCSTPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UCSTPredictor (std::shared_ptr< Network const > net, long int seed)
- UCSTPredictor (UCSTPredictor const &that)=default
- UCSTPredictor & operator= (UCSTPredictor const &that)=default
- UCSTPredictor (UCSTPredictor &&that)=default
- UCSTPredictor & operator= (UCSTPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ~UCSTPredictor ()=default

Additional Inherited Members

9.116.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Constant link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.116.2 Constructor & Destructor Documentation

9.116.2.1 UCSTPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UCSTPredictor (
            std::shared_ptr< Network const > net,
            long int seed )  [inline]
```

Parameters

net	The network.
seed	Seed for the random number generator. This is used to select randomly k edges in the method top. Different calls to top return different set of edges, which the correct behavior.

9.116.2.2 UCSTPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UCSTPredictor (
            UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.116.2.3 UCSTPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UCSTPredictor (
             UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.116.2.4 ~UCSTPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::~UCSTPredictor
( )  [virtual], [default]
```

Destructor.

9.116.3 Member Function Documentation

9.116.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.116.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learn.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.116.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UCSTPredictor& LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.116.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UCSTPredictor& LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.116.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.116.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.116.3.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
virtual std::size_t LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

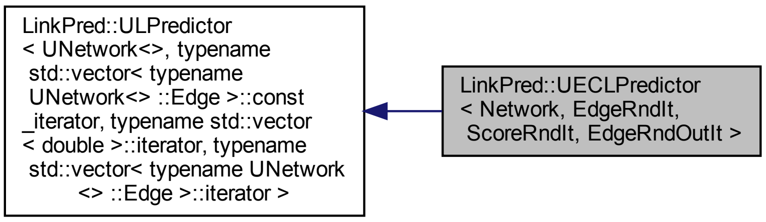
- include/linkpred/predictors/undirected/ucstpredictor.hpp

9.117 LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

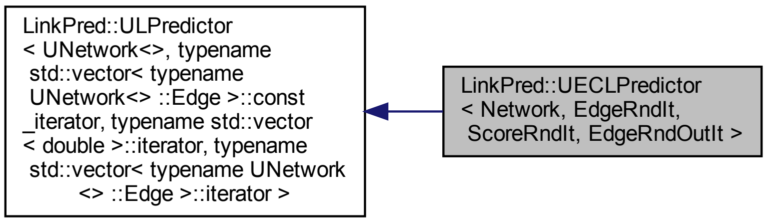
Encoder-classifier link predictor.

```
#include <ueclpredictor.hpp>
```

Inheritance diagram for LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UECLPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UECLPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UECLPredictor (std::shared_ptr< Network const > net, std::shared_ptr< Encoder< Network > > encoder, std::shared_ptr< Classifier<> > classifier, long int seed)
- UECLPredictor (UECLPredictor const &that)=default
- UECLPredictor & operator= (UECLPredictor const &that)=default
- UECLPredictor (UECLPredictor &&that)=default
- UECLPredictor & operator= (UECLPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- const std::shared_ptr< Classifier<> > & getClassifier () const
- const std::shared_ptr< Encoder< Network > > & getEncoder () const
- void setClassifier (const std::shared_ptr< Classifier<> > &classifier)
- void setEncoder (const std::shared_ptr< Encoder< Network > > &encoder)
- double getNegRatio () const
- void setNegRatio (double negRatio)
- double getPosRatio () const
- void setPosRatio (double posRatio)
- virtual ∼UECLPredictor ()=default

Additional Inherited Members

9.117.1 Detailed Description

**template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >**

Encoder-classifier link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.117.2 Constructor & Destructor Documentation

9.117.2.1 UECLPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UECLPredictor (
            std::shared_ptr< Network const > net,
            std::shared_ptr< Encoder< Network > > encoder,
            std::shared_ptr< Classifier<> > classifier,
            long int seed )  [inline]
```

Parameters

net	The network.
encoder	The encoder used to embed the network.
classifier	The classifier used to discrminate between positive and negative links.
seed	Seed for the random number generator.

9.117.2.2 UECLPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UECLPredictor (
            UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.117.2.3 UECLPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UECLPredictor (
            UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.117.2.4 ∼UECLPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UECLPredictor
( ) [virtual], [default]
```

Destructor.

9.117.3 Member Function Documentation

9.117.3.1 getClassifier()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
const std::shared_ptr<Classifier<> >& LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt,
EdgeRndOutIt >::getClassifier ( ) const [inline]
```

Returns

The classifier.

9.117.3.2 getEncoder()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
const std::shared_ptr<Encoder<Network> >& LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt,
EdgeRndOutIt >::getEncoder ( ) const [inline]
```

Returns

The encoder.

9.117.3.3 getNegRatio()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getNegRatio (
) const [inline]
```

Returns

Ratio of negative edges used in the training of the classifier.

9.117.3.4 getPosRatio()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getPosRatio (
) const [inline]
```

Returns

Ratio of positive edges used in the training of the classifier.

9.117.3.5 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.117.3.6 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.117.3.7 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UECLPredictor& LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.117.3.8 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UECLPredictor& LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.117.3.9 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.117.3.10 setClassifier()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setClassifier (
            const std::shared_ptr< Classifier<> > & classifier )  [inline]
```

Set the classifier.

Parameters

classifier	The new classifier.

9.117.3.11 setEncoder()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setEncoder (
            const std::shared_ptr< Encoder< Network > > & encoder )  [inline]
```

Set the encoder.

Parameters

encoder	The new encoder.

9.117.3.12 setNegRatio()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setNegRatio (
            double negRatio )  [inline]
```

Set the ratio of negative edges used in the training of the classifier.

Parameters

negRatio	Ratio of negative edges used in the training of the classifier.

9.117.3.13 setPosRatio()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setPosRatio (
             double posRatio )  [inline]
```

Set the ratio of positive edges used in the training of the classifier.

Parameters

posRatio	Ratio of positive edges used in the training of the classifier.

The documentation for this class was generated from the following file:

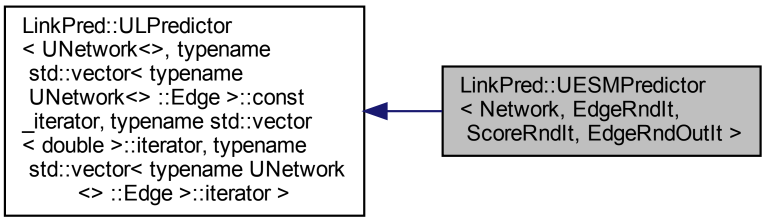
- include/linkpred/predictors/undirected/ueclpredictor.hpp

9.118 LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

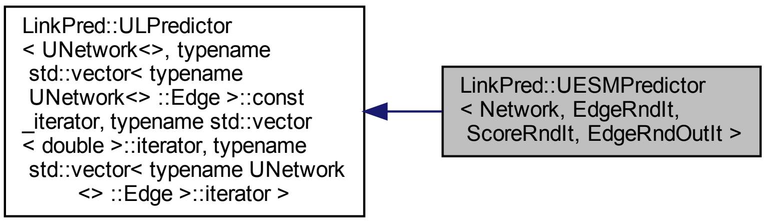
Encoder-Similarity measure link predictor.

```
#include <uesmpredictor.hpp>
```

Inheritance diagram for LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UESMPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor
< UNetwork<>, typename
std::vector< typename
UNetwork<> ::Edge >::const
_iterator, typename std::vector
< double >::iterator, typename
std::vector< typename UNetwork
<> ::Edge >::iterator >
LinkPred::UESMPredictor
< Network, EdgeRndIt,
ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UESMPredictor (std::shared_ptr< Network const > net, std::shared_ptr< Encoder< Network > > encoder, std::shared_ptr< SimMeasure > simMeasure)
- UESMPredictor (UESMPredictor const &that)=default
- UESMPredictor & operator= (UESMPredictor const &that)=default
- UESMPredictor (UESMPredictor &&that)=default
- UESMPredictor & operator= (UESMPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- const std::shared_ptr< Encoder< Network > > & getEncoder () const
- void setEncoder (const std::shared_ptr< Encoder< Network > > &encoder)
- const std::shared_ptr< SimMeasure > & getSimMeasure () const
- void setSimMeasure (const std::shared_ptr< SimMeasure > &simMeasure)
- virtual ∼UESMPredictor ()=default

Additional Inherited Members

9.118.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Encoder-Similarity measure link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.118.2 Constructor & Destructor Documentation

9.118.2.1 UESMPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UESMPredictor (
            std::shared_ptr< Network const > net,
            std::shared_ptr< Encoder< Network > > encoder,
            std::shared_ptr< SimMeasure > simMeasure )  [inline]
```

Parameters

net	The network.
encoder	The encoder used to embed the network.
simMeasure	The similarity measure.

9.118.2.2 UESMPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UESMPredictor (
            UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.118.2.3 UESMPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UESMPredictor (
            UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.118.2.4 ∼UESMPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UESMPredictor
( ) [virtual], [default]
```

Destructor.

9.118.3 Member Function Documentation

9.118.3.1 getEncoder()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
const std::shared_ptr<Encoder<Network> >& LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt,
EdgeRndOutIt >::getEncoder ( ) const [inline]
```

Returns

The encoder.

9.118.3.2 getSimMeasure()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
const std::shared_ptr<SimMeasure>& LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt,
EdgeRndOutIt >::getSimMeasure ( ) const [inline]
```

Returns

The similarity measure.

9.118.3.3 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.118.3.4 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.118.3.5 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UESMPredictor& LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.118.3.6 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
UESMPredictor& LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.118.3.7 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
             Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.118.3.8 setEncoder()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setEncoder (
             const std::shared_ptr< Encoder< Network > > & encoder )  [inline]
```

Set the encoder.

Parameters

encoder	The new encoder.

9.118.3.9 setSimMeasure()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setSimMeasure (
            const std::shared_ptr< SimMeasure > & simMeasure )  [inline]
```

Set the similarity measure.

Parameters

simMeasure	The new similarity measure.

The documentation for this class was generated from the following file:

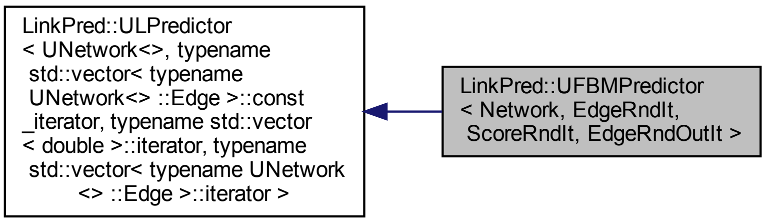
- include/linkpred/predictors/undirected/uesmpredictor.hpp

9.119 LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

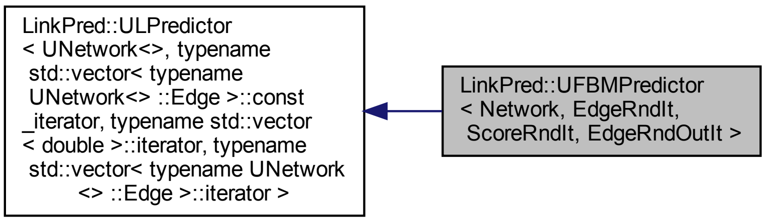
Fast blocking model link predictor.

`#include <ufbmpredictor.hpp>`

Inheritance diagram for LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UFBMPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UFBMPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UFBMPredictor (std::shared_ptr< Network const > net, long int seed)
- UFBMPredictor (UFBMPredictor const &that)=default
- UFBMPredictor & operator= (UFBMPredictor const &that)=default
- UFBMPredictor (UFBMPredictor &&that)=default
- UFBMPredictor & operator= (UFBMPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- std::size_t getMaxIter () const
- void setMaxIter (std::size_t maxIter)
- virtual ∼UFBMPredictor ()=default

Additional Inherited Members

9.119.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Fast blocking model link predictor.

This is a C++ translation of the Matlab code provided by the authors.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.119.2 Constructor & Destructor Documentation

9.119.2.1 UFBMPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UFBMPredictor (
              std::shared_ptr< Network const > net,
              long int seed )  [inline]
```

Parameters

net	The network.
seed	Random number generator seed.

9.119.2.2 UFBMPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UFBMPredictor (
            UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.119.2.3 UFBMPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UFBMPredictor (
            UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.119.2.4 ∼UFBMPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UFBMPredictor
( )  [virtual], [default]
```

Destructor.

9.119.3 Member Function Documentation

9.119.3.1 getMaxIter()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
std::size_t LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getMax↩
Iter ( ) const  [inline]
```

Returns

The maximum number of iterations.

9.119.3.2 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[virtual]
```

Initialize the solver.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.119.3.3 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [virtual]
```

Learn.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.119.3.4 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UFBMPredictor& LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.119.3.5 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UFBMPredictor& LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.119.3.6 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.119.3.7 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.119.3.8 setMaxIter()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setMaxIter (
            std::size_t maxIter )  [inline]
```

Set the maximum number of iterations.

Parameters

maxIter	The new maximum number of iterations.

The documentation for this class was generated from the following file:

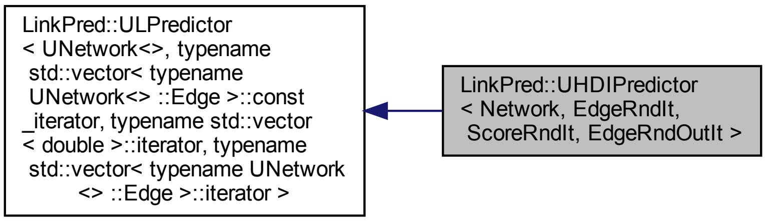
- include/linkpred/predictors/undirected/ufbmpredictor.hpp

9.120 LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

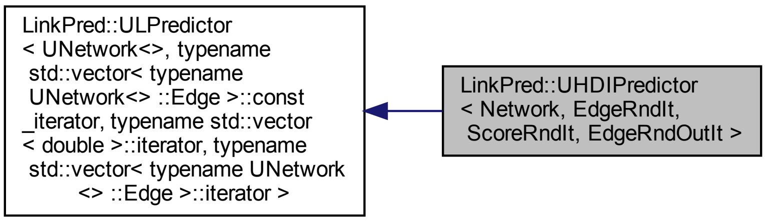
Hub depromoted index link predictor.

```
#include <uhdipredictor.hpp>
```

Inheritance diagram for LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UHDIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UHDIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UHDIPredictor (std::shared_ptr< Network const > net)
- UHDIPredictor (UHDIPredictor const &that)=default
- UHDIPredictor & operator= (UHDIPredictor const &that)=default
- UHDIPredictor (UHDIPredictor &&that)=default
- UHDIPredictor & operator= (UHDIPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ~UHDIPredictor ()=default

Additional Inherited Members

9.120.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Hub depromoted index link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.120.2 Constructor & Destructor Documentation

9.120.2.1 UHDIPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UHDIPredictor (
             std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.120.2.2 UHDIPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UHDIPredictor (
             UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.120.2.3 UHDIPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UHDIPredictor (
            UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.120.2.4 ∼UHDIPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UHDIPredictor
( )  [virtual], [default]
```

Destructor.

9.120.3 Member Function Documentation

9.120.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.120.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [inline], [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.120.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UHDIPredictor& LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.120.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UHDIPredictor& LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.120.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterato

9.120.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.120.3.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randmly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterato

The documentation for this class was generated from the following file:

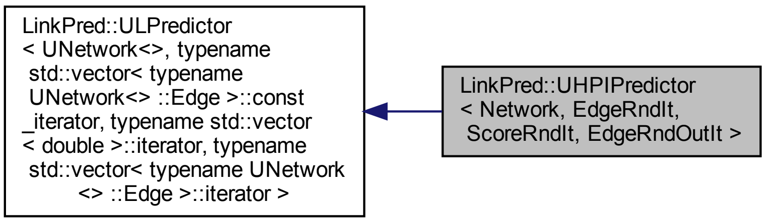
- include/linkpred/predictors/undirected/uhdipredictor.hpp

9.121 LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

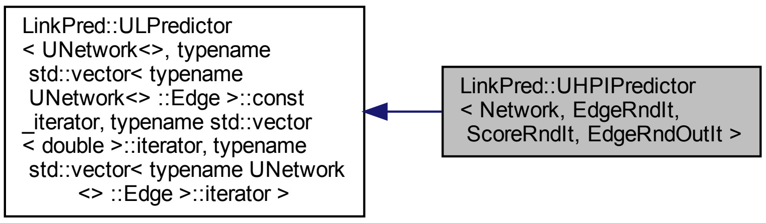
Hub promoted index link predictor.

`#include <uhpipredictor.hpp>`

Inheritance diagram for LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UHPIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UHPIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UHPIPredictor (std::shared_ptr< Network const > net)
- UHPIPredictor (UHPIPredictor const &that)=default
- UHPIPredictor & operator= (UHPIPredictor const &that)=default
- UHPIPredictor (UHPIPredictor &&that)=default
- UHPIPredictor & operator= (UHPIPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ~UHPIPredictor ()=default

Additional Inherited Members

9.121.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Hub promoted index link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.121.2 Constructor & Destructor Documentation

9.121.2.1 UHPIPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UHPIPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.121.2.2 UHPIPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UHPIPredictor (
            UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.121.2.3 UHPIPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UHPIPredictor (
            UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.121.2.4 ∼UHPIPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UHPIPredictor
( )  [virtual], [default]
```

Destructor.

9.121.3 Member Function Documentation

9.121.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.121.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [inline], [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.121.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UHPIPredictor& LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.121.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UHPIPredictor& LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.121.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.121.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.121.3.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
virtual std::size_t LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randmly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

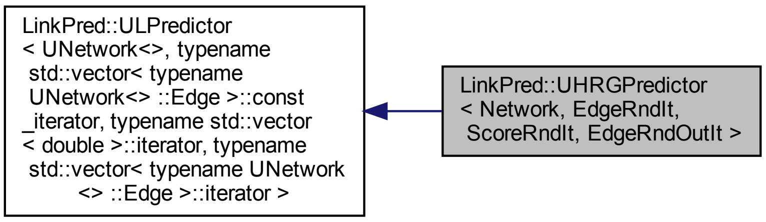
- include/linkpred/predictors/undirected/uhpipredictor.hpp

9.122 LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

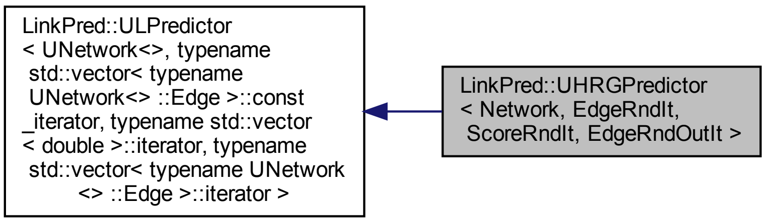
HRG predictor.

```
#include <uhrgpredictor.hpp>
```

Inheritance diagram for LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UHRGPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UHRGPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UHRGPredictor (std::shared_ptr< Network const > net, long int seed)
- UHRGPredictor (UHRGPredictor const &that)=delete
- UHRGPredictor & operator= (UHRGPredictor const &that)=delete
- UHRGPredictor (UHRGPredictor &&that)=delete
- UHRGPredictor & operator= (UHRGPredictor &&that)=delete
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- int getNbBeans () const
- void setNbBeans (int nbBeans)
- int getNbSamples () const
- void setNbSamples (int nbSamples)
- virtual ∼UHRGPredictor ()

Additional Inherited Members

9.122.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

HRG predictor.

This is actually a modified and wrapped version the code provided by the authors.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.122.2 Constructor & Destructor Documentation

9.122.2.1 UHRGPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UHRGPredictor (
            std::shared_ptr< Network const > net,
            long int seed )  [inline]
```

Parameters

net	The network.
seed	The random number generator's seed.

9.122.2.2 UHRGPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UHRGPredictor (
            UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[delete]
```

Copy constructor.

9.122.2.3 UHRGPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UHRGPredictor (
            UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [delete]
```

Move constructor.

9.122.2.4 ∼UHRGPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UHRGPredictor
( )  [virtual]
```

Destructor.

9.122.3 Member Function Documentation

9.122.3.1 getNbBeans()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
int LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getNbBeans ( )
const [inline]
```

Returns

The number of bins.

9.122.3.2 getNbSamples()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
int LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getNbSamples ( )
const [inline]
```

Returns

The number of samples.

9.122.3.3 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[virtual]
```

Initialize the solver.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.122.3.4 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.122.3.5 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UHRGPredictor& LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [delete]
```

Move assignment operator.

9.122.3.6 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UHRGPredictor& LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[delete]
```

Copy assignment operator.

9.122.3.7 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.122.3.8 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.122.3.9 setNbBeans()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setNbBeans (
            int nbBeans )  [inline]
```

Set the number of bins.

Parameters

nbBeans	The new number of bins.

9.122.3.10 setNbSamples()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setNbSamples (
            int nbSamples )  [inline]
```

Set the number of samples.

Parameters

nbSamples	The new number of samples.

The documentation for this class was generated from the following file:

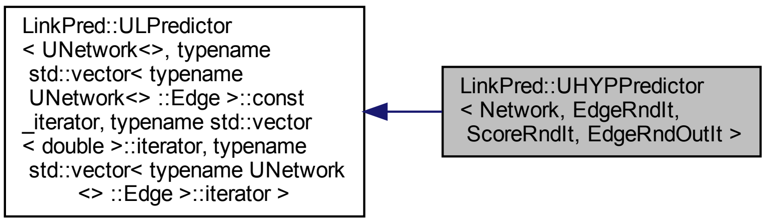
- include/linkpred/predictors/undirected/uhrgpredictor.hpp

9.123 LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

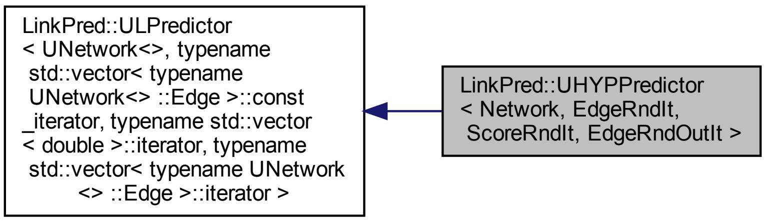
Hypermap predictor.

`#include <uhyppredictor.hpp>`

Inheritance diagram for LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor
< UNetwork<>, typename
std::vector< typename
UNetwork<> ::Edge >::const
_iterator, typename std::vector
< double >::iterator, typename
std::vector< typename UNetwork
<> ::Edge >::iterator >
LinkPred::UHYPPredictor
< Network, EdgeRndIt,
ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor
< UNetwork<>, typename
std::vector< typename
UNetwork<> ::Edge >::const
_iterator, typename std::vector
< double >::iterator, typename
std::vector< typename UNetwork
<> ::Edge >::iterator >
LinkPred::UHYPPredictor
< Network, EdgeRndIt,
ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UHYPPredictor (std::shared_ptr< Network const > net, long int seed)
- UHYPPredictor (UHYPPredictor const &that)=delete
- UHYPPredictor & operator= (UHYPPredictor const &that)=delete
- UHYPPredictor (UHYPPredictor &&that)=delete
- UHYPPredictor & operator= (UHYPPredictor &&that)=delete
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- long int getSeed () const
- double getGamma () const
- void setGamma (double gamma)
- double getL () const
- void setL (double L)
- double getM () const
- void setM (double m)
- double getT () const
- void setT (double T)
- double getZeta () const
- void setZeta (double zeta)
- virtual ∼UHYPPredictor ()=default

Additional Inherited Members

9.123.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Hypermap predictor.

This is a modified and wrapped version of the code provided by the authors.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.123.2 Constructor & Destructor Documentation

9.123.2.1 UHYPPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UHYPPredictor (
             std::shared_ptr< Network const > net,
             long int seed )  [inline]
```

Parameters

net	The network.
seed	The random number generator's seed.

9.123.2.2 UHYPPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UHYPPredictor (
             UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[delete]
```

Copy constructor.

Parameters

that	The object to copy.

9.123.2.3 UHYPPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UHYPPredictor (
             UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [delete]
```

Move constructor.

Parameters

that	The object to move.

9.123.2.4 ∼UHYPPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UHYPPredictor
( )  [virtual], [default]
```

Destructor.

9.123.3 Member Function Documentation

9.123.3.1 getGamma()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getGamma ( )
const  [inline]
```

Returns

The power law exponent gamma (see the algorithm description).

9.123.3.2 getL()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getL ( ) const
[inline]
```

Returns

The parameter L (see the algorithm description).

9.123.3.3 getM()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getM ( ) const
[inline]
```

Returns

The parameter m (see the algorithm description).

9.123.3.4 getSeed()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
long int LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getSeed ( )
const  [inline]
```

Returns

The random number generator seed.

9.123.3.5 getT()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getT ( ) const
[inline]
```

Returns

The parameter L (see the algorithm description).

9.123.3.6 getZeta()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getZeta ( )
const  [inline]
```

Returns

The parameter zeta (see the algorithm description).

9.123.3.7 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[virtual]
```

Initialize the solver.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.123.3.8 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.123.3.9 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UHYPPredictor& LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [delete]
```

Move assignment operator.

Parameters

that	The object to move.

9.123.3.10 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UHYPPredictor& LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[delete]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.123.3.11 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.123.3.12 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.123.3.13 setGamma()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setGamma (
            double gamma )  [inline]
```

Set the power law exponent gamma (see the algorithm description).

Parameters

gamma	The new power law exponent gamma (see the algorithm description).

9.123.3.14 setL()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setL (
            double L )  [inline]
```

Set the parameter L (see the algorithm description).

Parameters

L	The new value of the parameter L (see the algorithm description).

9.123.3.15 setM()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setM (
            double m )  [inline]
```

Set the parameter m (see the algorithm description).

Parameters

m	The new value of the parameter m (see the algorithm description).

9.123.3.16 setT()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setT (
            double T )  [inline]
```

Set the parameter L (see the algorithm description).

Parameters

T	The new value of the parameter L (see the algorithm description).

9.123.3.17 setZeta()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setZeta (
             double zeta )  [inline]
```

Set the parameter zeta (see the algorithm description).

Parameters

zeta	The new value of the parameter zeta (see the algorithm description).

The documentation for this class was generated from the following file:

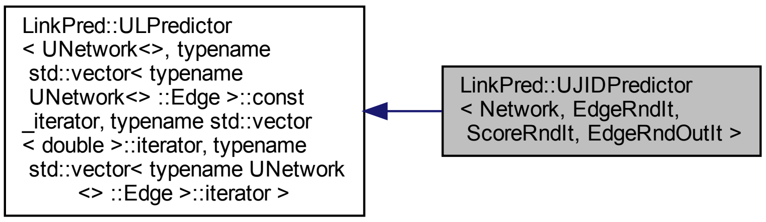
- include/linkpred/predictors/undirected/uhyppredictor.hpp

9.124 LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

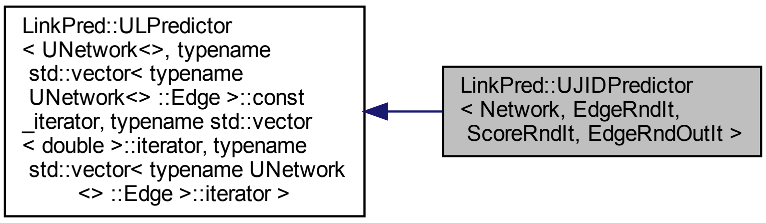
Jackard index link predictor.

```
#include <ujidpredictor.hpp>
```

Inheritance diagram for LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UJIDPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UJIDPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UJIDPredictor (std::shared_ptr< Network const > net)
- UJIDPredictor (UJIDPredictor const &that)
- UJIDPredictor & operator= (UJIDPredictor const &that)
- UJIDPredictor (UJIDPredictor &&that)
- UJIDPredictor & operator= (UJIDPredictor &&that)
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ∼UJIDPredictor ()=default

Additional Inherited Members

9.124.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Jackard index link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.124.2 Constructor & Destructor Documentation

9.124.2.1 UJIDPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UJIDPredictor (
                std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.124.2.2 UJIDPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UJIDPredictor (
                UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
```

Copy constructor.

Parameters

that	The object to copy.

9.124.2.3 UJIDPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UJIDPredictor (
                UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )
```

Move constructor.

Parameters

that	The object to move.

9.124.2.4 ∼UJIDPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UJIDPredictor
( ) [virtual], [default]
```

Destructor.

9.124.3 Member Function Documentation

9.124.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.124.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.124.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UJIDPredictor& LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )
```

Move assignment operator.

Parameters

that	The object to move.

9.124.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UJIDPredictor& LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
```

Copy assignment operator.

Parameters

that	The object to copy.

9.124.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.124.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.124.3.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randmly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

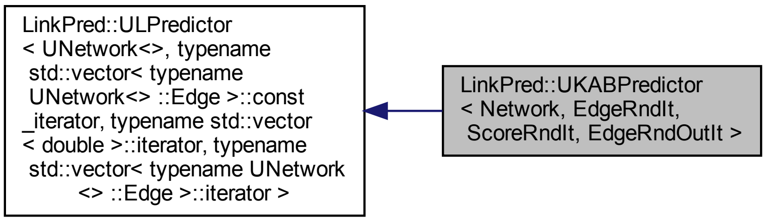
- include/linkpred/predictors/undirected/ujidpredictor.hpp

9.125 LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

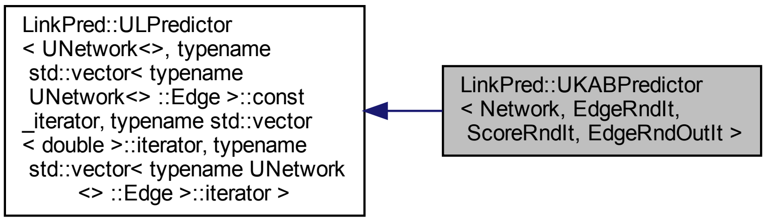
A scalable popularity similarity link predictor proposed in: "Kerrache, S., Alharbi, R. & Benhidour, H. A Scalable Similarity-Popularity Link Prediction Method. Sci Rep 10, 6394 (2020)". https://doi.org/10.1038/s41598-020-62636-1.

```
#include <ukabpredictor.hpp>
```

Inheritance diagram for LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UKABPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UKABPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Types

- using NodeID = typename ULPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::NodeID
- using Edge = typename ULPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::Edge

Public Member Functions

- UKABPredictor (std::shared_ptr< Network const > net)
- UKABPredictor (UKABPredictor const &that)=default
- UKABPredictor & operator= (UKABPredictor const &that)=default
- UKABPredictor (UKABPredictor &&that)=default
- UKABPredictor & operator= (UKABPredictor &&that)=default

- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- CacheLevel getCacheLevel () const
- void setCacheLevel (CacheLevel cacheLevel)
- std::size_t getHorizLim () const
- void setHorizLim (std::size_t horizLim)
- virtual ∼UKABPredictor ()=default

9.125.1 Detailed Description

**template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >**

A scalable popularity similarity link predictor proposed in: "Kerrache, S., Alharbi, R. & Benhidour, H. A Scalable Similarity-Popularity Link Prediction Method. Sci Rep 10, 6394 (2020)". `https://doi.org/10.↩ 1038/s41598-020-62636-1`.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.125.2 Member Typedef Documentation

9.125.2.1 Edge

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
using LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::Edge = typename
ULPredictor<Network, EdgeRndIt,ScoreRndIt, EdgeRndOutIt>::Edge
```

The edges type.

9.125.2.2 NodeID

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
using LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::NodeID = typename
ULPredictor<Network, EdgeRndIt,ScoreRndIt, EdgeRndOutIt>::NodeID
```

The node IDs type.

9.125.3 Constructor & Destructor Documentation

9.125.3.1 UKABPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UKABPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.125.3.2 UKABPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UKABPredictor (
            UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.125.3.3 UKABPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UKABPredictor (
            UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.125.3.4 ∼UKABPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UKABPredictor
( ) [virtual], [default]
```

Destructor.

9.125.4 Member Function Documentation

9.125.4.1 getCacheLevel()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
CacheLevel LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getCache←-
Level ( ) const [inline]
```

Returns

The distances cache level.

9.125.4.2 getHorizLim()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
std::size_t LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::get←-
HorizLim ( ) const [inline]
```

Returns

The horizon limit.

9.125.4.3 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.125.4.4 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [virtual]
```

Learn.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.125.4.5 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UKABPredictor& LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.125.4.6 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
UKABPredictor& LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.125.4.7 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.125.4.8 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.125.4.9 setCacheLevel()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setCacheLevel (
            CacheLevel cacheLevel )  [inline]
```

Set the distances cache level.

Parameters

cacheLevel	The new distances cache level.

9.125.4.10 setHorizLim()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setHorizLim (
            std::size_t horizLim )  [inline]
```

Parameters

horizLim	New horizon limit.

9.125.4.11 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

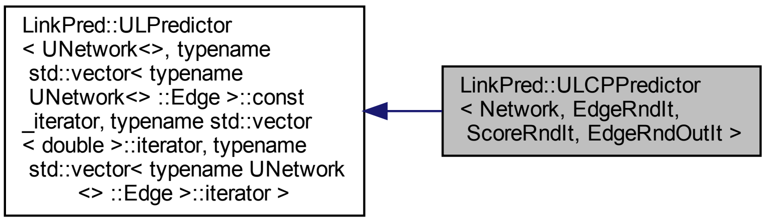
- include/linkpred/predictors/undirected/ukabpredictor.hpp

9.126 LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

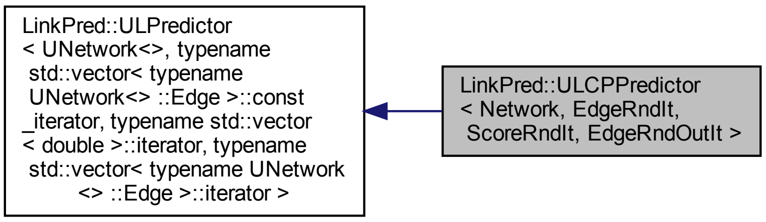
Local path link predictor.

```
#include <ulcppredictor.hpp>
```

Inheritance diagram for LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::ULCPPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::ULCPPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- ULCPPredictor (std::shared_ptr< Network const > net)
- ULCPPredictor (ULCPPredictor const &that)=default
- ULCPPredictor & operator= (ULCPPredictor const &that)=default
- ULCPPredictor (ULCPPredictor &&that)=default
- ULCPPredictor & operator= (ULCPPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- double getEpsilon () const
- void setEpsilon (double epsilon)
- virtual ~ULCPPredictor ()=default

Additional Inherited Members

9.126.1 Detailed Description

**template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↵ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↵ ::vector<typename Network::Edge>::iterator>
class LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >**

Local path link predictor.

Template Parameters

Network	The network type.
Edge↵ RndIt	A random iterator type used to iterate on edges.
Score↵ RndIt	A random iterator type used to iterate on scores.

9.126.2 Constructor & Destructor Documentation

9.126.2.1 ULCPPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::ULCPPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.126.2.2 ULCPPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::ULCPPredictor (
            ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.126.2.3 ULCPPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::ULCPPredictor (
            ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.126.2.4 ∼ULCPPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::~ULCPPredictor
( )  [virtual], [default]
```

Destructor.

9.126.3 Member Function Documentation

9.126.3.1 getEpsilon()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getEpsilon ( )
const  [inline]
```

Returns

epsilon, the weight of paths of length 3.

9.126.3.2 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.126.3.3 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [inline], [virtual]
```

Learn.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.126.3.4 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
ULCPPredictor& LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.126.3.5 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
ULCPPredictor& LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.126.3.6 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.126.3.7 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.126.3.8 setEpsilon()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setEpsilon (
            double epsilon )  [inline]
```

Set epsilon, the weight of paths of length 3.

Parameters

epsilon	The new weight of paths of length 3.

The documentation for this class was generated from the following file:

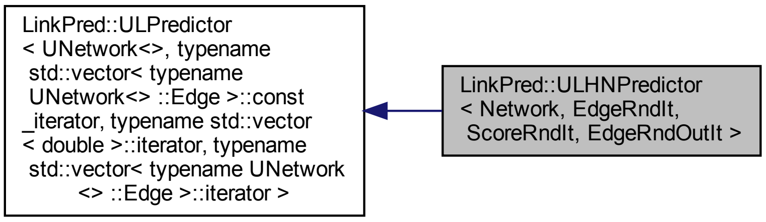
- include/linkpred/predictors/undirected/ulcppredictor.hpp

9.127 LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

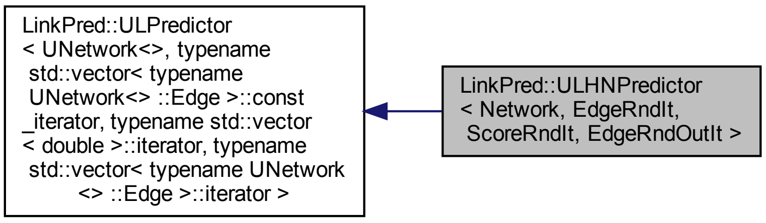
Leicht-Holme-Newman index link predictor.

```
#include <ulhnpredictor.hpp>
```

Inheritance diagram for LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor
< UNetwork<>, typename
std::vector< typename
UNetwork<> ::Edge >::const
_iterator, typename std::vector
< double >::iterator, typename
std::vector< typename UNetwork
<> ::Edge >::iterator >
LinkPred::ULHNPredictor
< Network, EdgeRndIt,
ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor
< UNetwork<>, typename
std::vector< typename
UNetwork<> ::Edge >::const
_iterator, typename std::vector
< double >::iterator, typename
std::vector< typename UNetwork
<> ::Edge >::iterator >
LinkPred::ULHNPredictor
< Network, EdgeRndIt,
ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- ULHNPredictor (std::shared_ptr< Network const > net)
- ULHNPredictor (ULHNPredictor const &that)=default
- ULHNPredictor & operator= (ULHNPredictor const &that)=default
- ULHNPredictor (ULHNPredictor &&that)=default
- ULHNPredictor & operator= (ULHNPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ~ULHNPredictor ()=default

Additional Inherited Members

9.127.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Leicht-Holme-Newman index link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.127.2 Constructor & Destructor Documentation

9.127.2.1 ULHNPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::ULHNPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.127.2.2 ULHNPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::ULHNPredictor (
            ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.127.2.3 ULHNPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::ULHNPredictor (
            ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.127.2.4 ∼ULHNPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼ULHNPredictor
( )  [virtual], [default]
```

Destructor.

9.127.3 Member Function Documentation

9.127.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.127.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [inline], [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.127.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
ULHNPredictor& LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.127.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
ULHNPredictor& LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.127.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
             EdgeRndIt begin,
             EdgeRndIt end,
             ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterato

9.127.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.127.3.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randmly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterato

The documentation for this class was generated from the following file:

- include/linkpred/predictors/undirected/ulhnpredictor.hpp

9.128 LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT > Class Template Reference

The interface of a link predictor in an undirected network.

```
#include <ulpredictor.hpp>
```

Public Types

- using Network = NetworkT
- using EdgeRndIt = EdgeRndItT
- using ScoreRndIt = ScoreRndItT
- using EdgeRndOutIt = EdgeRndOutItT
- using NodeID = typename Network::NodeID
- using Edge = typename Network::Edge

Public Member Functions

- ULPredictor (std::shared_ptr< Network const > net)
- ULPredictor (ULPredictor const &that)=default
- ULPredictor & operator= (ULPredictor const &that)=default
- ULPredictor (ULPredictor &&that)=default
- ULPredictor & operator= (ULPredictor &&that)=default
- virtual void init ()=0
- virtual void learn ()=0
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::pair< typename Network::NonEdgeIt, typename Network::NonEdgeIt > predictNeg (ScoreRndIt scores)
- virtual double score (Edge const &e)=0
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- auto getNet () const
- const std::string & getName () const
- void setName (const std::string &name)
- virtual ∼ULPredictor ()=default

9.128.1 Detailed Description

template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename NetworkT::Edge>↩ ::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator, typename EdgeRndOutItT = typename std↩ ::vector<typename NetworkT::Edge>::iterator>
class LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >

The interface of a link predictor in an undirected network.

Template Parameters

NetworkT	The network type.
EdgeRndItT	A random iterator type used to iterate on edges.
ScoreRndItT	A random iterator type used to iterate on scores.

Parameters

EdgeRndOutItT	A random output iterator to write edges.

9.128.2 Member Typedef Documentation

9.128.2.1 Edge

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
using LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::Edge = typename
Network::Edge
```

The edges type.

9.128.2.2 EdgeRndIt

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
using LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::EdgeRndIt =
EdgeRndItT
```

A random iterator type used to iterate on edges.

9.128.2.3 EdgeRndOutIt

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
using LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::EdgeRndOutIt
= EdgeRndOutItT
```

A random output iterator to write edges.

9.128.2.4 Network

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
using LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::Network =
NetworkT
```

The network type.

9.128.2.5 NodeID

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
using LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::NodeID =
typename Network::NodeID
```

The node IDs type.

9.128.2.6 ScoreRndIt

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
using LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::ScoreRndIt =
ScoreRndItT
```

A random iterator type used to iterate on scores.

9.128.3 Constructor & Destructor Documentation

9.128.3.1 ULPredictor() [1/3]

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::ULPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Constructor.

Parameters

net	The network.

9.128.3.2 ULPredictor() [2/3]

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::ULPredictor (
            ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.128.3.3 ULPredictor() [3/3]

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::ULPredictor (
            ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.128.3.4 ∼ULPredictor()

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::∼ULPredictor
( )  [virtual], [default]
```

Destructor.

9.128.4 Member Function Documentation

9.128.4.1 getName()

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
const std::string& LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >↩
::getName ( ) const  [inline]
```

Returns

The name of the predictor.

9.128.4.2 getNet()

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
auto LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::getNet ( )
const  [inline]
```

Returns

The network.

9.128.4.3 init()

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual void LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::init (
)  [pure virtual]
```

Initialize the solver.

Implemented in LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UMPSPredictor< Network
LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UHRGPredictor< Network, EdgeRndIt, Sc
LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UFBMPredictor< Network, EdgeRndIt, Sc
LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UPSTPredictor< Network, EdgeRndIt, Sc
LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UESMPredictor< Network, EdgeRndIt, Sc
LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UCSTPredictor< Network, EdgeRndIt, Sc
LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UCNEPredictor< Network, EdgeRndIt, Sc
LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::URNDPredictor< Network, EdgeRndIt, Sc
LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::URALPredictor< Network, EdgeRndIt, Sc
LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UHDIPredictor< Network, EdgeRndIt, Sco
LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UJIDPredictor< Network, EdgeRndIt, Scor
LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UPATPredictor< Network, EdgeRndIt, Sc
LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, and LinkPred::ULCPPredictor< Network, EdgeRndIt,

9.128.4.4 learn()

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual void LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::learn
( ) [pure virtual]
```

Learning.

Implemented in LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UMPSPredictor< Network
LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UHRGPredictor< Network, EdgeRndIt, Sc
LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UFBMPredictor< Network, EdgeRndIt, Sc
LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UPSTPredictor< Network, EdgeRndIt, Sc
LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UESMPredictor< Network, EdgeRndIt, Sc
LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UCSTPredictor< Network, EdgeRndIt, Sc
LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UCNEPredictor< Network, EdgeRndIt, Sc
LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::URNDPredictor< Network, EdgeRndIt, Sc
LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::URALPredictor< Network, EdgeRndIt, Sc
LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UHDIPredictor< Network, EdgeRndIt, Sco
LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UJIDPredictor< Network, EdgeRndIt, Scor
LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UPATPredictor< Network, EdgeRndIt, Sc
LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, and LinkPred::ULCPPredictor< Network, EdgeRndIt,

9.128.4.5 operator=() [1/2]

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
ULPredictor& LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::operator=
(
            ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT > && that ) [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.128.4.6 operator=() [2/2]

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
ULPredictor& LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::operator=
(
            ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.128.4.7 predict()

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual void LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [inline], [virtual]
```

Predict links.

Parameters

begin	Iterator to the first edge to be predicted.
end	end Iterator to one past the last edge to be predicted.
scores	Random output iterator to store the scores.

Reimplemented in LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UMPSPredictor< Netw
LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UHRGPredictor< Network, EdgeRndIt, Sc
LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UFBMPredictor< Network, EdgeRndIt, Sc
LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::USHPPredictor< Network, EdgeRndIt, Sc
LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UADAPredictor< Network, EdgeRndIt, Sc
LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UJIDPredictor< Network, EdgeRndIt, Sco
LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::USAIPredictor< Network, EdgeRndIt, Sco
LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UHDIPredictor< Network, EdgeRndIt, Sco
LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::ULHNPredictor< Network, EdgeRndIt, Sco
LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UCNEPredictor< Network, EdgeRndIt, Sc
LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::USUMPredictor< Network, EdgeRndIt, Sc
and LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >.

9.128.4.8 predictNeg()

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual std::pair<typename Network::NonEdgeIt, typename Network::NonEdgeIt> LinkPred::ULPredictor<
NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::predictNeg (
            ScoreRndIt scores )  [inline], [virtual]
```

Predict score for all negative (non-existing) links in the network.

Parameters

scores	Random output iterator to store the scores.

Returns

A pair of iterators begin and end to the range of non-existing links predicted by the method.

9.128.4.9 score()

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual double LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >↩
::score (
            Edge const & e )  [pure virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.128.4.10 setName()

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
void LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >::setName (
            const std::string & name )  [inline]
```

Set the name of the predictor.

Parameters

name	The new name of the predictor.

9.128.4.11 top()

```
template<typename NetworkT = UNetwork<>, typename EdgeRndItT = typename std::vector<typename
NetworkT::Edge>::const_iterator, typename ScoreRndItT = typename std::vector<double>::iterator,
typename EdgeRndOutItT = typename std::vector<typename NetworkT::Edge>::iterator>
virtual std::size_t LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT
>::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit ) [inline], [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented in LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UNEDPredictor< Netw
LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UADAPredictor< Network, EdgeRndIt, Sc
LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UJIDPredictor< Network, EdgeRndIt, Sco
LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::USAIPredictor< Network, EdgeRndIt, Sco
LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UHDIPredictor< Network, EdgeRndIt, Sco
LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::ULHNPredictor< Network, EdgeRndIt, Sco
LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >, LinkPred::UCNEPredictor< Network, EdgeRndIt, Sc
and LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >.

The documentation for this class was generated from the following file:

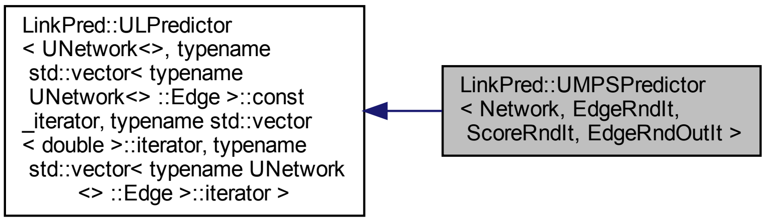
- include/linkpred/predictors/undirected/ulpredictor.hpp

9.129 LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

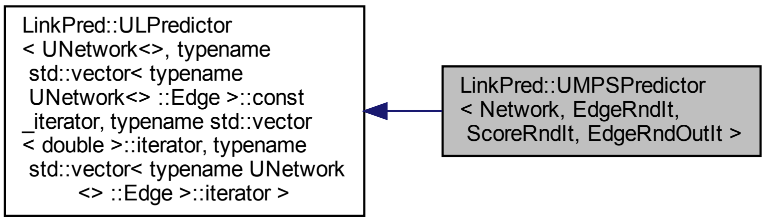
A scalable popularity similarity link predictor.

```
#include <umpspredictor.hpp>
```

Inheritance diagram for LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UMPSPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UMPSPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Types

- enum LandmarkStrategy { Random, Hub, IHub }

  An enumeration of the different landmark positioning strategies.
- enum LambdaMethod { User, MeanApp, Scan, Opt }

  An enumeration of different methods to find lambda.
- enum EdgeLengthMethod { PAT, RA1, RA2 }

  An enumeration of edge length methods.

Public Member Functions

- UMPSPredictor (std::shared_ptr< Network const > net, double remRatio, long int seed)
- UMPSPredictor (UMPSPredictor const &that)=default
- UMPSPredictor & operator= (UMPSPredictor const &that)=default
- UMPSPredictor (UMPSPredictor &&that)=default
- UMPSPredictor & operator= (UMPSPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- auto getLength () const

- bool getAsp () const
- void setAsp (bool asp)
- double getLandmarkRatio () const
- void setLandmarkRatio (double landmarkRatio)
- LandmarkStrategy getLandmarkStrategy () const
- void setLandmarkStrategy (LandmarkStrategy landmarkStrategy)
- double getLambda () const
- void setLambda (double lambda)
- CacheLevel getCacheLevel () const
- void setCacheLevel (CacheLevel cacheLevel)
- double getNegScore () const
- void setNegScore (double negScore)
- double getPosScore () const
- void setPosScore (double posScore)
- LambdaMethod getLambdaMethod () const
- void setLambdaMethod (LambdaMethod lambdaMethod)
- double getLambdaStep () const
- void setLambdaStep (double lambdaStep)
- double getMaxLambda () const
- void setMaxLambda (double maxLambda)
- double getMinLambda () const
- void setMinLambda (double minLambda)
- auto getPerfMeasure () const
- void setPerfMeasure (std::shared_ptr< PerfMeasure<>> perfMeasure)
- double getTol () const
- void setTol (double tol)
- double getLambdaNegEstRatio () const
- void setLambdaNegEstRatio (double lambdaNegEstRatio)
- double getLambdaPosEstRatio () const
- void setLambdaPosEstRatio (double lambdaPosEstRatio)
- EdgeLengthMethod getEdgeLengthMethod () const
- void setEdgeLengthMethod (EdgeLengthMethod edgeLengthMethod)
- virtual ∼UMPSPredictor ()=default

9.129.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

A scalable popularity similarity link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.129.2 Member Enumeration Documentation

9.129.2.1 EdgeLengthMethod

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
enum LinkPred::UMPSPredictor::EdgeLengthMethod
```

An enumeration of edge length methods.

Enumerator

PAT	Degree products.
RA1	RA1 method.
RA2	RA2 method.

9.129.2.2 LambdaMethod

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
enum LinkPred::UMPSPredictor::LambdaMethod
```

An enumeration of different methods to find lambda.

Enumerator

User	Use the value fixed by the user.
MeanApp	Lambda is approximated by an average.
Scan	Scan specified values and choose the best.
Opt	Find lambda by optimization.

9.129.2.3 LandmarkStrategy

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
enum LinkPred::UMPSPredictor::LandmarkStrategy
```

An enumeration of the different landmark positioning strategies.

Enumerator

Random	Landmarks are chosen randomly.
Hub	The nodes with the highest degree are chosen.
IHub	The nodes with the lowest degree are chosen.

9.129.3 Constructor & Destructor Documentation

9.129.3.1 UMPSPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UMPSPredictor (
            std::shared_ptr< Network const > net,
            double remRatio,
            long int seed )  [inline]
```

Parameters

net	The network.
seed	The random number generator's seed.
remRatio	Ratio of removed links.

9.129.3.2 UMPSPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UMPSPredictor (
            UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.129.3.3 UMPSPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
```

```
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UMPSPredictor (
            UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.129.3.4 ∼UMPSPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UMPSPredictor
( )  [virtual], [default]
```

Destructor.

9.129.4 Member Function Documentation

9.129.4.1 getAsp()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
bool LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getAsp ( ) const
[inline]
```

Returns

Whether approximate shortest path distances are used.

9.129.4.2 getCacheLevel()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
CacheLevel LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getCache↩
Level ( ) const  [inline]
```

Returns

The distances cache level.

9.129.4.3 getEdgeLengthMethod()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
EdgeLengthMethod LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::getEdgeLengthMethod ( ) const  [inline]
```

Returns

The method used to compute edge lengths.

9.129.4.4 getLambda()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getLambda ( )
const  [inline]
```

Returns

The parameter lambda.

9.129.4.5 getLambdaMethod()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LambdaMethod LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::get↩
LambdaMethod ( ) const  [inline]
```

Returns

The lambda estimation method.

9.129.4.6 getLambdaNegEstRatio()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getLambdaNeg↩
EstRatio ( ) const  [inline]
```

Returns

Ratio of negative links used to estimate lambda (used only if lambdaMethod != User).

9.129.4.7 getLambdaPosEstRatio()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getLambdaPos↩
EstRatio ( ) const  [inline]
```

Returns

Ratio of positive links used to estimate lambda (used only if lambdaMethod != User).

9.129.4.8 getLambdaStep()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getLambdaStep
( ) const  [inline]
```

Returns

The step size when scanning for lambda. Used when betMethod is set to Scan.

9.129.4.9 getLandmarkRatio()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getLandmark↩
Ratio ( ) const  [inline]
```

Returns

The landmark ratio.

9.129.4.10 getLandmarkStrategy()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LandmarkStrategy LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::getLandmarkStrategy ( ) const  [inline]
```

Returns

The landmark strategy.

9.129.4.11 getLength()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
auto LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getLength ( )
const  [inline]
```

Returns

The length map.

9.129.4.12 getMaxLambda()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getMaxLambda (
) const  [inline]
```

Returns

The maximum lambda value to try. Used when betMethod is set to Scan.

9.129.4.13 getMinLambda()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getMinLambda (
) const  [inline]
```

Returns

The minimum lambda value to try. Used when betMethod is set to Scan.

9.129.4.14 getNegScore()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getNegScore (
) const  [inline]
```

Returns

Score given to a negative edge.

9.129.4.15 getPerfMeasure()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
auto LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getPerfMeasure (
) const [inline]
```

Returns

The performance measure used to determine the best edge score method.

9.129.4.16 getPosScore()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getPosScore (
) const [inline]
```

Returns

Score given to a positive edge.

9.129.4.17 getTol()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getTol ( )
const [inline]
```

Returns

The tolerance when optimizing for lambda. Used only when lambdaMethod == Opt.

9.129.4.18 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.129.4.19 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [virtual]
```

Learn.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.129.4.20 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UMPSPredictor& LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.129.4.21 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UMPSPredictor& LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.129.4.22 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
             EdgeRndIt begin,
             EdgeRndIt end,
             ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.129.4.23 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
             Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.129.4.24 setAsp()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setAsp (
             bool asp )  [inline]
```

Set Whether approximate shortest path distances are used.

Parameters

asp	Whether approximate shortest path distances should be used.

9.129.4.25 setCacheLevel()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setCacheLevel (
            CacheLevel cacheLevel )  [inline]
```

Set the distances cache level.

Parameters

cacheLevel	The new distances cache level.

9.129.4.26 setEdgeLengthMethod()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setEdgeLength←
Method (
            EdgeLengthMethod edgeLengthMethod )  [inline]
```

Set the edge length method.

Parameters

edgeLengthMethod	The new edge length method.

9.129.4.27 setLambda()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setLambda (
            double lambda )  [inline]
```

Set the parameter lambda.

Parameters

lambda	The new value of the parameter lambda.

9.129.4.28 setLambdaMethod()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setLambdaMethod
(
            LambdaMethod lambdaMethod )  [inline]
```

Set the lambda estimation method.

Parameters

lambdaMethod	The new lambda estimation method.

9.129.4.29 setLambdaNegEstRatio()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setLambdaNeg↩
EstRatio (
            double lambdaNegEstRatio )  [inline]
```

Set the ratio of negative links used to estimate lambda (used only if lambdaMethod != User).

Parameters

lambdaNegEstRatio	The new ratio of negative links used to estimate lambda (used only if lambdaMethod != User).

9.129.4.30 setLambdaPosEstRatio()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setLambdaPos↩
EstRatio (
            double lambdaPosEstRatio )  [inline]
```

Set the ratio of positive links used to estimate lambda (used only if lambdaMethod != User).

Parameters

lambdaPosEstRatio	The new ratio of positive links used to estimate lambda (used only if lambdaMethod != User).

9.129.4.31 setLambdaStep()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setLambdaStep (
            double lambdaStep ) [inline]
```

Set the step size when scanning for lambda. Used when betMethod is set to Scan.

Parameters

lambdaStep	The new step size when scanning for lambda. Used when betMethod is set to Scan.

9.129.4.32 setLandmarkRatio()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setLandmarkRatio
(
            double landmarkRatio ) [inline]
```

Set the landmark ratio.

Parameters

landmarkRatio	The new landmark ratio.

9.129.4.33 setLandmarkStrategy()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setLandmark←
Strategy (
            LandmarkStrategy landmarkStrategy ) [inline]
```

Set the landmark strategy.

Parameters

landmarkStrategy	The new landmark strategy.

9.129.4.34 setMaxLambda()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setMaxLambda (
             double maxLambda )  [inline]
```

Set the maximum lambda value to try. Used when betMethod is set to Scan.

Parameters

maxLambda	The new maximum lambda value to try. Used when betMethod is set to Scan.

9.129.4.35 setMinLambda()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setMinLambda (
             double minLambda )  [inline]
```

Set the minimum lambda value to try. Used when betMethod is set to Scan.

Parameters

minLambda	The new minimum lambda value to try. Used when betMethod is set to Scan.

9.129.4.36 setNegScore()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setNegScore (
             double negScore )  [inline]
```

Set the score given to a negative edge.

Parameters

negScore	The new score given to a negative edge.

9.129.4.37 setPerfMeasure()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setPerfMeasure (
            std::shared_ptr< PerfMeasure<>> perfMeasure )  [inline]
```

Set the performance measure used to determine the best edge score method.

Parameters

perfMeasure	The new performance measure used to determine the best edge score method.

9.129.4.38 setPosScore()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setPosScore (
            double posScore )  [inline]
```

Set the score given to a positive edge.

Parameters

posScore	The new score given to a positive edge.

9.129.4.39 setTol()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setTol (
            double tol )  [inline]
```

Set the tolerance when optimizing for lambda. Used only when lambdaMethod == Opt.

Parameters

tol	The new tolerance when optimizing for lambda. Used only when lambdaMethod == Opt.

The documentation for this class was generated from the following file:

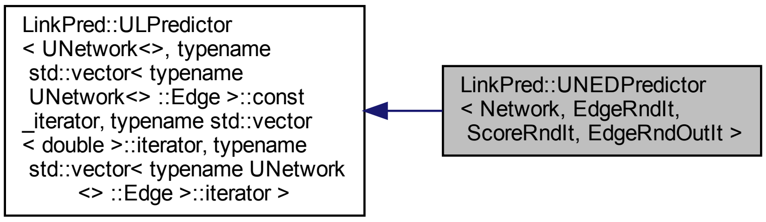
- include/linkpred/predictors/undirected/umpspredictor.hpp

9.130 LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

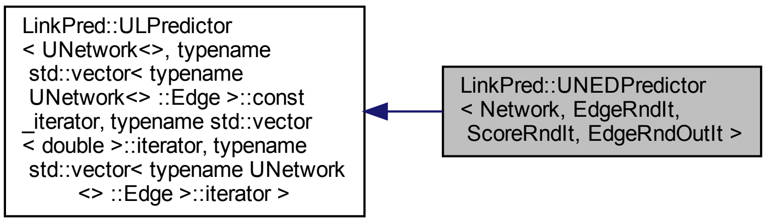
A neighbors degree link predictor.

```
#include <unedpredictor.hpp>
```

Inheritance diagram for LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UNEDPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UNEDPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Types

- using NodeID = typename ULPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::NodeID
- using Edge = typename ULPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::Edge

Public Member Functions

- UNEDPredictor (std::shared_ptr< Network const > net)
- UNEDPredictor (UNEDPredictor const &that)=default
- UNEDPredictor & operator= (UNEDPredictor const &that)=default
- UNEDPredictor (UNEDPredictor &&that)=default
- UNEDPredictor & operator= (UNEDPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ~UNEDPredictor ()=default

9.130.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

A neighbors degree link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.130.2 Member Typedef Documentation

9.130.2.1 Edge

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
using LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::Edge = typename
ULPredictor<Network, EdgeRndIt,ScoreRndIt, EdgeRndOutIt>::Edge
```

The edges type.

9.130.2.2 NodeID

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
using LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::NodeID = typename
ULPredictor<Network, EdgeRndIt,ScoreRndIt, EdgeRndOutIt>::NodeID
```

The node IDs type.

9.130.3 Constructor & Destructor Documentation

9.130.3.1 UNEDPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UNEDPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.130.3.2 UNEDPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UNEDPredictor (
            UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.130.3.3 UNEDPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UNEDPredictor (
            UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.130.3.4 ∼UNEDPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UNEDPredictor
( )  [virtual], [default]
```

Destructor.

9.130.4 Member Function Documentation

9.130.4.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.130.4.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [inline], [virtual]
```

Learn.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.130.4.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UNEDPredictor& LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.130.4.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UNEDPredictor& LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.130.4.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterato

9.130.4.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.130.4.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randmly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterato

The documentation for this class was generated from the following file:

- include/linkpred/predictors/undirected/unedpredictor.hpp

9.131 LinkPred::UNetwork< LabelT, NodeIDT, EdgeT > Class Template Reference

This class represents an undirected network in the sense of graph theory.

```
#include <unetwork.hpp>
```

Classes

- class EdgeMap

  An edge map.
- class NodeDegIt

  Node-degree iterator. This class can be used to iterate over pairs of node IDs and degrees.
- class NodeMap

  A node map.
- class NodeSMap

  A sparse node map.
- class NonEdgeIt

  Nonedges iterator.
- class RndEdgeIt

  Randomized edges iterator.
- class RndNodeIt

  Randomized Nodes iterator.
- class RndNonEdgeIt

  Randomized nonedges iterator.

Public Types

- using Label = LabelT
- using NodeID = NodeIDT
- using Edge = EdgeT
- using LabelIt = typename Bhmap< Label, NodeID >::k_const_iterator
- using NodeIt = typename Bhmap< Label, NodeID >::p_const_iterator
- using EdgeIt = typename std::vector< Edge >::const_iterator
- template<typename ValueT >
  using NodeMapSP = std::shared_ptr< NodeMap< ValueT > >
- template<typename ValueT >
  using NodeSMapSP = std::shared_ptr< NodeSMap< ValueT > >
- template<typename ValueT >
  using EdgeMapSP = std::shared_ptr< EdgeMap< ValueT > >

Public Member Functions

- UNetwork ()=default
- UNetwork (std::vector< std::pair< Label, Label >> const &edges)
- UNetwork (UNetwork const &that)=default
- UNetwork & operator= (UNetwork const &that)=default
- UNetwork (UNetwork &&that)=default
- UNetwork & operator= (UNetwork &&that)=default
- std::pair< NodeID, bool > addNode (Label const &nodeId)
- NodeID getID (Label const &label) const
- Label getLabel (NodeID const &iid) const
- LabelIt findLabel (Label const &label) const
- NodeIt findNode (NodeID const &iid) const
- void addEdge (NodeID const &i, NodeID const &j)
- EdgeIt neighbBegin (NodeID const &iid) const
- std::size_t coupleOrd (Edge const &e) const
- std::size_t coupleAtOrd (std::size_t ord) const
- EdgeIt neighbEnd (NodeID const &iid) const
- std::size_t getDeg (NodeID const &iid) const
- bool isEdge (NodeID const &ii, NodeID const &ij) const
- bool isEdge (Edge const &edge) const
- std::size_t getNbNodes () const
- std::size_t getNbCouples () const
- std::size_t getNbEdges () const
- std::size_t getNbNonEdges () const
- double getAvgDeg () const
- std::size_t getMaxDeg () const
- std::size_t getMinDeg () const
- void assemble ()
- std::pair< std::vector< std::size_t >, std::vector< std::size_t > > getCSR () const
- void shuffle (long int seed)
- LabelIt labelsBegin () const
- LabelIt labelsEnd () const
- NodeIt nodesBegin () const
- NodeIt nodesEnd () const
- NodeDegIt nodesDegBegin () const
- NodeDegIt nodesDegEnd () const
- EdgeIt edgesBegin () const
- EdgeIt edgesEnd () const
- NonEdgeIt nonEdgesBegin () const
- NonEdgeIt nonEdgesEnd () const
- RndNodeIt rndNodesBegin (double ratio, long int seed) const
- RndNodeIt rndNodesEnd () const
- RndNonEdgeIt rndNonEdgesBegin (double ratio, long int seed) const
- RndNonEdgeIt rndNonEdgesEnd () const
- RndEdgeIt rndEdgesBegin (double ratio, long int seed) const
- RndEdgeIt rndEdgesEnd () const
- void getDegStat (std::size_t &minDeg, std::size_t &maxDeg, double &avgDeg) const
- template<typename ValueT >
  NodeMap< ValueT > createNodeMap () const
- template<typename ValueT >
  NodeMapSP< ValueT > createNodeMapSP () const
- template<typename ValueT >
  NodeSMap< ValueT > createNodeSMap (ValueT const &defVal) const

- template<typename ValueT >
  NodeSMapSP< ValueT > createNodeSMapSP (ValueT const &defVal) const
- template<typename ValueT >
  EdgeMap< ValueT > createEdgeMap () const
- template<typename ValueT >
  EdgeMapSP< ValueT > createEdgeMapSP () const
- std::size_t getNbCommonNeighbors (NodeID const &i, NodeID const &j) const
- template<typename InserterIt >
  void getCommonNeighbors (NodeID const &i, NodeID const &j, InserterIt inserter) const
- std::set< NodeID > getCommonNeighbors (NodeID const &i, NodeID const &j) const
- double getCC (NodeID const &i) const
- double getCC () const
- std::size_t getNbPaths (NodeID const &srcId, NodeID const &endId, std::size_t length) const
- std::size_t getNbInEdges (std::set< NodeID > const &ns) const
- std::shared_ptr< std::vector< Edge > > readEdges (std::string fileName) const
- void write (std::string fileName) const
- void print () const
- template<typename ForwardIterator >
  void printEdges (ForwardIterator edgesBegin, ForwardIterator edgesEnd) const
- virtual ~UNetwork ()=default

Static Public Member Functions

- static Edge makeEdge (NodeID const &i, NodeID const &j)
- static Edge reverseEdge (Edge const &e)
- static const NodeID start (Edge const &edge)
- static const NodeID end (Edge const &edge)
- static bool compareEdgeEnd (Edge const &e1, Edge const &e2)
- static std::shared_ptr< UNetwork< Label, NodeID, Edge > > read (std::string fileName, bool ignore↩ Repetitions=false, bool ignoreLoops=false)
- static std::shared_ptr< UNetwork< unsigned int, NodeID, Edge > > generateERN (std::size_t nbNodes, double pr, long int seed)
- static std::shared_ptr< UNetwork< unsigned int, NodeID, Edge > > generateRNC (std::size_t nbNodes, double pr, long int seed)
- static std::shared_ptr< UNetwork< unsigned int, NodeID, Edge > > generateREG (std::size_t h, std::size_t w)

9.131.1 Detailed Description

**template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT = unsigned long long int>
class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >**

This class represents an undirected network in the sense of graph theory.

Template Parameters

LabelT	Type of external labels.
NodeIDT	Type of internal node IDs. This must be an unsigned integral type.
EdgeT	Type of edges. This must be an unsigned integral type having at least double the size of `NodeID` UNetwork.

9.131.2 Member Typedef Documentation

9.131.2.1 Edge

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::Edge = EdgeT
```

Internal edge type.

9.131.2.2 EdgeIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeIt = typename std::vector<Edge>↩
::const_iterator
```

Edge iterator.

9.131.2.3 EdgeMapSP

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMapSP = std::shared_ptr<EdgeMap<ValueT>
>
```

Shared pointer to an edge map.

9.131.2.4 Label

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::Label = LabelT
```

External label type.

9.131.2.5 LabelIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::LabelIt = typename Bhmap<Label, NodeID>↩
::k_const_iterator
```

External node iterator that offers the mapping to internal IDs.

9.131.2.6 NodeID

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeID = NodeIDT
```

Internal node ID type.

9.131.2.7 NodeIt

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeIt = typename Bhmap<Label, NodeID>↩
::p_const_iterator
```

Internal node iterator (random access iterator).

9.131.2.8 NodeMapSP

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMapSP = std::shared_ptr<NodeMap<ValueT>
>
```

Shared pointer to a node map.

9.131.2.9 NodeSMapSP

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
using LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMapSP = std::shared_ptr<NodeSMap<ValueT>
>
```

Shared pointer to a node map.

9.131.3 Constructor & Destructor Documentation

9.131.3.1 UNetwork() [1/4]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::UNetwork ( )  [default]
```

Default constructor.

9.131.3.2 UNetwork() [2/4]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::UNetwork (
             std::vector< std::pair< Label, Label >> const & edges )
```

Build the network form a list of edges. The network is assembled within this constructor.

Parameters

edges	List of edges.

9.131.3.3 UNetwork() [3/4]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::UNetwork (
             UNetwork< LabelT, NodeIDT, EdgeT > const & that )  [default]
```

Copy constructor.

Parameters

that	The object to copy.

9.131.3.4 UNetwork() [4/4]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::UNetwork (
             UNetwork< LabelT, NodeIDT, EdgeT > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.131.3.5 ∼UNetwork()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
virtual LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::∼UNetwork ( )  [virtual], [default]
```

Destructor.

9.131.4 Member Function Documentation

9.131.4.1 addEdge()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::addEdge (
            NodeID const & i,
            NodeID const & j )
```

Add an edge.

Parameters

i	The starting node.
j	The end node.

9.131.4.2 addNode()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::pair<NodeID, bool> LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::addNode (
            Label const & nodeId )
```

Add a node.

Parameters

node↩ Id	The ID of the node.

Returns

An std::pair, where first is the internal ID, and second is a boolean which is true if the node is actually added.

9.131.4.3 assemble()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::assemble ( )
```

Assemble the network. No changes to the network are allowed after calling this method.

9.131.4.4 compareEdgeEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::compareEdgeEnd (
            Edge const & e1,
            Edge const & e2 ) [inline], [static]
```

Compare edge ends.

Parameters

e1	First edge.
e2	Second edge.

Returns

True if the end of e1 is smaller than that of e2 (comparison is based on node IDs).

9.131.4.5 coupleAtOrd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::coupleAtOrd (
            std::size_t ord ) const [inline]
```

Parameters

ord	The order of an edge.

Returns

The edge given its order.

9.131.4.6 coupleOrd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::coupleOrd (
            Edge const & e ) const [inline]
```

Parameters

e	An edge.

Returns

The order of the edge

9.131.4.7 createEdgeMap()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
```

```
template<typename ValueT >
EdgeMap<ValueT> LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::createEdgeMap ( ) const  [inline]
```

Template Parameters

ValueT	Value type.

Returns

An edge map.

9.131.4.8 createEdgeMapSP()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
EdgeMapSP<ValueT> LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::createEdgeMapSP ( ) const
[inline]
```

Template Parameters

ValueT	Value type.

Returns

A pointer to an edge map.

9.131.4.9 createNodeMap()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
NodeMap<ValueT> LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::createNodeMap ( ) const  [inline]
```

Template Parameters

ValueT	Value type.

Returns

A node map.

9.131.4.10 createNodeMapSP()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
NodeMapSP<ValueT> LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::createNodeMapSP ( ) const
[inline]
```

Template Parameters

ValueT	Value type.

Returns

A pointer to a node map.

9.131.4.11 createNodeSMap()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
NodeSMap<ValueT> LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::createNodeSMap (
             ValueT const & defVal ) const  [inline]
```

Template Parameters

ValueT	Value type.

Returns

A sparse node map.

9.131.4.12 createNodeSMapSP()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ValueT >
NodeSMapSP<ValueT> LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::createNodeSMapSP (
             ValueT const & defVal ) const  [inline]
```

Template Parameters

ValueT	Value type.

Returns

A pointer to a sparse node map.

9.131.4.13 edgesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::edgesBegin ( ) const  [inline]
```

Returns

A read-only (constant) iterator that points to the first edge (with internal ID).

9.131.4.14 edgesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::edgesEnd ( ) const  [inline]
```

Returns

A read-only (constant) iterator that points one past the last edge (with internal ID).

9.131.4.15 end()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static const NodeID LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::end (
             Edge const & edge )  [inline], [static]
```

Parameters

edge	An edge.

Returns

The end node of edge.

9.131.4.16 findLabel()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LabelIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::findLabel (
             Label const & label ) const  [inline]
```

Parameters

label	An external node ID.

Returns

Iterator to the external node ID.

9.131.4.17 findNode()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::findNode (
             NodeID const & iid ) const  [inline]
```

Parameters

iid	An internal node ID.

Returns

Iterator to the internal node ID.

9.131.4.18 generateERN()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static std::shared_ptr<UNetwork<unsigned int, NodeID, Edge> > LinkPred::UNetwork< LabelT,
NodeIDT, EdgeT >::generateERN (
             std::size_t nbNodes,
             double pr,
             long int seed )  [static]
```

Generate an Erdos-Renyi (random) network.

Parameters

nbNodes	The number of nodes.
pr	The probability of connecting any two nodes.
seed	Number generator seed.

9.131.4.19 generateREG()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static std::shared_ptr<UNetwork<unsigned int, NodeID, Edge> > LinkPred::UNetwork< LabelT,
NodeIDT, EdgeT >::generateREG (
            std::size_t h,
            std::size_t w ) [static]
```

Generate a regular two-dimensional grid of size $h \times w$, where h is the height of grid and w its width. The nodes are connected to their four neighbors right, left, up and down, except of course for boundary nodes. The nodes are assigned coordinates in $[0, 1]^2$ using equi-distant spacing in each dimension. The step size in the first dimension is $1/(h - 1)$, in the second dimension, it is $1/(w - 1)$.

Parameters

h	Height of the grid.
w	Width of the grid.

9.131.4.20 generateRNC()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static std::shared_ptr<UNetwork<unsigned int, NodeID, Edge> > LinkPred::UNetwork< LabelT,
NodeIDT, EdgeT >::generateRNC (
            std::size_t nbNodes,
            double pr,
            long int seed ) [static]
```

Generate a random connected network.

Parameters

nbNodes	The number of nodes.
pr	The probability of connecting any two nodes.
seed	Number generator seed.

9.131.4.21 getAvgDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
double LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getAvgDeg ( ) const [inline]
```

Returns

Average degree. Can only be called after the network is assembled.

9.131.4.22 getCC() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
double LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getCC ( ) const  [inline]
```

Returns

The average clustering coefficient of the network.

9.131.4.23 getCC() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
double LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getCC (
             NodeID const & i ) const  [inline]
```

Parameters

i	A node ID.

Returns

The clustering coefficient of i.

9.131.4.24 getCommonNeighbors() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::set<NodeID> LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getCommonNeighbors (
             NodeID const & i,
             NodeID const & j ) const  [inline]
```

Parameters

i	A node ID.
j	A node ID.

Returns

The set of common neighbors of i and j as an std::set.

9.131.4.25 getCommonNeighbors() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename InserterIt >
void LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getCommonNeighbors (
            NodeID const & i,
            NodeID const & j,
            InserterIt inserter ) const  [inline]
```

Parameters

i	A node ID.
j	A node ID.
inserter	An inserter iterator to insert the common neighbors of i and j.

9.131.4.26 getCSR()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::pair<std::vector<std::size_t>, std::vector<std::size_t> > LinkPred::UNetwork< LabelT,
NodeIDT, EdgeT >::getCSR ( ) const  [inline]
```

Returns

The CSR representation of the network. The first element contains the row index, whereas the second contains the column index.

9.131.4.27 getDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getDeg (
            NodeID const & iid ) const  [inline]
```

Parameters

iid	The node internal ID.

Returns

The degree of node iid.

9.131.4.28 getDegStat()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getDegStat (
             std::size_t & minDeg,
             std::size_t & maxDeg,
             double & avgDeg ) const  [inline]
```

Compute some degree statistics.

Parameters

minDeg	(output parameter) minimum degree.
maxDeg	(output parameter) maximum degree.
avgDeg	(output parameter) average degree.

9.131.4.29 getID()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeID LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getID (
             Label const & label ) const  [inline]
```

Translates from external label to internal IDs. This method is O(log n), where n is the number of nodes.

Parameters

label	An external node label.

Returns

The internal ID of label;

9.131.4.30 getLabel()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
Label LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getLabel (
             NodeID const & iid ) const  [inline]
```

Parameters

iid	An internal node ID.

Returns

The external label of the node iid.

9.131.4.31 getMaxDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getMaxDeg ( ) const  [inline]
```

Returns

Maximum degree. Can only be called after the network is assembled.

9.131.4.32 getMinDeg()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getMinDeg ( ) const  [inline]
```

Returns

Minimum degree. Can only be called after the network is assembled.

9.131.4.33 getNbCommonNeighbors()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getNbCommonNeighbors (
             NodeID const & i,
             NodeID const & j ) const  [inline]
```

Parameters

i	A node ID.
j	A node ID.

Returns

The number of common neighbors between i and j.

9.131.4.34 getNbCouples()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getNbCouples ( ) const  [inline]
```

Returns

The number of couples in the network.

9.131.4.35 getNbEdges()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getNbEdges ( ) const  [inline]
```

Returns

The number of edges in the network.

9.131.4.36 getNbInEdges()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getNbInEdges (
             std::set< NodeID > const & ns ) const
```

Parameters

ns	A set of nodes.

Returns

The number of edges connecting nodes in the set ns.

9.131.4.37 getNbNodes()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getNbNodes ( ) const  [inline]
```

Returns

The number of nodes in the network.

9.131.4.38 getNbNonEdges()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getNbNonEdges ( ) const  [inline]
```

Returns

The number of non-edges in the network.

9.131.4.39 getNbPaths()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::size_t LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::getNbPaths (
             NodeID const & srcId,
             NodeID const & endId,
             std::size_t length ) const
```

Parameters

srcId	The source node ID.
endId	The end node ID.
length	Specified length.

Returns

The number of paths of length exactly length joining srcNode and endNode.

9.131.4.40 isEdge() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
```

```
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::isEdge (
            Edge const & edge ) const
```

Check if an edge exists in O(k_max).

Parameters

edge	An edge.

Returns

True if edge exists in the network, false otherwise.

9.131.4.41 isEdge() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
bool LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::isEdge (
            NodeID const & ii,
            NodeID const & ij ) const [inline]
```

Check if an edge exists in O(k_max).

Parameters

ii	An internal node ID.
ij	An internal node ID.

Returns

true if the edge (ii, ij) exists, false otherwise.

9.131.4.42 labelsBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LabelIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::labelsBegin ( ) const [inline]
```

Returns

A read-only (constant) external node ID iterator that points to the first node.

9.131.4.43 labelsEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
LabelIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::labelsEnd ( ) const  [inline]
```

Returns

A read-only (constant) external node ID iterator that points one past the last node.

9.131.4.44 makeEdge()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static Edge LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::makeEdge (
            NodeID const & i,
            NodeID const & j )  [inline], [static]
```

Make an edge in internal representation out of two nodes' internal IDs.

Parameters

i	The starting node.
j	The end node.

Returns

The edge (i, j).

9.131.4.45 neighbBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::neighbBegin (
            NodeID const & iid ) const  [inline]
```

Parameters

iid	An internal node ID.

Returns

An iterator to the first neighbor of iid.

9.131.4.46 neighbEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
EdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::neighbEnd (
             NodeID const & iid ) const  [inline]
```

Parameters

iid	An internal node ID.

Returns

An iterator to one past the last neighbor of iid.

9.131.4.47 nodesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::nodesBegin ( ) const  [inline]
```

Returns

A read-only (constant) external node ID iterator that points to the first node.

9.131.4.48 nodesDegBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::nodesDegBegin ( ) const  [inline]
```

Returns

A read-only (constant) external node ID iterator that points to the first node-degree couple.

9.131.4.49 nodesDegEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeDegIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::nodesDegEnd ( ) const  [inline]
```

Returns

A read-only (constant) external node ID iterator that points one past the last node-degree couple.

9.131.4.50 nodesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NodeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::nodesEnd ( ) const  [inline]
```

Returns

A read-only (constant) external node ID iterator that points one past the last node.

9.131.4.51 nonEdgesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::nonEdgesBegin ( ) const  [inline]
```

Returns

A read-only (constant) iterator that points to the first non-edge (with internal ID).

9.131.4.52 nonEdgesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
NonEdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::nonEdgesEnd ( ) const  [inline]
```

Returns

A read-only (constant) iterator that points one past the last non-edge (with internal ID).

9.131.4.53 operator=() [1/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
UNetwork& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::operator= (
             UNetwork< LabelT, NodeIDT, EdgeT > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.131.4.54 operator=() [2/2]

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
UNetwork& LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::operator= (
            UNetwork< LabelT, NodeIDT, EdgeT > const & that ) [default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.131.4.55 print()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::print ( ) const
```

Print edges to std::cout.

9.131.4.56 printEdges()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
template<typename ForwardIterator >
void LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::printEdges (
            ForwardIterator edgesBegin,
            ForwardIterator edgesEnd ) const [inline]
```

Print edges to std::cout.

Parameters

edgesBegin	Iterator to the beginning of the edges.
edgesEnd	Iterator to one past the the end of the edges.

9.131.4.57 read()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
```

```
static std::shared_ptr<UNetwork<Label, NodeID, Edge> > LinkPred::UNetwork< LabelT, NodeIDT,
EdgeT >::read (
             std::string fileName,
             bool ignoreRepetitions = false,
             bool ignoreLoops = false )  [static]
```

Read network from file.

Parameters

fileName	The file name.
ignoreRepetitions	Whether to ignore repeated edges.
ignoreLoops	Whether to ignore loops.

Returns

The read network.

9.131.4.58 readEdges()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
std::shared_ptr<std::vector<Edge> > LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::readEdges
(
             std::string fileName ) const
```

Read couples from file.

Parameters

fileName	The file name.

Returns

The edges.

9.131.4.59 reverseEdge()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static Edge LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::reverseEdge (
             Edge const & e )  [inline], [static]
```

Parameters

e	An edge (i,j).

Returns

The edge (j, i).

9.131.4.60 rndEdgesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndEdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::rndEdgesBegin (
             double ratio,
             long int seed ) const  [inline]
```

Parameters

ratio	Ratio of edges that are selected.
seed	The random number gnerator's seed.

Returns

a read-only (constant) randomized iterator that points to the first edge (with internal ID).

9.131.4.61 rndEdgesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndEdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::rndEdgesEnd ( ) const  [inline]
```

Returns

A read-only (constant) randomized iterator that points one past the last edge (with internal ID).

9.131.4.62 rndNodesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNodeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::rndNodesBegin (
             double ratio,
             long int seed ) const  [inline]
```

Parameters

ratio	Ratio of nodes that are selected.
seed	The random number gnerator's seed.

Returns

a read-only (constant) randomized iterator that points to the first node (with internal ID).

9.131.4.63 rndNodesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNodeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::rndNodesEnd ( ) const  [inline]
```

Returns

A read-only (constant) randomized iterator that points one past the last node (with internal ID).

9.131.4.64 rndNonEdgesBegin()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNonEdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::rndNonEdgesBegin (
             double ratio,
             long int seed ) const  [inline]
```

Parameters

ratio	Ratio of nonedges that are selected.
seed	The random number gnerator's seed.

Returns

a read-only (constant) randomized iterator that points to the first non-edge (with internal ID).

9.131.4.65 rndNonEdgesEnd()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
RndNonEdgeIt LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::rndNonEdgesEnd ( ) const  [inline]
```

Returns

A read-only (constant) randomized iterator that points one past the last non-edge (with internal ID).

9.131.4.66 shuffle()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::shuffle (
            long int seed )
```

Shuffles the nodes' internal IDs. This is useful to eliminate bias in methods that depend on node/edge order. Upon calling this method, all iterators and maps associated with the network are invalidated.

Parameters

seed	Random number generator's seed.

9.131.4.67 start()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
static const NodeID LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::start (
            Edge const & edge )  [inline], [static]
```

Parameters

edge	An edge.

Returns

The starting node of edge.

9.131.4.68 write()

```
template<typename LabelT = std::string, typename NodeIDT = unsigned int, typename EdgeT =
unsigned long long int>
void LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::write (
            std::string fileName ) const
```

Write adjacency matrix in sparse form to file.

Parameters

fileName	the file name.

The documentation for this class was generated from the following file:

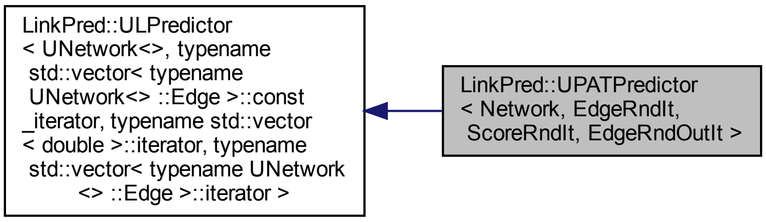
- include/linkpred/core/unetwork/unetwork.hpp

9.132 LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

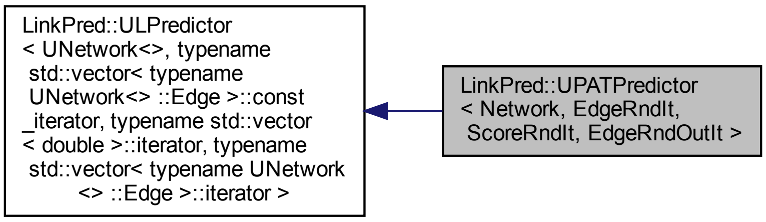
A preferential attachment link predictor.

```
#include <upatpredictor.hpp>
```

Inheritance diagram for LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UPATPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UPATPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UPATPredictor (std::shared_ptr< Network const > net)
- UPATPredictor (UPATPredictor const &that)=default
- UPATPredictor & operator= (UPATPredictor const &that)=default
- UPATPredictor (UPATPredictor &&that)=default
- UPATPredictor & operator= (UPATPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ∼UPATPredictor ()=default

Additional Inherited Members

9.132.1 Detailed Description

**template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >**

A preferential attachment link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.132.2 Constructor & Destructor Documentation

9.132.2.1 UPATPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UPATPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.132.2.2 UPATPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UPATPredictor (
            UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.132.2.3 UPATPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UPATPredictor (
            UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.132.2.4 ∼UPATPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UPATPredictor
( )  [virtual], [default]
```

Destructor.

9.132.3 Member Function Documentation

9.132.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.132.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.132.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UPATPredictor& LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.132.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UPATPredictor& LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.132.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
             EdgeRndIt begin,
             EdgeRndIt end,
             ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.132.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
             Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.132.3.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
virtual std::size_t LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [inline], [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

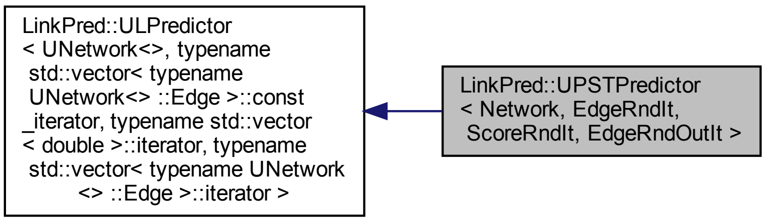
- include/linkpred/predictors/undirected/upatpredictor.hpp

9.133 LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

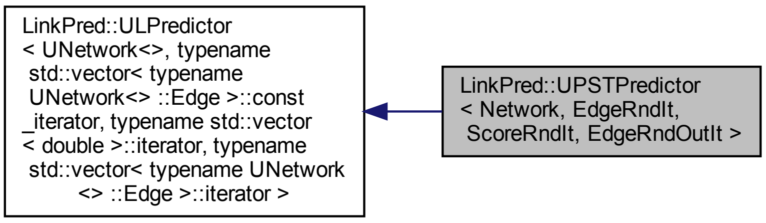
A link predictor that prestores edge scores. This allows to seemingly integrate results from external link prediction algorithms to LinkPred (for example, users may implement their own link prediction algorithm and then use this link predictor to use compare their results to algorithms available in LinkPred).

```
#include <upstpredictor.hpp>
```

Inheritance diagram for LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UPSTPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::UPSTPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- UPSTPredictor (std::shared_ptr< Network const > net)
- UPSTPredictor (UPSTPredictor const &that)=default
- UPSTPredictor & operator= (UPSTPredictor const &that)=default
- UPSTPredictor (UPSTPredictor &&that)=default
- UPSTPredictor & operator= (UPSTPredictor &&that)=default
- void setEdgeScores (typename Network::template EdgeMapSP< double > edgeScores)
- void loadEdgeScores (std::string fileName)
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual ∼UPSTPredictor ()=default

Additional Inherited Members

9.133.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

A link predictor that prestores edge scores. This allows to seemingly integrate results from external link prediction algorithms to LinkPred (for example, users may implement their own link prediction algorithm and then use this link predictor to use compare their results to algorithms available in LinkPred).

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.133.2 Constructor & Destructor Documentation

9.133.2.1 UPSTPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UPSTPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.133.2.2 UPSTPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UPSTPredictor (
            UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.133.2.3 UPSTPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::UPSTPredictor (
            UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.133.2.4 ∼UPSTPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼UPSTPredictor
( ) [virtual], [default]
```

Destructor.

9.133.3 Member Function Documentation

9.133.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.133.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learn.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.133.3.3 loadEdgeScores()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::loadEdgeScores (
            std::string fileName )
```

Load edge scores from file. This file should contain the scores of all non-exisitng links of net.

Parameters

fileName	The name of the file containing edge scores. This should be a text file in which each line contains three columns separate by a space character (one or multiple spaces or tabs). The first two columns contain the the labels (not the internal IDs) of two nodes composing the edge. The third column contains the score. For example: A B 0.35 or: 5 8 2.6 All node labels that appear in this file must already exist in the network.

9.133.3.4 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UPSTPredictor& LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.133.3.5 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
UPSTPredictor& LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.133.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.133.3.7 setEdgeScores()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setEdgeScores (
            typename Network::template EdgeMapSP< double > edgeScores )  [inline]
```

Set the edge scores. This should contain the scores of all non-exisitng links of net.

Parameters

edgeScores	A map contatining the scores of non-exisitng links of net.

The documentation for this class was generated from the following file:

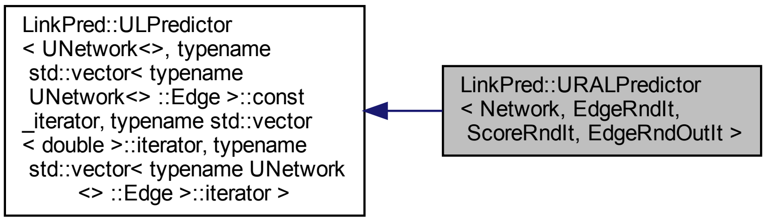
- include/linkpred/predictors/undirected/upstpredictor.hpp

9.134 LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

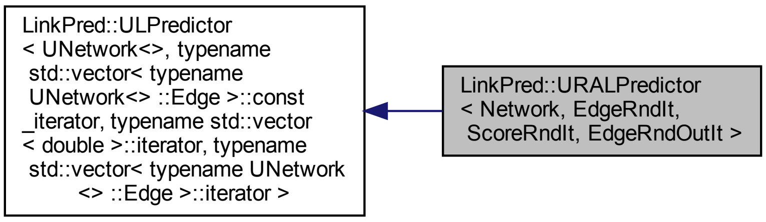
A resource allocation link predictor.

```
#include <uralpredictor.hpp>
```

Inheritance diagram for LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::URALPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::URALPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- URALPredictor (std::shared_ptr< Network const > net)
- URALPredictor (URALPredictor const &that)=default
- URALPredictor & operator= (URALPredictor const &that)=default
- URALPredictor (URALPredictor &&that)=default
- URALPredictor & operator= (URALPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ~URALPredictor ()=default

Additional Inherited Members

9.134.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
class LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

A resource allocation link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.134.2 Constructor & Destructor Documentation

9.134.2.1 URALPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::URALPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.134.2.2 URALPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::URALPredictor (
            URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.134.2.3 URALPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::URALPredictor (
             URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.134.2.4 ∼URALPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼URALPredictor
( )  [virtual], [default]
```

Destructor.

9.134.3 Member Function Documentation

9.134.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.134.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [inline], [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.134.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
URALPredictor& LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.134.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
URALPredictor& LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.134.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterato

9.134.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.134.3.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randmly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterato

The documentation for this class was generated from the following file:

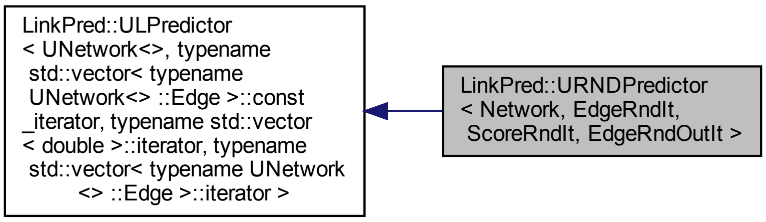
- include/linkpred/predictors/undirected/uralpredictor.hpp

9.135 LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

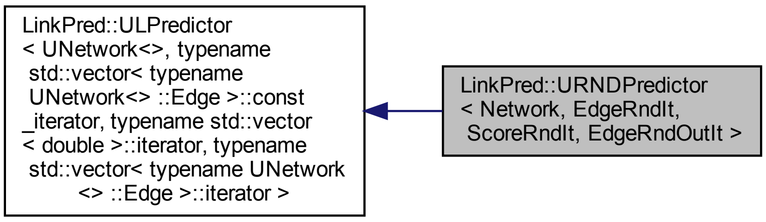
A random link predictor.

```
#include <urndpredictor.hpp>
```

Inheritance diagram for LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::URNDPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::URNDPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- URNDPredictor (std::shared_ptr< Network const > net, long int seed)
- URNDPredictor (URNDPredictor const &that)=default
- URNDPredictor & operator= (URNDPredictor const &that)=default
- URNDPredictor (URNDPredictor &&that)=default
- URNDPredictor & operator= (URNDPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- virtual ~URNDPredictor ()=default

Additional Inherited Members

9.135.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

A random link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.135.2 Constructor & Destructor Documentation

9.135.2.1 URNDPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::URNDPredictor (
            std::shared_ptr< Network const > net,
            long int seed )  [inline]
```

Parameters

net	The network.
seed	The random number generator's seed.

9.135.2.2 URNDPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::URNDPredictor (
            URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.135.2.3 URNDPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::URNDPredictor (
            URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.135.2.4 ∼URNDPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼URNDPredictor
( )  [virtual], [default]
```

Destructor.

9.135.3 Member Function Documentation

9.135.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.135.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learn.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.135.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
URNDPredictor& LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.135.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
URNDPredictor& LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.135.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.135.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

The documentation for this class was generated from the following file:

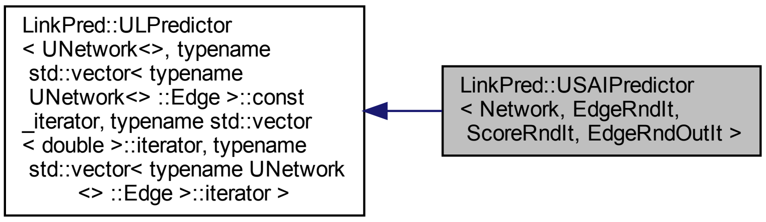
- include/linkpred/predictors/undirected/urndpredictor.hpp

9.136 LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

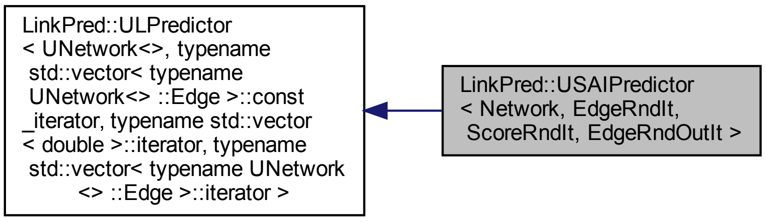
A Salton index link predictor.

```
#include <usaipredictor.hpp>
```

Inheritance diagram for LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::USAIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::USAIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- USAIPredictor (std::shared_ptr< Network const > net)
- USAIPredictor (USAIPredictor const &that)=default
- USAIPredictor & operator= (USAIPredictor const &that)=default
- USAIPredictor (USAIPredictor &&that)=default
- USAIPredictor & operator= (USAIPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ∼USAIPredictor ()=default

Additional Inherited Members

9.136.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

A Salton index link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.136.2 Constructor & Destructor Documentation

9.136.2.1 USAIPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USAIPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.136.2.2 USAIPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USAIPredictor (
            USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.136.2.3 USAIPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USAIPredictor (
            USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.136.2.4 ∼USAIPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼USAIPredictor
( )  [virtual], [default]
```

Destructor.

9.136.3 Member Function Documentation

9.136.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.136.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
)  [inline], [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.136.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
USAIPredictor& LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.136.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
USAIPredictor& LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.136.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.136.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.136.3.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randmly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

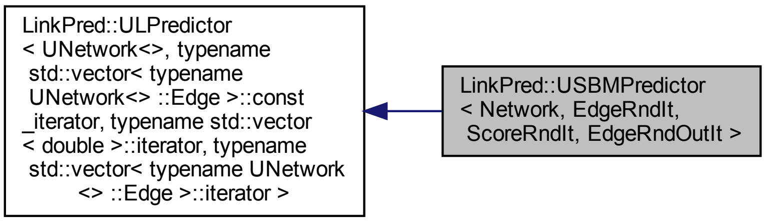
- include/linkpred/predictors/undirected/usaipredictor.hpp

9.137 LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

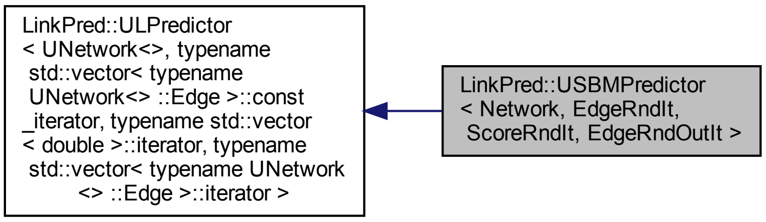
The stochastic block model link predictor.

```
#include <usbmpredictor.hpp>
```

Inheritance diagram for LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::USBMPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::USBMPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- USBMPredictor (std::shared_ptr< Network const > net, long int seed)
- USBMPredictor (USBMPredictor const &that)=delete
- USBMPredictor & operator= (USBMPredictor const &that)=delete
- USBMPredictor (USBMPredictor &&that)=delete
- USBMPredictor & operator= (USBMPredictor &&that)=delete
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- std::size_t getMaxIter () const
- void setMaxIter (std::size_t maxIter)
- virtual ~USBMPredictor ()

Additional Inherited Members

9.137.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩
::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩
::vector<typename Network::Edge>::iterator>
class LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

The stochastic block model link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.137.2 Constructor & Destructor Documentation

9.137.2.1 USBMPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USBMPredictor (
             std::shared_ptr< Network const > net,
             long int seed )  [inline]
```

Parameters

net	The network.
seed	The random number generator's seed.

9.137.2.2 USBMPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USBMPredictor (
             USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[delete]
```

Copy constructor.

Parameters

that	The object to copy.

9.137.2.3 USBMPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USBMPredictor (
            USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that ) [delete]
```

Move constructor.

Parameters

that	The object to move.

9.137.2.4 ∼USBMPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼USBMPredictor
( ) [virtual]
```

Destructor.

9.137.3 Member Function Documentation

9.137.3.1 getMaxIter()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
std::size_t LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getMax←
Iter ( ) const [inline]
```

Returns

The maximum number of iterations.

9.137.3.2 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[virtual]
```

Initialize the solver.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.137.3.3 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.137.3.4 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
USBMPredictor& LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [delete]
```

Move assignment operator.

Parameters

that	The object to move.

9.137.3.5 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
USBMPredictor& LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[delete]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.137.3.6 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
             EdgeRndIt begin,
             EdgeRndIt end,
             ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.137.3.7 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
             Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.137.3.8 setMaxIter()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setMaxIter (
            std::size_t maxIter ) [inline]
```

Set the maximum number of iterations.

Parameters

maxIter	The new maximum number of iterations.

The documentation for this class was generated from the following file:

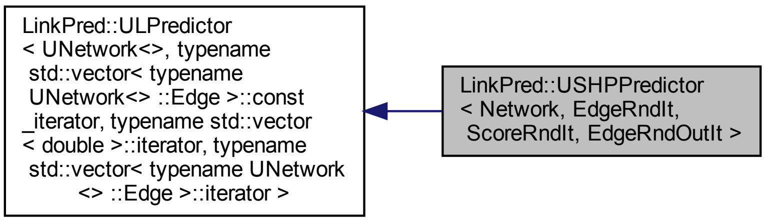
- include/linkpred/predictors/undirected/usbmpredictor.hpp

9.138 LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

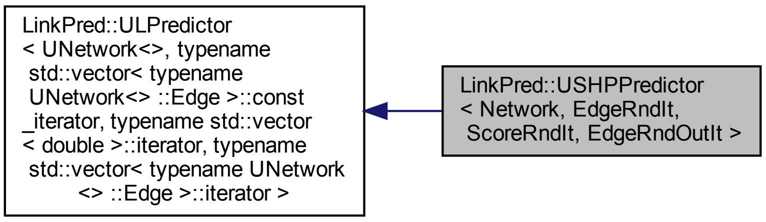
A shortest path link predictor link predictor.

```
#include <ushppredictor.hpp>
```

Inheritance diagram for LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::USHPPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor
< UNetwork<>, typename
std::vector< typename
UNetwork<> ::Edge >::const
_iterator, typename std::vector
< double >::iterator, typename
std::vector< typename UNetwork
<> ::Edge >::iterator >
LinkPred::USHPPredictor
< Network, EdgeRndIt,
ScoreRndIt, EdgeRndOutIt >

Public Types

- enum LandmarkStrategy { Random, Hub, IHub }

  An enumeration of the different landmark positioning strategies.

Public Member Functions

- USHPPredictor (std::shared_ptr< Network const > net, long int seed)
- USHPPredictor (USHPPredictor const &that)=default
- USHPPredictor & operator= (USHPPredictor const &that)=default
- USHPPredictor (USHPPredictor &&that)=default
- USHPPredictor & operator= (USHPPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- bool getAsp () const
- void setAsp (bool asp)
- double getLandmarkRatio () const
- void setLandmarkRatio (double landmarkRatio)
- LandmarkStrategy getLandmarkStrategy () const
- void setLandmarkStrategy (LandmarkStrategy landmarkStrategy)
- CacheLevel getCacheLevel () const
- void setCacheLevel (CacheLevel cacheLevel)
- virtual ∼USHPPredictor ()=default

9.138.1 Detailed Description

**template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >**

A shortest path link predictor link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.138.2 Member Enumeration Documentation

9.138.2.1 LandmarkStrategy

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
enum LinkPred::USHPPredictor::LandmarkStrategy
```

An enumeration of the different landmark positioning strategies.

Enumerator

Random	Landmarks are chosen randomly.
Hub	The nodes with the highest degree are chosen.
IHub	The nodes with the lowest degree are chosen.

9.138.3 Constructor & Destructor Documentation

9.138.3.1 USHPPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USHPPredictor (
             std::shared_ptr< Network const > net,
             long int seed )  [inline]
```

Parameters

net	The network.
seed	The random number generator's seed.

9.138.3.2 USHPPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USHPPredictor (
            USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.138.3.3 USHPPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USHPPredictor (
            USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.138.3.4 ∼USHPPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼USHPPredictor
( )  [virtual], [default]
```

Destructor.

9.138.4 Member Function Documentation

9.138.4.1 getAsp()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
bool LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getAsp ( ) const
[inline]
```

Returns

Whether approximate shortest path distances are used.

9.138.4.2 getCacheLevel()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
CacheLevel LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getCache↩
Level ( ) const [inline]
```

Returns

The distances cache level.

9.138.4.3 getLandmarkRatio()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
double LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::getLandmark↩
Ratio ( ) const [inline]
```

Returns

The landmark ratio.

9.138.4.4 getLandmarkStrategy()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LandmarkStrategy LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::getLandmarkStrategy ( ) const [inline]
```

Returns

The landmark strategy.

9.138.4.5 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[virtual]
```

Initialize the solver.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.138.4.6 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [virtual]
```

Learn.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.138.4.7 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
USHPPredictor& LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.138.4.8 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
USHPPredictor& LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.138.4.9 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
             EdgeRndIt begin,
             EdgeRndIt end,
             ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.138.4.10 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
             Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.138.4.11 setAsp()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setAsp (
            bool asp )  [inline]
```

Set Whether approximate shortest path distances are used.

Parameters

asp	Whether approximate shortest path distances should be used.

9.138.4.12 setCacheLevel()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setCacheLevel (
            CacheLevel cacheLevel )  [inline]
```

Set the distances cache level.

Parameters

cacheLevel	The new distances cache level.

9.138.4.13 setLandmarkRatio()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setLandmarkRatio
(
            double landmarkRatio )  [inline]
```

Set the landmark ratio.

Parameters

landmarkRatio	The new landmark ratio.

9.138.4.14 setLandmarkStrategy()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
void LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::setLandmark↩
Strategy (
            LandmarkStrategy landmarkStrategy )  [inline]
```

Set the landmark strategy.

Parameters

landmarkStrategy	The new landmark strategy.

The documentation for this class was generated from the following file:

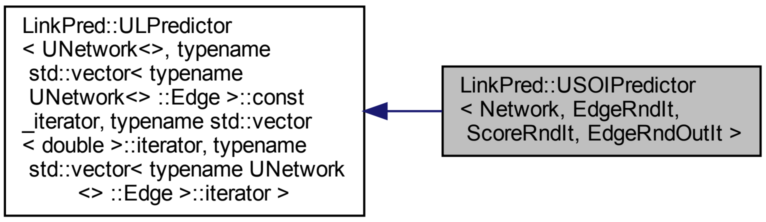
- include/linkpred/predictors/undirected/ushppredictor.hpp

9.139 LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

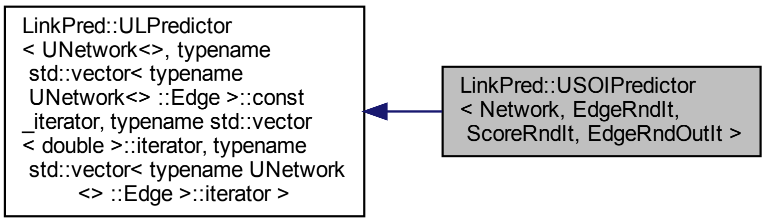
A Sorensen index link predictor.

```
#include <usoipredictor.hpp>
```

Inheritance diagram for LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::USOIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::USOIPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- USOIPredictor (std::shared_ptr< Network const > net)
- USOIPredictor (USOIPredictor const &that)=default
- USOIPredictor & operator= (USOIPredictor const &that)=default
- USOIPredictor (USOIPredictor &&that)=default
- USOIPredictor & operator= (USOIPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual double score (Edge const &e)
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ~USOIPredictor ()=default

Additional Inherited Members

9.139.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

A Sorensen index link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.139.2 Constructor & Destructor Documentation

9.139.2.1 USOIPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USOIPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.139.2.2 USOIPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USOIPredictor (
            USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.139.2.3 USOIPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USOIPredictor (
            USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.139.2.4 ∼USOIPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼USOIPredictor
( ) [virtual], [default]
```

Destructor.

9.139.3 Member Function Documentation

9.139.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the solver.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.139.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Solve the link prediction problem.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.139.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
USOIPredictor& LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that ) [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.139.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
USOIPredictor& LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
            USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.139.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )   [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.139.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [inline], [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.139.3.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual std::size_t LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
            std::size_t k,
            EdgeRndOutIt eit,
            ScoreRndIt sit )  [virtual]
```

Finds the k negative edges with the top score. Ties are broken randmly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

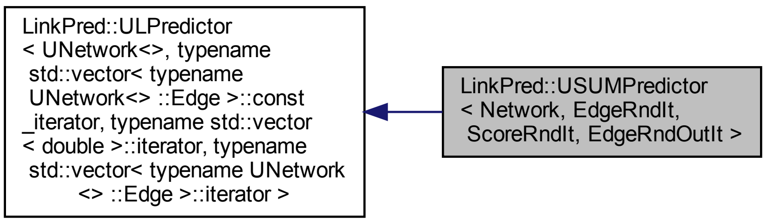
- include/linkpred/predictors/undirected/usoipredictor.hpp

9.140 LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > Class Template Reference

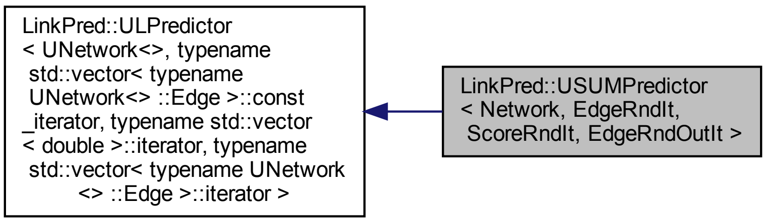
A sum-of-degrees link predictor.

```
#include <usumpredictor.hpp>
```

Inheritance diagram for LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::USUMPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Collaboration diagram for LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >:


LinkPred::ULPredictor < UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const _iterator, typename std::vector < double >::iterator, typename std::vector< typename UNetwork <> ::Edge >::iterator >
LinkPred::USUMPredictor < Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

Public Member Functions

- USUMPredictor (std::shared_ptr< Network const > net)
- USUMPredictor (USUMPredictor const &that)=default
- USUMPredictor & operator= (USUMPredictor const &that)=default
- USUMPredictor (USUMPredictor &&that)=default
- USUMPredictor & operator= (USUMPredictor &&that)=default
- virtual void init ()
- virtual void learn ()
- virtual void predict (EdgeRndIt begin, EdgeRndIt end, ScoreRndIt scores)
- virtual double score (Edge const &e)
- virtual std::size_t top (std::size_t k, EdgeRndOutIt eit, ScoreRndIt sit)
- virtual ∼USUMPredictor ()=default

Additional Inherited Members

9.140.1 Detailed Description

template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename Network::Edge>↩ ::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator, typename EdgeRndOutIt = typename std↩ ::vector<typename Network::Edge>::iterator>
class LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

A sum-of-degrees link predictor.

Template Parameters

Network	The network type.
Edge↩ RndIt	A random iterator type used to iterate on edges.
Score↩ RndIt	A random iterator type used to iterate on scores.

9.140.2 Constructor & Destructor Documentation

9.140.2.1 USUMPredictor() [1/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USUMPredictor (
            std::shared_ptr< Network const > net )  [inline]
```

Parameters

net	The network.

9.140.2.2 USUMPredictor() [2/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USUMPredictor (
            USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy constructor.

Parameters

that	The object to copy.

9.140.2.3 USUMPredictor() [3/3]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::USUMPredictor (
            USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move constructor.

Parameters

that	The object to move.

9.140.2.4 ∼USUMPredictor()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::∼USUMPredictor
( )  [virtual], [default]
```

Destructor.

9.140.3 Member Function Documentation

9.140.3.1 init()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::init ( )
[inline], [virtual]
```

Initialize the predictor.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.140.3.2 learn()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::learn (
) [inline], [virtual]
```

Learning.

Implements LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterator, typena

9.140.3.3 operator=() [1/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
USUMPredictor& LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > && that )  [default]
```

Move assignment operator.

Parameters

that	The object to move.

9.140.3.4 operator=() [2/2]

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
USUMPredictor& LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::operator=
(
             USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt > const & that )
[default]
```

Copy assignment operator.

Parameters

that	The object to copy.

9.140.3.5 predict()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual void LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::predict
(
            EdgeRndIt begin,
            EdgeRndIt end,
            ScoreRndIt scores )  [virtual]
```

Predict the links.

Parameters

begin	Beginning of the links to be predicted.
end	end of the links to be predicted.
scores	Beginning of scores.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

9.140.3.6 score()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
virtual double LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >::score
(
            Edge const & e )  [virtual]
```

Compute the score of a single edge.

Parameters

e	The edge.

Returns

The score of e.

9.140.3.7 top()

```
template<typename Network = UNetwork<>, typename EdgeRndIt = typename std::vector<typename
Network::Edge>::const_iterator, typename ScoreRndIt = typename std::vector<double>::iterator,
typename EdgeRndOutIt = typename std::vector<typename Network::Edge>::iterator>
```

```
virtual std::size_t LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >↩
::top (
             std::size_t k,
             EdgeRndOutIt eit,
             ScoreRndIt sit )  [inline], [virtual]
```

Finds the k negative edges with the top score. Ties are broken randomly.

Parameters

k	The number of edges to find.
eit	An output iterator where the edges are written.
sit	An output iterator where the scores are written. The scores are written in the same order as the edges.

Returns

The number of negative edges inserted. It is the minimum between k and the number of negative edges in the network.

Reimplemented from LinkPred::ULPredictor< UNetwork<>, typename std::vector< typename UNetwork<> ::Edge >::const_iterat

The documentation for this class was generated from the following file:

- include/linkpred/predictors/undirected/usumpredictor.hpp

9.141 LinkPred::Vec Class Reference

This class represent a vector (in the sense of linear algebra).

`#include <vec.hpp>`

Public Member Functions

- Vec ()
- Vec (int n)
- Vec (std::initializer_list< double > l)
- Vec (int n, double ∗vals)
- Vec (Vec const &v, std::shared_ptr< std::vector< int >> ind)
- Vec (Vec const &v1, Vec const &v2)
- Vec (Vec const &that)
- Vec & operator= (Vec const &that)
- Vec (Vec &&that)
- Vec & operator= (Vec &&that)
- int size () const
- double ∗ getValues () const
- bool isConstant () const
- void setConstant (bool constant)
- bool makeConstant (double tol)
- void resize (int newSize)
- void resize (int newSize, double val)

- bool operator== (const Vec &other) const
- bool operator!= (const Vec &other) const
- double & operator[ ] (const int k)
- double operator[ ] (const int k) const
- std::vector< int > findNz () const
- std::vector< int > find (double val) const
- void reset ()
- void reset (double val)
- void read (std::ifstream *in)
- void write (std::ofstream *out) const
- void read (std::string fileName)
- void write (std::string fileName) const
- double norm () const
- double mean () const
- double amin () const
- double amax () const
- double min () const
- double max () const
- int imin () const
- int imax () const
- int ifmin () const
- int ifmax () const
- int ilmin () const
- int ilmax () const
- void center ()
- double norm (int lim) const
- double mean (int lim) const
- double amin (int lim) const
- double amax (int lim) const
- double min (int lim) const
- double max (int lim) const
- void center (int lim)
- void axpy (double a, Vec const &x)
- void scale (double a)
- void partScale (int start, int nb, double a)
- void scatter (int start, Vec const &v, int const *ind)
- double sum () const
- void print () const
- void print (std::string header) const
- void print (std::ostream &out) const
- void print (std::ostream &out, std::string header) const
- virtual ~Vec ()

Friends

- class **GFMatrix**
- Vec operator+ (Vec const &v1, Vec const &v2)
- Vec operator- (Vec const &v1, Vec const &v2)
- Vec operator* (double a, Vec const &v)
- Vec operator* (Vec const &v1, Vec const &v2)
- Vec operator/ (Vec const &v1, Vec const &v2)
- Vec operator+ (double a, Vec const &v)
- Vec operator- (double a, Vec const &v)
- Vec operator* (double a, Vec const &v)

- Vec operator/ (double a, Vec const &v)
- Vec operator+ (Vec const &v, double a)
- Vec operator- (Vec const &v, double a)
- Vec operator* (Vec const &v, double a)
- Vec operator/ (Vec const &v, double a)
- double operator^ (Vec const &v1, Vec const &v2)
- GFMatrix **operator+** (const GFMatrix &mat1, const Vec &mat2)
- GFMatrix **operator+** (const Vec &mat1, const GFMatrix &mat2)
- GFMatrix **operator-** (const GFMatrix &mat1, const Vec &mat2)
- GFMatrix **operator-** (const Vec &mat1, const GFMatrix &mat2)
- Vec operator* (const GFMatrix &mat, const Vec &vec)

9.141.1 Detailed Description

This class represent a vector (in the sense of linear algebra).

9.141.2 Constructor & Destructor Documentation

9.141.2.1 Vec() [1/8]

```
LinkPred::Vec::Vec ( )
```

Default constructor.

9.141.2.2 Vec() [2/8]

```
LinkPred::Vec::Vec (
             int n )
```

Constructor.

Parameters

n	The dimension.

9.141.2.3 Vec() [3/8]

```
LinkPred::Vec::Vec (
             std::initializer_list< double > l )
```

Constructor.

Parameters

l	Initilizer list.

9.141.2.4 Vec() [4/8]

```
LinkPred::Vec::Vec (
             int n,
             double * vals )
```

Constructor.

Parameters

n	The dimension.
vals	The values.

9.141.2.5 Vec() [5/8]

```
LinkPred::Vec::Vec (
             Vec const & v,
             std::shared_ptr< std::vector< int >> ind )
```

Create a new vector from an existing one by copying specified elements.

Parameters

v	The vector from which the data is taken.
ind	Index of the elements to be copied.

9.141.2.6 Vec() [6/8]

```
LinkPred::Vec::Vec (
             Vec const & v1,
             Vec const & v2 )
```

Create a new vector from two existing ones by concatenation.

Parameters

v1	The first vector.
v2	The second vector.

9.141.2.7 Vec() [7/8]

```
LinkPred::Vec::Vec (
            Vec const & that )
```

Copy constructor.

Parameters

that	The object to copy.

9.141.2.8 Vec() [8/8]

```
LinkPred::Vec::Vec (
            Vec && that )
```

Move constructor.

Parameters

that	The object to move.

9.141.2.9 ∼Vec()

```
virtual LinkPred::Vec::∼Vec ( )  [virtual]
```

Destructor.

9.141.3 Member Function Documentation

9.141.3.1 amax() [1/2]

```
double LinkPred::Vec::amax ( ) const
```

Returns

The maximum absolute value in the vector.

9.141.3.2 amax() [2/2]

```
double LinkPred::Vec::amax (
             int lim ) const
```

Returns

The maximum absolute value in the vector up to lim number of elements.

Parameters

lim	The limit.

9.141.3.3 amin() [1/2]

```
double LinkPred::Vec::amin ( ) const
```

Returns

The minimum absolute value in the vector.

9.141.3.4 amin() [2/2]

```
double LinkPred::Vec::amin (
             int lim ) const
```

Returns

The minimum absolute value in the vector up to lim number of elements.

Parameters

lim	The limit.

9.141.3.5 axpy()

```
void LinkPred::Vec::axpy (
             double a,
             Vec const & x )
```

Computes y = a $*$ x + y, where y is the current object (this) and x is a full vector.

Parameters

a	The value of a.
x	The other vector.

9.141.3.6 center() [1/2]

```
void LinkPred::Vec::center ( )
```

Center vector.

9.141.3.7 center() [2/2]

```
void LinkPred::Vec::center (
             int lim )
```

Center vector up to lim.

Parameters

lim	The limit.

9.141.3.8 find()

```
std::vector<int> LinkPred::Vec::find (
             double val ) const
```

Parameters

val	The avlue we are lookign for.

Returns

Indices of elements equal to val.

9.141.3.9 findNz()

```
std::vector<int> LinkPred::Vec::findNz ( ) const
```

Returns

Indices of non-zero elements.

9.141.3.10 getValues()

```
double* LinkPred::Vec::getValues ( ) const  [inline]
```

Returns

Array of values.

9.141.3.11 ifmax()

```
int LinkPred::Vec::ifmax ( ) const
```

Returns

The index of the first maximum value in the vector.

9.141.3.12 ifmin()

```
int LinkPred::Vec::ifmin ( ) const
```

Returns

The index of the first minimum value in the vector.

9.141.3.13 ilmax()

```
int LinkPred::Vec::ilmax ( ) const
```

Returns

The index of the last maximum value in the vector.

9.141.3.14 ilmin()

```
int LinkPred::Vec::ilmin ( ) const
```

Returns

The index of the last minimum value in the vector.

9.141.3.15 imax()

```
int LinkPred::Vec::imax ( ) const
```

Returns

The index of the maximum value in the vector.

9.141.3.16 imin()

```
int LinkPred::Vec::imin ( ) const
```

Returns

The index of the minimum value in the vector.

9.141.3.17 isConstant()

```
bool LinkPred::Vec::isConstant ( ) const  [inline]
```

Returns

True if all entries of the vector are equal.

9.141.3.18 makeConstant()

```
bool LinkPred::Vec::makeConstant (
             double tol )
```

Check if the vector is constant (all entries are equal) up to a specific tolerance.

Parameters

tol	The tolerance.

Returns

True if the vector is constant.

9.141.3.19 max() [1/2]

```
double LinkPred::Vec::max ( ) const
```

Returns

The maximum value in the vector.

9.141.3.20 max() [2/2]

```
double LinkPred::Vec::max (
             int lim ) const
```

Returns

The maximum value in the vector up to lim number of elements.

Parameters

lim	The limit.

9.141.3.21 mean() [1/2]

```
double LinkPred::Vec::mean ( ) const
```

Computes the mean of the vector.

Returns

The mean of the vector.

9.141.3.22 mean() [2/2]

```
double LinkPred::Vec::mean (
             int lim ) const
```

Computes the mean of the vector.

Returns

The mean of the vector.

9.141.3.23 min() [1/2]

```
double LinkPred::Vec::min ( ) const
```

Returns

The minimum value in the vector.

9.141.3.24 min() [2/2]

```
double LinkPred::Vec::min (
             int lim ) const
```

Returns

The minimum value in the vector up to lim number of elements.

Parameters

lim	The limit.

9.141.3.25 norm() [1/2]

```
double LinkPred::Vec::norm ( ) const
```

Computes the norm of the vector.

Returns

The norm of the vector.

9.141.3.26 norm() [2/2]

```
double LinkPred::Vec::norm (
             int lim ) const
```

Computes the norm of the vector.

Parameters

lim	The limit.

Returns

The norm of the vector.

9.141.3.27 operator"!=()

```
bool LinkPred::Vec::operator!= (
             const Vec & other ) const
```

Overloads operator !=.

Parameters

other	The other vector.

Returns

True if the the two vectors are not equal.

9.141.3.28 operator=() [1/2]

```
Vec& LinkPred::Vec::operator= (
             Vec && that )
```

Move assignment operator.

Parameters

that	The object to move.

9.141.3.29 operator=() [2/2]

```
Vec& LinkPred::Vec::operator= (
             Vec const & that )
```

Copy assignment operator.

Parameters

that	The object to copy.

9.141.3.30 operator==()

```
bool LinkPred::Vec::operator== (
            const Vec & other ) const
```

Overloads operator ==.

Parameters

other	The other vector.

Returns

True if the the two vectors are equal.

9.141.3.31 operator[]() [1/2]

```
double& LinkPred::Vec::operator[ ] (
            const int k ) [inline]
```

Overloaded subscript.

Parameters

k	index.

Returns

reference to the k'th entry.

9.141.3.32 operator[]() [2/2]

```
double LinkPred::Vec::operator[ ] (
            const int k ) const [inline]
```

Overloaded subscript.

Parameters

k	index.

Returns

the k'th entry.

9.141.3.33 partScale()

```
void LinkPred::Vec::partScale (
            int start,
            int nb,
            double a )
```

Scale part of the vector.

Parameters

start	The starting index.
nb	Number of elements to be scaled.
a	The scale factor.

9.141.3.34 print() [1/4]

```
void LinkPred::Vec::print ( ) const
```

Print vector to standard output.

9.141.3.35 print() [2/4]

```
void LinkPred::Vec::print (
            std::ostream & out ) const
```

Print vector to output stream.

Parameters

out	The output stream.

9.141.3.36 print() [3/4]

```
void LinkPred::Vec::print (
            std::ostream & out,
            std::string header ) const
```

Print vector to output stream.

Parameters

out	The output stream.
header	Header.

9.141.3.37 print() [4/4]

```
void LinkPred::Vec::print (
             std::string header ) const
```

Print vector to standard output.

Parameters

header	Header.

9.141.3.38 read() [1/2]

```
void LinkPred::Vec::read (
             std::ifstream * in )
```

Read the values from a text file.

Parameters

in	Input file.

9.141.3.39 read() [2/2]

```
void LinkPred::Vec::read (
             std::string fileName )
```

Read the values from a text file.

Parameters

fileName	Input file name.

9.141.3.40 reset() [1/2]

```
void LinkPred::Vec::reset ( )
```

Reset vector to 0.

9.141.3.41 reset() [2/2]

```
void LinkPred::Vec::reset (
             double val )
```

Reset vector to a specified value.

Parameters

val	All vector elements are set to val.

9.141.3.42 resize() [1/2]

```
void LinkPred::Vec::resize (
             int newSize )
```

Resize the vector.

Parameters

newSize	The new size. If this is smaller than the current size, nothing happens.

9.141.3.43 resize() [2/2]

```
void LinkPred::Vec::resize (
             int newSize,
             double val )
```

Resize the vector.

Parameters

newSize	The new size. If this is smaller than the current size, nothing happens.
val	Initialization value for new entries.

9.141.3.44 scale()

```
void LinkPred::Vec::scale (
             double a )
```

Scale the vector by a scalar.

Parameters

a	The scale.

9.141.3.45 scatter()

```
void LinkPred::Vec::scatter (
             int start,
             Vec const & v,
             int const * ind )
```

Scatter a vector into the current vector starting from given position.

Parameters

start	The starting position.
v	The vector to be scattered.
ind	The index. Only entries in this array are affected by this operation.

9.141.3.46 setConstant()

```
void LinkPred::Vec::setConstant (
             bool constant )  [inline]
```

Parameters

constant	New value for constant.

9.141.3.47 size()

```
int LinkPred::Vec::size ( ) const  [inline]
```

Returns

The size of the vector.

9.141.3.48 sum()

```
double LinkPred::Vec::sum ( ) const
```

Returns

The sum of the elements of the vector.

9.141.3.49 write() [1/2]

```
void LinkPred::Vec::write (
             std::ofstream * out ) const
```

Write values to file.

Parameters

out	Output file.

9.141.3.50 write() [2/2]

```
void LinkPred::Vec::write (
             std::string fileName ) const
```

Write values to file.

Parameters

fileName	Output file name.

9.141.4 Friends And Related Function Documentation

9.141.4.1 operator* [1/5]

```
Vec operator* (
             const GFMatrix & mat,
             const Vec & vec )  [friend]
```

GFMatrix-vector multiplication.

Parameters

mat	The matrix.
vec	The vector that will be multiplied by the matrix.

Returns

The resulting vector.

9.141.4.2 operator* [2/5]

```
Vec operator* (
            double a,
            Vec const & v )  [friend]
```

Scalar-vector multiplication.

Parameters

a	The scalar.
v	The vector.

Returns

a * v.

9.141.4.3 operator* [3/5]

```
Vec operator* (
            double a,
            Vec const & v )  [friend]
```

Scalar-vector multiplication.

Parameters

a	The scalar.
v	The vector.

Returns

a * v.

9.141.4.4 operator* [4/5]

```
Vec operator* (
             Vec const & v,
             double a )  [friend]
```

Vector-scalar multiplication.

Parameters

v	The vector.
a	The scalar.

Returns

v ∗ a.

9.141.4.5 operator* [5/5]

```
Vec operator* (
             Vec const & v1,
             Vec const & v2 )  [friend]
```

Vector element-wise multiplication.

Parameters

v1	The first vector.
v2	The second vector.

Returns

v1 .∗ v2.

9.141.4.6 operator+ [1/3]

```
Vec operator+ (
             double a,
             Vec const & v )  [friend]
```

Scalar-vector addition.

Parameters

a	The scalar.
v	The vector.

Returns

a + v.

9.141.4.7 operator+ [2/3]

```
Vec operator+ (
            Vec const & v,
            double a )  [friend]
```

Vector-scalar addition.

Parameters

v	The vector.
a	The scalar.

Returns

v + a.

9.141.4.8 operator+ [3/3]

```
Vec operator+ (
            Vec const & v1,
            Vec const & v2 )  [friend]
```

Vector addition.

Parameters

v1	The first vector.
v2	The second vector.

Returns

v1 + v2.

9.141.4.9 operator- [1/3]

```
Vec operator- (
            double a,
            Vec const & v )  [friend]
```

Scalar-vector subtraction.

Parameters

a	The scalar.
v	The vector.

Returns

a - v.

9.141.4.10 operator- [2/3]

```
Vec operator- (
            Vec const & v,
            double a )  [friend]
```

Vector-scalar subtraction.

Parameters

v	The vector.
a	The scalar.

Returns

v - a.

9.141.4.11 operator- [3/3]

```
Vec operator- (
            Vec const & v1,
            Vec const & v2 )  [friend]
```

Vector subtraction.

Parameters

v1	The first vector.
v2	The second vector.

Returns

v1 - v2.

9.141.4.12 operator/ [1/3]

```
Vec operator/ (
            double a,
            Vec const & v )  [friend]
```

Scalar-vector division.

Parameters

a	The scalar.
v	The vector.

Returns

a / v.

9.141.4.13 operator/ [2/3]

```
Vec operator/ (
            Vec const & v,
            double a )  [friend]
```

Vector-scalar division.

Parameters

v	The vector.
a	The scalar.

Returns

v / a.

9.141.4.14 operator/ [3/3]

```
Vec operator/ (
            Vec const & v1,
            Vec const & v2 )  [friend]
```

Vector element-wise division.

Parameters

v1	The first vector.
v2	The second vector.

Returns

v1 ./ v2.

9.141.4.15 operator^

```
double operator^ (
            Vec const & v1,
            Vec const & v2 )  [friend]
```

Dot product.

Parameters

v1	The first vector.
v2	The second vector.

Returns

v1' ∗ v2.

The documentation for this class was generated from the following file:

- include/linkpred/numerical/linear/vec.hpp

Chapter 10

File Documentation

10.1 bindings/Java/include/LinkPredJavaConfig.hpp File Reference

Contains configuration options.

Macros

- #define **LinkPredJava_VERSION_MAJOR** 1
- #define **LinkPredJava_VERSION_MINOR** 0
- #define **LinkPredJava_VERSION_PATCH** 0

10.1.1 Detailed Description

Contains configuration options.

10.2 bindings/Python/include/LinkPredPythonConfig.hpp File Reference

Contains configuration options.

Macros

- #define **LinkPredPython_VERSION_MAJOR** 1
- #define **LinkPredPython_VERSION_MINOR** 0
- #define **LinkPredPython_VERSION_PATCH** 0
- #define **LINKPRED_WITH_OPENMP**
- #define **LINKPRED_WITH_MPI**
- #define **LINKPRED_WITH_MLPACK**

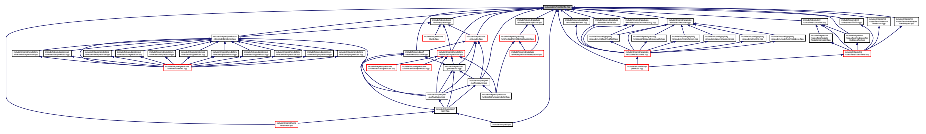
10.2.1 Detailed Description

Contains configuration options.

10.3 include/LinkPredConfig.hpp File Reference

Contains configuration options.

This graph shows which files directly or indirectly include this file:



Macros

- #define **LinkPred_VERSION_MAJOR** 1
- #define **LinkPred_VERSION_MINOR** 0
- #define **LinkPred_VERSION_PATCH** 0

10.3.1 Detailed Description

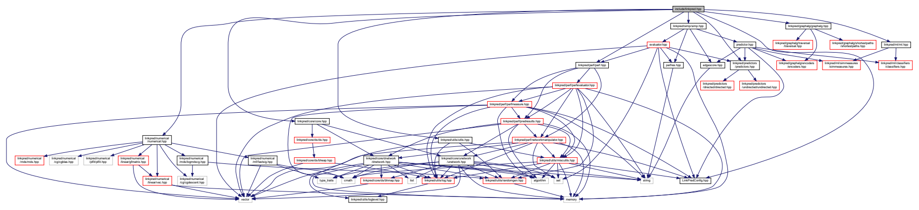
Contains configuration options.

10.4 include/linkpred.hpp File Reference

Includes all headers of the library.

```
#include "LinkPredConfig.hpp"
#include "linkpred/core/core.hpp"
#include "linkpred/graphalg/graphalg.hpp"
#include "linkpred/predictors/predictors.hpp"
#include "linkpred/perf/perf.hpp"
#include "linkpred/utils/utils.hpp"
#include "linkpred/ml/ml.hpp"
#include "linkpred/numerical/numerical.hpp"
#include "linkpred/simp/simp.hpp"
```

Include dependency graph for linkpred.hpp:



Namespaces

- LinkPred

    Main namespace.

10.4.1 Detailed Description

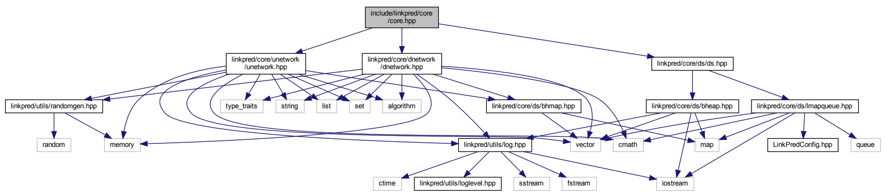
Includes all headers of the library.

10.5 include/linkpred/core/core.hpp File Reference

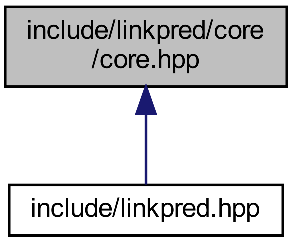
Includes the headers related to core classes.

```
#include "linkpred/core/unetwork/unetwork.hpp"
#include "linkpred/core/dnetwork/dnetwork.hpp"
#include "linkpred/core/ds/ds.hpp"
```

Include dependency graph for core.hpp:


include/linkpred/core /core.hpp
linkpred/core/unetwork /unetwork.hpp
linkpred/core/dnetwork /dnetwork.hpp
linkpred/core/ds/ds.hpp
linkpred/utils/randomgen.hpp
type_traits
string
list
set
algorithm
linkpred/core/ds/bhmap.hpp
linkpred/core/ds/bheap.hpp
linkpred/core/ds/lmapqueue.hpp
random
memory
linkpred/utils/log.hpp
vector
cmath
map
LinkPredConfig.hpp
queue
ctime
linkpred/utils/loglevel.hpp
sstream
fstream
iostream

This graph shows which files directly or indirectly include this file:



10.5.1 Detailed Description

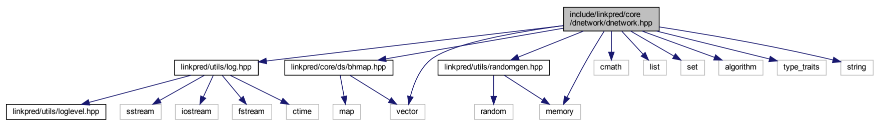
Includes the headers related to core classes.

10.6 include/linkpred/core/dnetwork/dnetwork.hpp File Reference

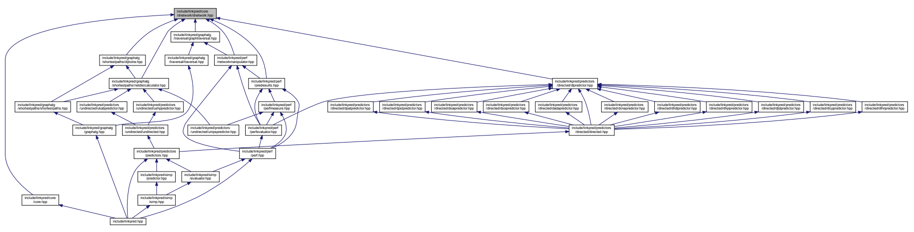
Contains the implementation of a directed network data structure.

```
#include "linkpred/utils/log.hpp"
#include "linkpred/core/ds/bhmap.hpp"
#include "linkpred/utils/randomgen.hpp"
#include <cmath>
#include <memory>
#include <vector>
#include <list>
#include <set>
#include <algorithm>
#include <type_traits>
#include <string>
```

Include dependency graph for dnetwork.hpp:


include/linkpred/core/dnetwork/dnetwork.hpp
linkpred/utils/log.hpp
linkpred/core/ds/bhmap.hpp
linkpred/utils/randomgen.hpp
cmath
list
set
algorithm
type_traits
string
linkpred/utils/loglevel.hpp
sstream
iostream
fstream
ctime
map
vector
random
memory

This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >

  This class represents a directed network in the sense of graph theory.
- class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt

  Node-degree iterator. This class can be used to iterate over pairs of node IDs and in and out degrees.
- class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt

  Nonedges iterator.
- class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt

  Randomized Nodes iterator.
- class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt

  Randomized edges iterator.
- class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt

  Randomized nonedges iterator.
- class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >

  A node map.
- class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >

  A sparse node map.
- class LinkPred::DNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >

  An edge map.

Namespaces

- LinkPred

  Main namespace.

10.6.1 Detailed Description

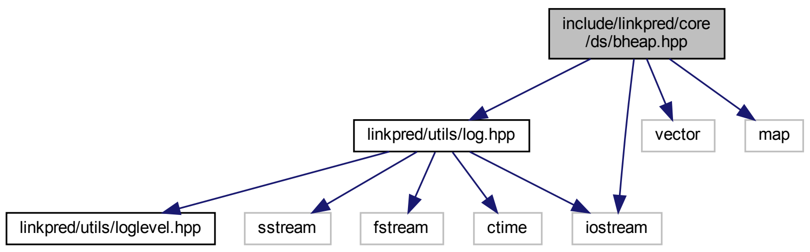
Contains the implementation of a directed network data structure.

10.7 include/linkpred/core/ds/bheap.hpp File Reference

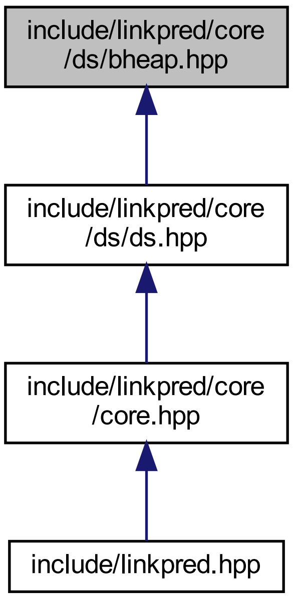
Contains the implementation of a templated binary heap.

```
#include "linkpred/utils/log.hpp"
#include <vector>
#include <map>
#include <iostream>
```

Include dependency graph for bheap.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/core/ds/bheap.hpp
include/linkpred/core/ds/ds.hpp
include/linkpred/core/core.hpp
include/linkpred.hpp

Classes

- class LinkPred::BHeap< T, P, ComparatorT, ComparatorP >

    A binary heap.

Namespaces

- LinkPred

    Main namespace.

10.7.1 Detailed Description

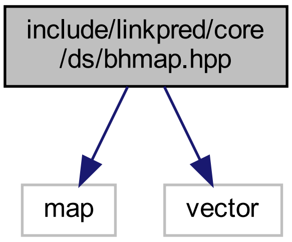
Contains the implementation of a templated binary heap.

10.8 include/linkpred/core/ds/bhmap.hpp File Reference

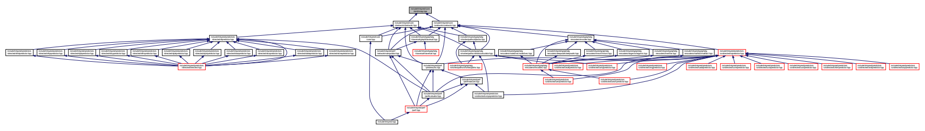
Contains the implementation of a templated bidirectional half map.

```
#include <map>
#include <vector>
```

Include dependency graph for bhmap.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::Bhmap< K, P, Comparator >

  A bidirectional half map.

Namespaces

- LinkPred

  Main namespace.

10.8.1 Detailed Description

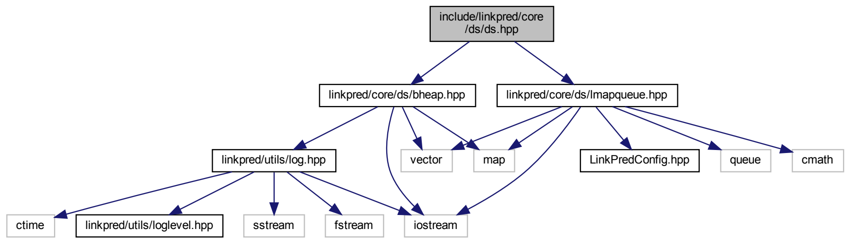
Contains the implementation of a templated bidirectional half map.

10.9 include/linkpred/core/ds/ds.hpp File Reference

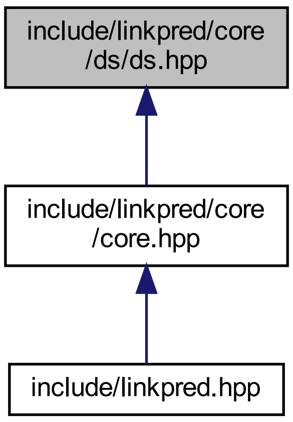
Includes the headers related to data structures.

```
#include "linkpred/core/ds/bheap.hpp"
#include "linkpred/core/ds/lmapqueue.hpp"
```

Include dependency graph for ds.hpp:


include/linkpred/core/ds/ds.hpp
linkpred/core/ds/bheap.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/utils/log.hpp
vector
map
LinkPredConfig.hpp
queue
cmath
ctime
linkpred/utils/loglevel.hpp
sstream
fstream
iostream

This graph shows which files directly or indirectly include this file:


include/linkpred/core/ds/ds.hpp
include/linkpred/core/core.hpp
include/linkpred.hpp

10.9.1 Detailed Description

Includes the headers related to data structures.

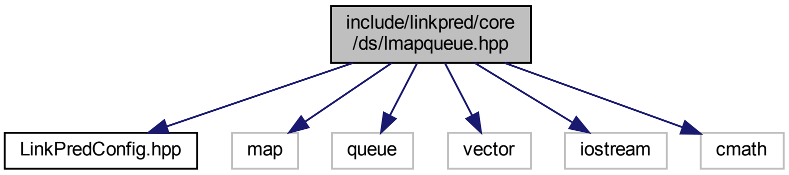
10.10 include/linkpred/core/ds/lmapqueue.hpp File Reference

Contains the implementation of a templated map-priority queue with limit on the capacity.

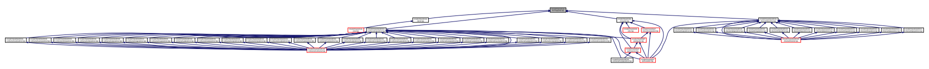
```
#include "LinkPredConfig.hpp"
#include <map>
#include <queue>
#include <vector>
#include <iostream>
```

```
#include <cmath>
```

Include dependency graph for lmapqueue.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::LMapQueue< K, P, KComparator, PComparator >

  A map-priority queue with limit on the capacity.

Namespaces

- LinkPred

  Main namespace.

10.10.1 Detailed Description

Contains the implementation of a templated map-priority queue with limit on the capacity.

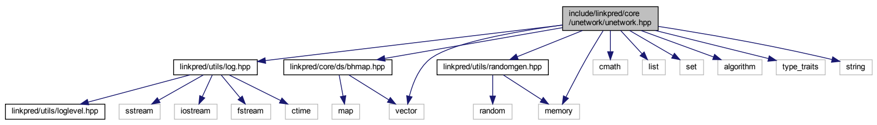
10.11 include/linkpred/core/unetwork/unetwork.hpp File Reference

Contains the implementation of an undirected network data structure.

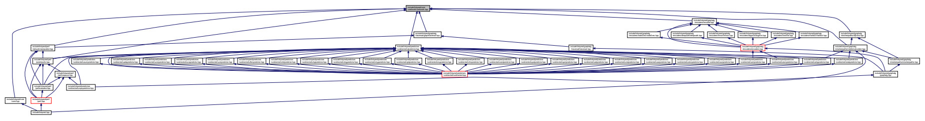
```
#include "linkpred/utils/log.hpp"
#include "linkpred/core/ds/bhmap.hpp"
#include "linkpred/utils/randomgen.hpp"
#include <cmath>
#include <memory>
#include <vector>
#include <list>
#include <set>
#include <algorithm>
#include <type_traits>
```

```
#include <string>
```

Include dependency graph for unetwork.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >

    This class represents an undirected network in the sense of graph theory.
- class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeDegIt

    Node-degree iterator. This class can be used to iterate over pairs of node IDs and degrees.
- class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NonEdgeIt

    Nonedges iterator.
- class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNodeIt

    Randomized Nodes iterator.
- class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndEdgeIt

    Randomized edges iterator.
- class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::RndNonEdgeIt

    Randomized nonedges iterator.
- class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeMap< ValueType >

    A node map.
- class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::NodeSMap< ValueType >

    A sparse node map.
- class LinkPred::UNetwork< LabelT, NodeIDT, EdgeT >::EdgeMap< ValueType >

    An edge map.

Namespaces

- LinkPred

    Main namespace.

10.11.1 Detailed Description

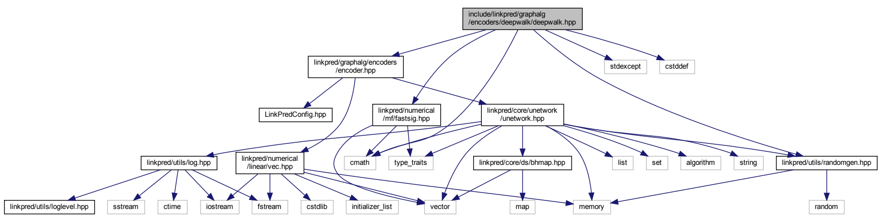
Contains the implementation of an undirected network data structure.

10.12 include/linkpred/graphalg/encoders/deepwalk/deepwalk.hpp File Reference

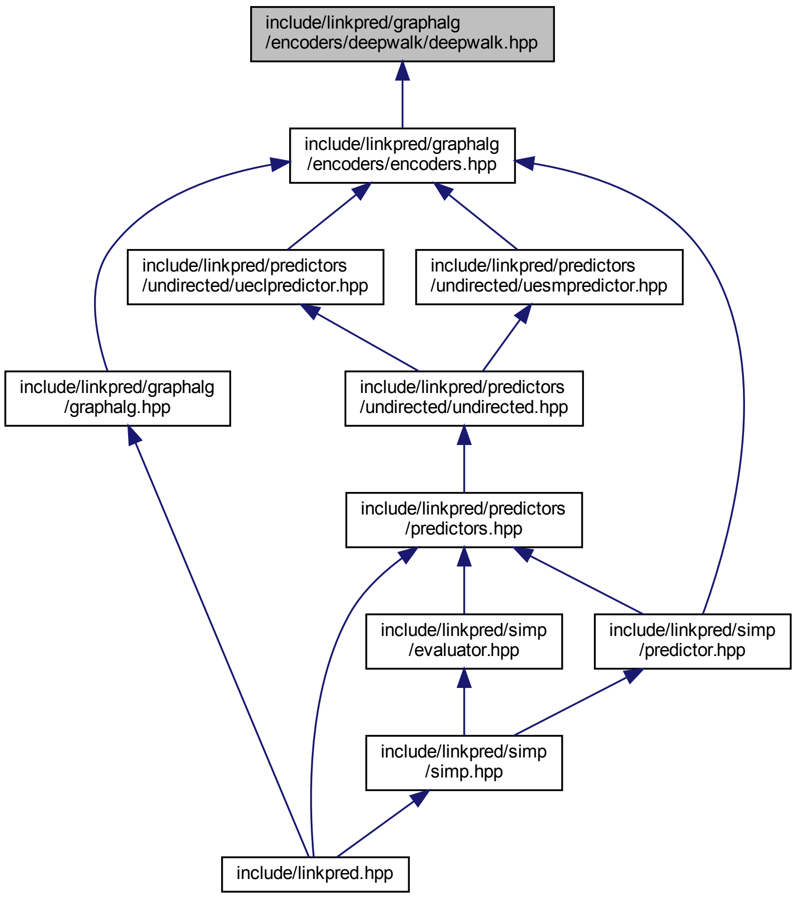
DeepWalk encoder.

```
#include "linkpred/graphalg/encoders/encoder.hpp"
#include "linkpred/utils/randomgen.hpp"
#include "linkpred/numerical/mf/fastsig.hpp"
#include <cmath>
#include <stdexcept>
#include <cstddef>
```

Include dependency graph for deepwalk.hpp:


include/linkpred/graphalg /encoders/deepwalk/deepwalk.hpp
linkpred/graphalg/encoders /encoder.hpp
stdexcept
cstddef
LinkPredConfig.hpp
linkpred/numerical /mf/fastsig.hpp
linkpred/core/unetwork /unetwork.hpp
linkpred/utils/log.hpp
linkpred/numerical /linear/vec.hpp
cmath
type_traits
linkpred/core/ds/bhmap.hpp
list
set
algorithm
string
linkpred/utils/randomgen.hpp
linkpred/utils/loglevel.hpp
sstream
ctime
iostream
fstream
cstdlib
initializer_list
vector
map
memory
random

This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg /encoders/deepwalk/deepwalk.hpp
include/linkpred/graphalg /encoders/encoders.hpp
include/linkpred/predictors /undirected/ueclpredictor.hpp
include/linkpred/predictors /undirected/uesmpredictor.hpp
include/linkpred/graphalg /graphalg.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::DeepWalk< Network >

  DeepWalk encoder. Reference: Perozzi, B., Al-Rfou, R., and Skiena, S. (2014). Deepwalk: Online learning of social representations. In Proceedings of the 20th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, KDD '14, pages 701–710, New York, NY, USA. Association for Computing Machinery. This implementation is based on the code `https://github.com/xgfs/deepwalk-c`.

Namespaces

- LinkPred

  Main namespace.

10.12.1 Detailed Description

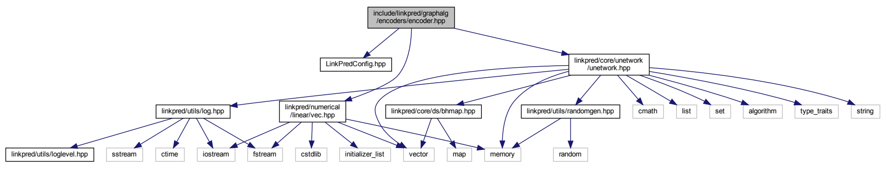
DeepWalk encoder.

10.13 include/linkpred/graphalg/encoders/encoder.hpp File Reference

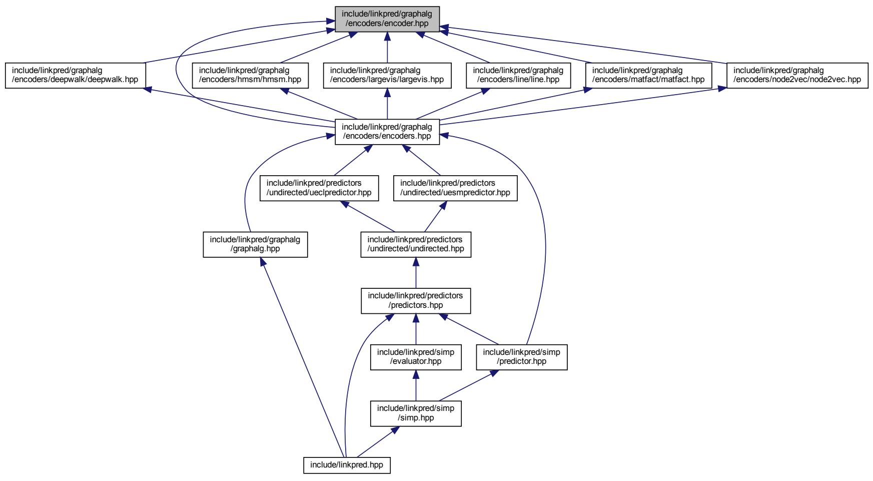
Contains the interface of a network encoder.

```
#include "LinkPredConfig.hpp"
#include "linkpred/core/unetwork/unetwork.hpp"
#include "linkpred/numerical/linear/vec.hpp"
```

Include dependency graph for encoder.hpp:


include/linkpred/graphalg/encoders/encoder.hpp
LinkPredConfig.hpp
linkpred/core/unetwork/unetwork.hpp
linkpred/utils/log.hpp
linkpred/numerical/linear/vec.hpp
linkpred/core/ds/bhmap.hpp
linkpred/utils/randomgen.hpp
cmath
list
set
algorithm
type_traits
string
linkpred/utils/loglevel.hpp
sstream
ctime
iostream
fstream
cstdlib
initializer_list
vector
map
memory
random

This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg/encoders/encoder.hpp
include/linkpred/graphalg/encoders/deepwalk/deepwalk.hpp
include/linkpred/graphalg/encoders/hmsm/hmsm.hpp
include/linkpred/graphalg/encoders/largevis/largevis.hpp
include/linkpred/graphalg/encoders/line/line.hpp
include/linkpred/graphalg/encoders/matfact/matfact.hpp
include/linkpred/graphalg/encoders/node2vec/node2vec.hpp
include/linkpred/graphalg/encoders/encoders.hpp
include/linkpred/predictors/undirected/ueclpredictor.hpp
include/linkpred/predictors/undirected/uesmpredictor.hpp
include/linkpred/graphalg/graphalg.hpp
include/linkpred/predictors/undirected/undirected.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::Encoder< Network >

  The interface of a network encoder.

Namespaces

- LinkPred

  Main namespace.

10.13.1 Detailed Description

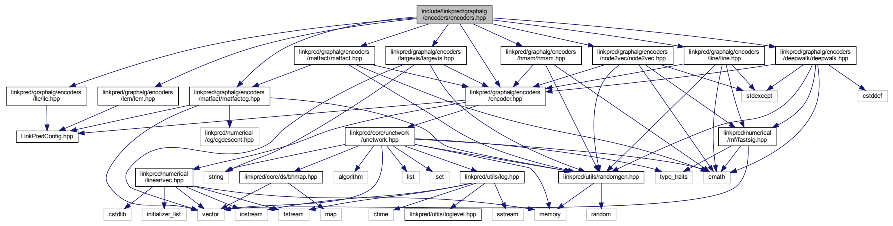
Contains the interface of a network encoder.

10.14 include/linkpred/graphalg/encoders/encoders.hpp File Reference

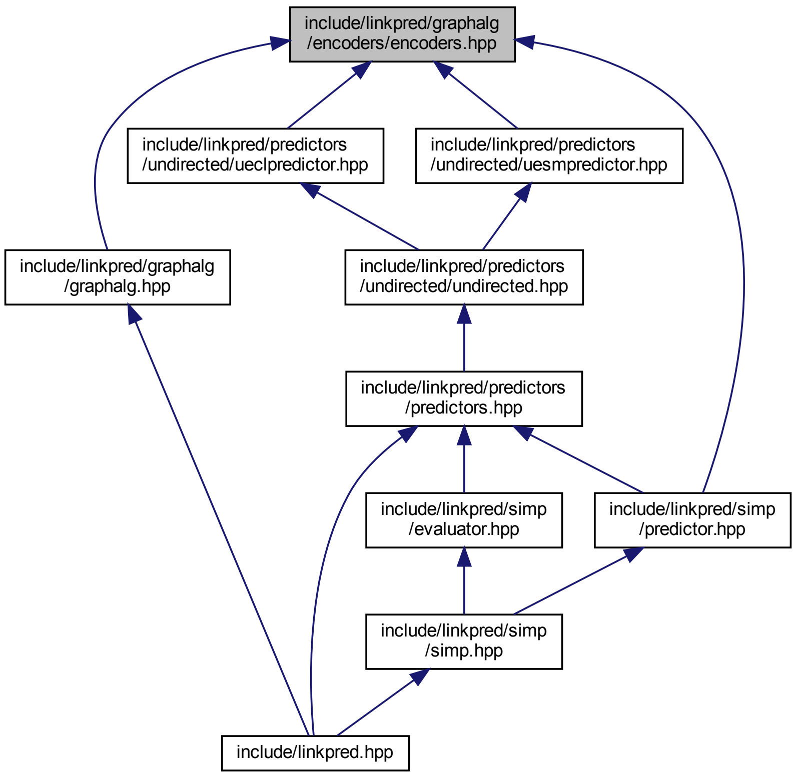
Includes the headers related to network encoders.

```
#include "linkpred/graphalg/encoders/encoder.hpp"
#include "linkpred/graphalg/encoders/node2vec/node2vec.hpp"
#include "linkpred/graphalg/encoders/hmsm/hmsm.hpp"
#include "linkpred/graphalg/encoders/largevis/largevis.hpp"
#include "linkpred/graphalg/encoders/lem/lem.hpp"
#include "linkpred/graphalg/encoders/line/line.hpp"
#include "linkpred/graphalg/encoders/lle/lle.hpp"
#include "linkpred/graphalg/encoders/matfact/matfact.hpp"
#include "linkpred/graphalg/encoders/matfact/matfactcg.hpp"
#include "linkpred/graphalg/encoders/deepwalk/deepwalk.hpp"
```

Include dependency graph for encoders.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg
/encoders/encoders.hpp
include/linkpred/predictors
/undirected/ueclpredictor.hpp
include/linkpred/predictors
/undirected/uesmpredictor.hpp
include/linkpred/graphalg
/graphalg.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

10.14.1 Detailed Description

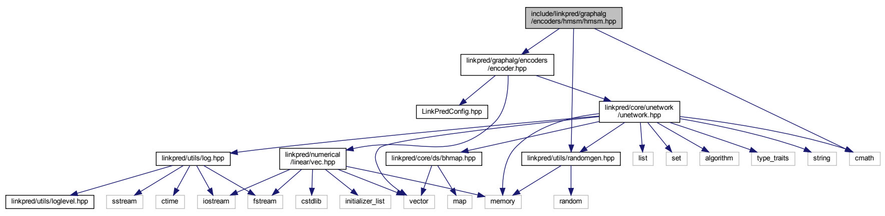
Includes the headers related to network encoders.

10.15 include/linkpred/graphalg/encoders/hmsm/hmsm.hpp File Reference

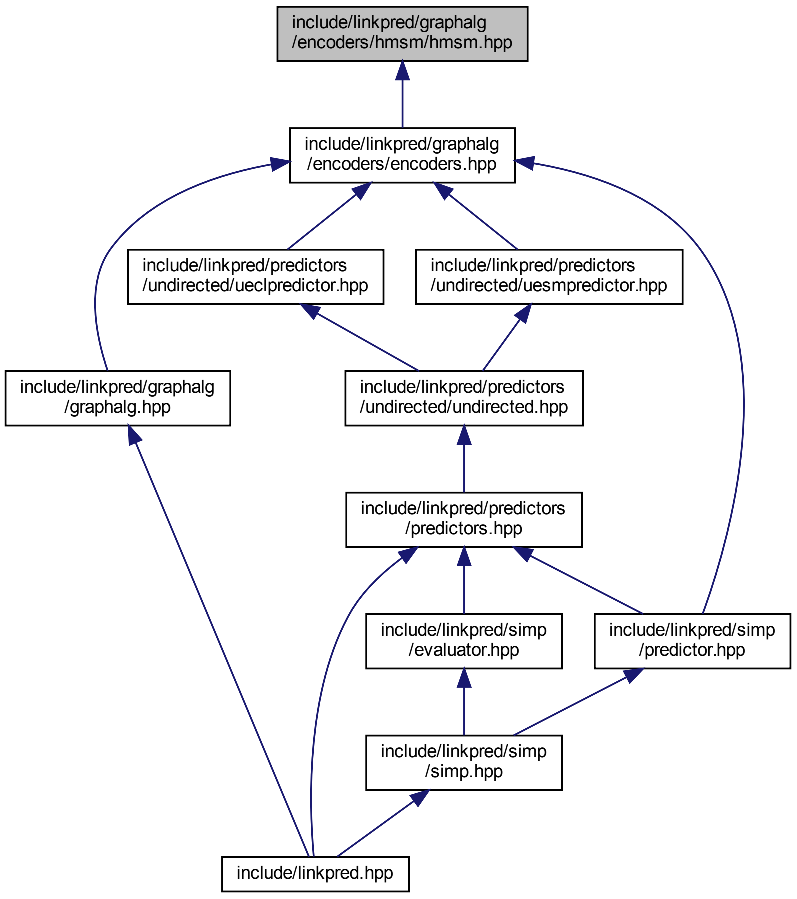
Contains the implementation of an algorithm for embedding a network using a a hidden metric space model.

```
#include "linkpred/graphalg/encoders/encoder.hpp"
#include "linkpred/utils/randomgen.hpp"
#include <cmath>
```

Include dependency graph for hmsm.hpp:


include/linkpred/graphalg/encoders/hmsm/hmsm.hpp
linkpred/graphalg/encoders/encoder.hpp
LinkPredConfig.hpp
linkpred/core/unetwork/unetwork.hpp
linkpred/utils/log.hpp
linkpred/numerical/linear/vec.hpp
linkpred/core/ds/bhmap.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
type_traits
string
cmath
linkpred/utils/loglevel.hpp
sstream
ctime
iostream
fstream
cstdlib
initializer_list
vector
map
memory
random

This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg /encoders/hmsm/hmsm.hpp
include/linkpred/graphalg /encoders/encoders.hpp
include/linkpred/predictors /undirected/ueclpredictor.hpp
include/linkpred/predictors /undirected/uesmpredictor.hpp
include/linkpred/graphalg /graphalg.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::HMSM< Network >

  Contains the implementation of an algorithm for embedding a network using a a hidden metric space model. Reference: R. Alharbi, H. Benhidour, and S. Kerrache. "Link Prediction in Complex Net-works Based on a Hidden Variables Model". In: 2016 UKSim-AMSS 18th Inter-national Conference on Computer Modelling and Simulation (UKSim). 2016,pages 119–124.

Namespaces

- LinkPred

  Main namespace.

10.15.1 Detailed Description

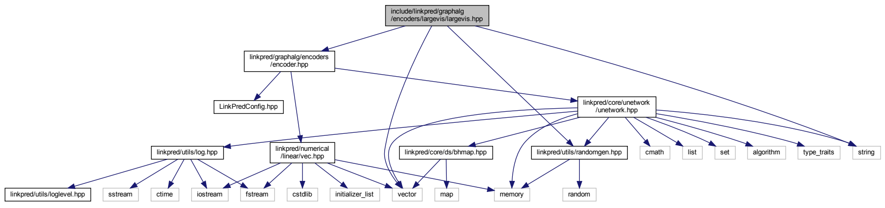
Contains the implementation of an algorithm for embedding a network using a a hidden metric space model.

10.16 include/linkpred/graphalg/encoders/largevis/largevis.hpp File Reference

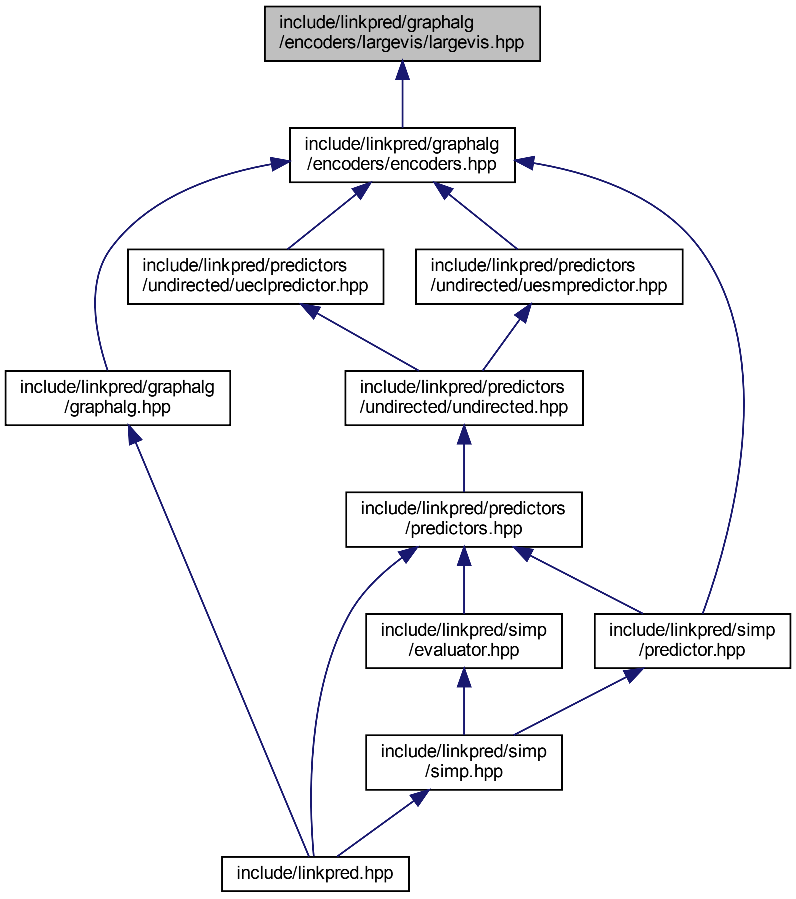
LargeVis encoder.

```
#include "linkpred/graphalg/encoders/encoder.hpp"
#include "linkpred/utils/randomgen.hpp"
#include <string>
#include <vector>
```

Include dependency graph for largevis.hpp:


include/linkpred/graphalg/encoders/largevis/largevis.hpp
linkpred/graphalg/encoders/encoder.hpp
LinkPredConfig.hpp
linkpred/core/unetwork/unetwork.hpp
linkpred/utils/log.hpp
linkpred/numerical/linear/vec.hpp
linkpred/core/ds/bhmap.hpp
linkpred/utils/randomgen.hpp
cmath
list
set
algorithm
type_traits
string
linkpred/utils/loglevel.hpp
sstream
ctime
iostream
fstream
cstdlib
initializer_list
vector
map
memory
random

This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg/encoders/largevis/largevis.hpp
include/linkpred/graphalg/encoders/encoders.hpp
include/linkpred/predictors/undirected/ueclpredictor.hpp
include/linkpred/predictors/undirected/uesmpredictor.hpp
include/linkpred/graphalg/graphalg.hpp
include/linkpred/predictors/undirected/undirected.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::LargeVis< Network >

  LargeVis encoder. Reference: Tang, J., Liu, J., Zhang, M., and Mei, Q. (2016b). Visualizing large-scale and high-dimensional data. In Bourdeau, J., Hendler, J., Nkambou, R., Horrocks, I., and Zhao, B. Y., editors, WWW, pages 287–297. ACM. This implementation is based on the code `https://github.com/lferry007/LargeVis`.

Namespaces

- LinkPred

  Main namespace.

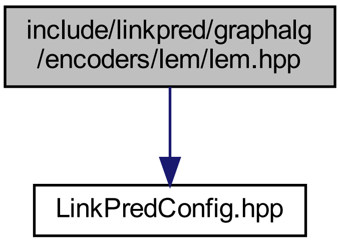
10.16.1 Detailed Description

LargeVis encoder.

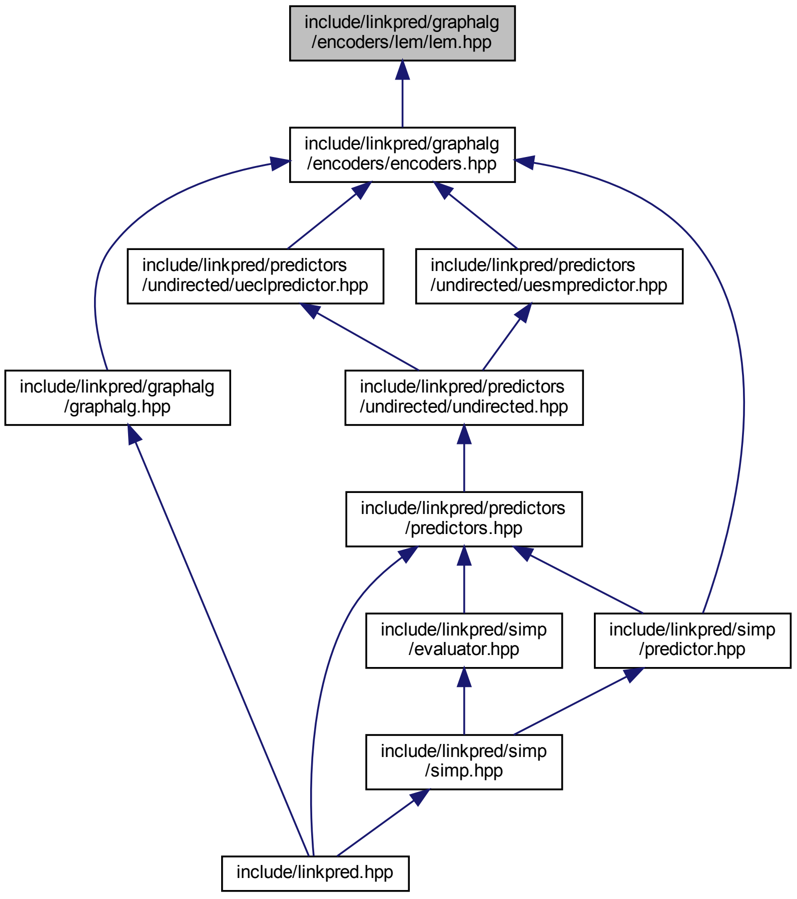
10.17 include/linkpred/graphalg/encoders/lem/lem.hpp File Reference

Contains the implementation of Laplacian eigenmaps embedding (LEM).

```
#include "LinkPredConfig.hpp"
```
Include dependency graph for lem.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg/encoders/lem/lem.hpp
include/linkpred/graphalg/encoders/encoders.hpp
include/linkpred/predictors/undirected/ueclpredictor.hpp
include/linkpred/predictors/undirected/uesmpredictor.hpp
include/linkpred/graphalg/graphalg.hpp
include/linkpred/predictors/undirected/undirected.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

10.17.1 Detailed Description

Contains the implementation of Laplacian eigenmaps embedding (LEM).

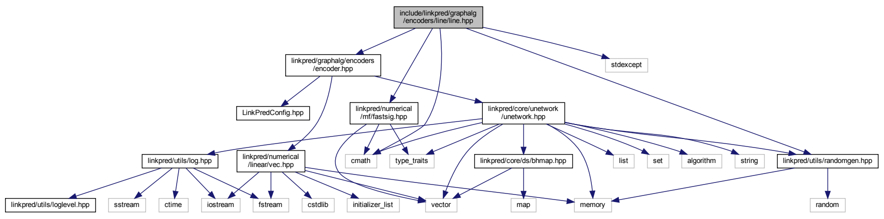
10.18 include/linkpred/graphalg/encoders/line/line.hpp File Reference

The LINE (Large-scale Information Network Embedding) encoder.

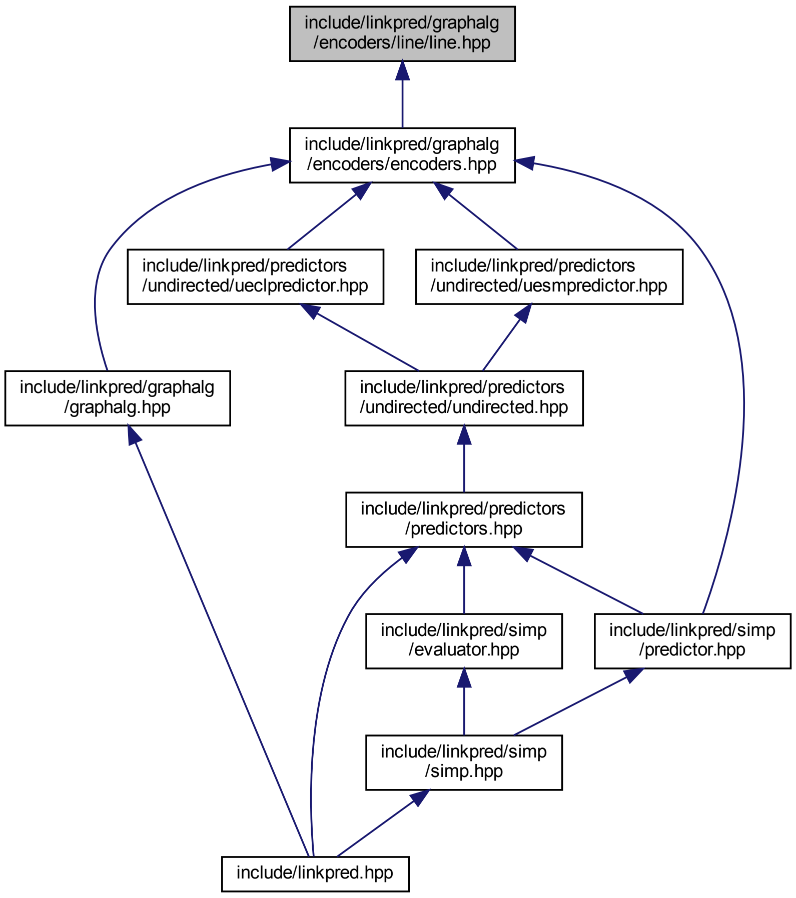
```
#include "linkpred/graphalg/encoders/encoder.hpp"
#include "linkpred/utils/randomgen.hpp"
#include "linkpred/numerical/mf/fastsig.hpp"
#include <cmath>
```

`#include <stdexcept>`

Include dependency graph for line.hpp:


include/linkpred/graphalg/encoders/line/line.hpp
linkpred/graphalg/encoders/encoder.hpp
stdexcept
LinkPredConfig.hpp
linkpred/numerical/mf/fastsig.hpp
linkpred/core/unetwork/unetwork.hpp
linkpred/utils/log.hpp
linkpred/numerical/linear/vec.hpp
cmath
type_traits
linkpred/core/ds/bhmap.hpp
list
set
algorithm
string
linkpred/utils/randomgen.hpp
linkpred/utils/loglevel.hpp
sstream
ctime
iostream
fstream
cstdlib
initializer_list
vector
map
memory
random

This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg/encoders/line/line.hpp
include/linkpred/graphalg/encoders/encoders.hpp
include/linkpred/predictors/undirected/ueclpredictor.hpp
include/linkpred/predictors/undirected/uesmpredictor.hpp
include/linkpred/graphalg/graphalg.hpp
include/linkpred/predictors/undirected/undirected.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::LINE< Network >

  LINE encoder.

Namespaces

- LinkPred

  Main namespace.

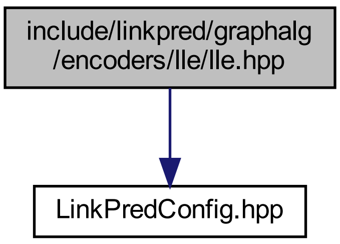
10.18.1 Detailed Description

The LINE (Large-scale Information Network Embedding) encoder.

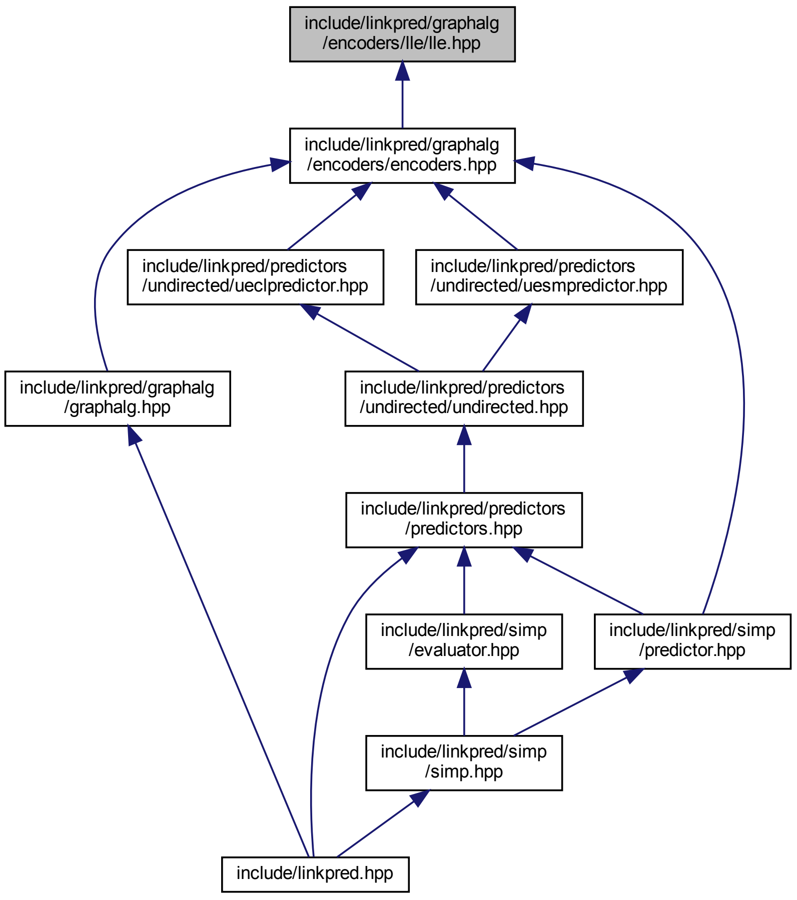
10.19 include/linkpred/graphalg/encoders/lle/lle.hpp File Reference

Contains the implementation of locally linear graph embedding (LLE).

```
#include "LinkPredConfig.hpp"
```
Include dependency graph for lle.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg
/encoders/lle/lle.hpp
include/linkpred/graphalg
/encoders/encoders.hpp
include/linkpred/predictors
/undirected/ueclpredictor.hpp
include/linkpred/predictors
/undirected/uesmpredictor.hpp
include/linkpred/graphalg
/graphalg.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

10.19.1 Detailed Description

Contains the implementation of locally linear graph embedding (LLE).

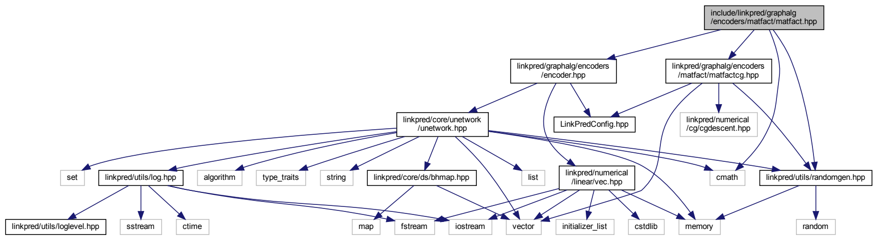
10.20 include/linkpred/graphalg/encoders/matfact/matfact.hpp File Reference

Contains the implementation of an algorithm for embedding a network using matrix factorization. Reference: Koren, Y., Bell, R., and Volinsky, C. (2009). Matrix factorization techniques for recommender systems. Computer, 42(8)↩
:30–37 Ahmed, A., Shervashidze, N., Narayanamurthy, S., Josifovski, V., and Smola, A. J. (2013). Distributed large-scale natural graph factorization. In Proceedings of the 22nd International Conference on World Wide Web, WWW '13, pages 37–48, New York, NY, USA. Association for Computing Machinery.

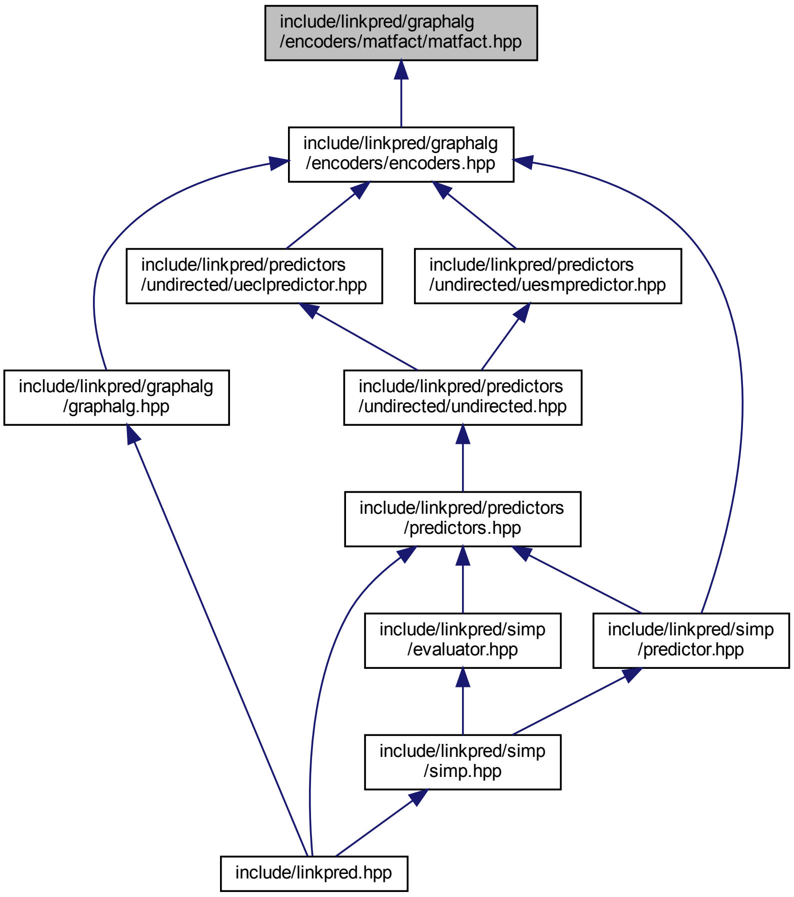
```
#include "linkpred/graphalg/encoders/encoder.hpp"
#include "linkpred/graphalg/encoders/matfact/matfactcg.hpp"
#include "linkpred/utils/randomgen.hpp"
```

```
#include <cmath>
```

Include dependency graph for matfact.hpp:


include/linkpred/graphalg/encoders/matfact/matfact.hpp
linkpred/graphalg/encoders/encoder.hpp
linkpred/graphalg/encoders/matfact/matfactcg.hpp
linkpred/core/unetwork/unetwork.hpp
LinkPredConfig.hpp
linkpred/numerical/cg/cgdescent.hpp
set
linkpred/utils/log.hpp
algorithm
type_traits
string
linkpred/core/ds/bhmap.hpp
list
linkpred/numerical/linear/vec.hpp
cmath
linkpred/utils/randomgen.hpp
linkpred/utils/loglevel.hpp
sstream
ctime
map
fstream
iostream
vector
initializer_list
cstdlib
memory
random

This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg/encoders/matfact/matfact.hpp
include/linkpred/graphalg/encoders/encoders.hpp
include/linkpred/predictors/undirected/ueclpredictor.hpp
include/linkpred/predictors/undirected/uesmpredictor.hpp
include/linkpred/graphalg/graphalg.hpp
include/linkpred/predictors/undirected/undirected.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::MatFact< Network >

  Contains the implementation of an algorithm for embedding a network using matrix factorization. Reference: Koren, Y., Bell, R., and Volinsky, C. (2009). Matrix factorization techniques for recommender systems. Computer, 42(8)↩ :30–37 Ahmed, A., Shervashidze, N., Narayanamurthy, S., Josifovski, V., and Smola, A. J. (2013). Distributed large-scale natural graph factorization. In Proceedings of the 22nd International Conference on World Wide Web, WWW '13, pages 37–48, New York, NY, USA. Association for Computing Machinery.

Namespaces

- LinkPred

  Main namespace.

10.20.1 Detailed Description

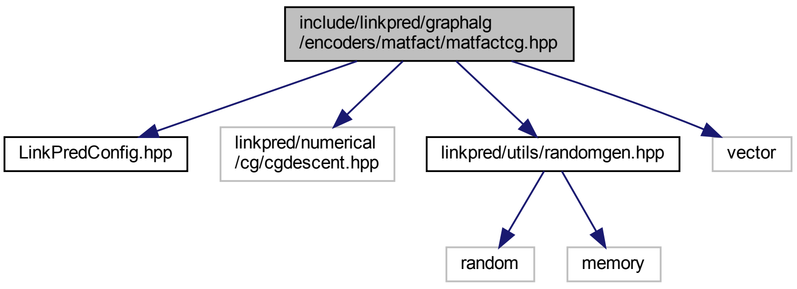
Contains the implementation of an algorithm for embedding a network using matrix factorization. Reference: Koren, Y., Bell, R., and Volinsky, C. (2009). Matrix factorization techniques for recommender systems. Computer, 42(8)↩ :30–37 Ahmed, A., Shervashidze, N., Narayanamurthy, S., Josifovski, V., and Smola, A. J. (2013). Distributed large-scale natural graph factorization. In Proceedings of the 22nd International Conference on World Wide Web, WWW '13, pages 37–48, New York, NY, USA. Association for Computing Machinery.

10.21 include/linkpred/graphalg/encoders/matfact/matfactcg.hpp File Reference

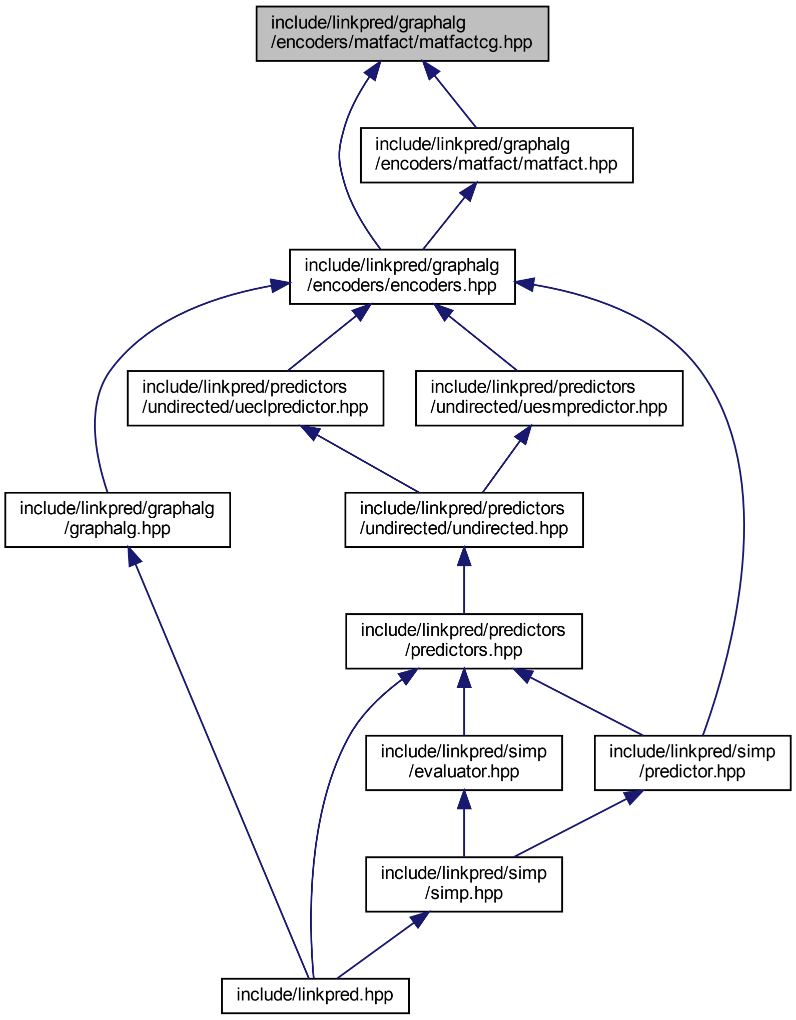
Contains the implementation of the optimization problem associated with matrix factorization.

```
#include "LinkPredConfig.hpp"
#include "linkpred/numerical/cg/cgdescent.hpp"
#include "linkpred/utils/randomgen.hpp"
#include <vector>
```

Include dependency graph for matfactcg.hpp:


include/linkpred/graphalg
/encoders/matfact/matfactcg.hpp
LinkPredConfig.hpp
linkpred/numerical
/cg/cgdescent.hpp
linkpred/utils/randomgen.hpp
vector
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg/encoders/matfact/matfactcg.hpp
include/linkpred/graphalg/encoders/matfact/matfact.hpp
include/linkpred/graphalg/encoders/encoders.hpp
include/linkpred/predictors/undirected/ueclpredictor.hpp
include/linkpred/predictors/undirected/uesmpredictor.hpp
include/linkpred/graphalg/graphalg.hpp
include/linkpred/predictors/undirected/undirected.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

Classes

- struct LinkPred::MatFactPbData

  A simple structure to store matrix factoization problem data.
- class LinkPred::MatFactCG

  Optimization problem associated with matrix factorization.

Namespaces

- LinkPred

  Main namespace.

10.21.1 Detailed Description

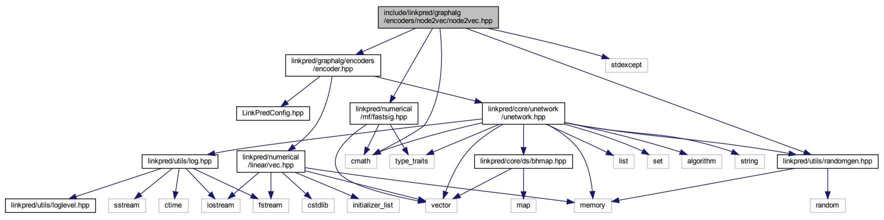
Contains the implementation of the optimization problem associated with matrix factorization.

10.22 include/linkpred/graphalg/encoders/node2vec/node2vec.hpp File Reference

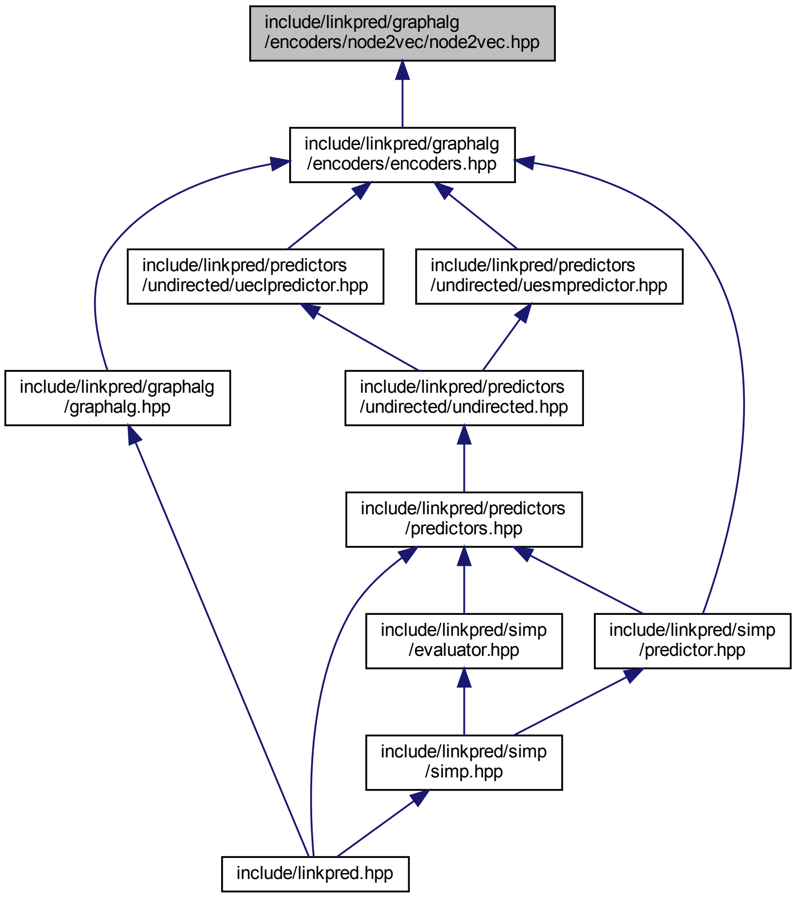
A node2vec encoder.

```
#include "linkpred/graphalg/encoders/encoder.hpp"
#include "linkpred/utils/randomgen.hpp"
#include "linkpred/numerical/mf/fastsig.hpp"
#include <cmath>
#include <stdexcept>
```

Include dependency graph for node2vec.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg
/encoders/node2vec/node2vec.hpp
include/linkpred/graphalg
/encoders/encoders.hpp
include/linkpred/predictors
/undirected/ueclpredictor.hpp
include/linkpred/predictors
/undirected/uesmpredictor.hpp
include/linkpred/graphalg
/graphalg.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::Node2Vec< Network >

  Node2Vec encoder. References: Grover, A. and Leskovec, J. (2016). Node2vec: Scalable feature learning for networks. In Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, KDD'16, pages 855–864, New York, NY, USA. Association for Computing Machinery. This implementation is based on the code `https://github.com/xgfs/node2vec-c`.

Namespaces

- LinkPred

  Main namespace.

10.22.1 Detailed Description

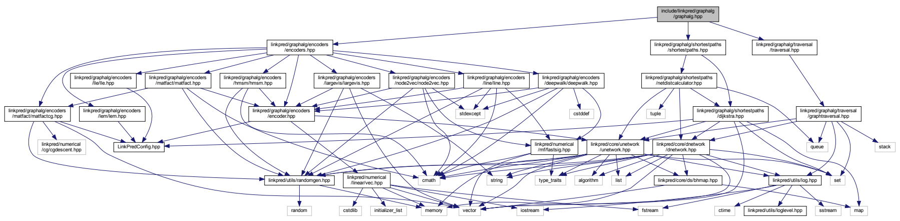
A node2vec encoder.

10.23 include/linkpred/graphalg/graphalg.hpp File Reference

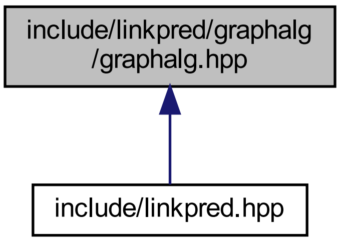
Includes the headers related to graph algorithms.

```
#include "linkpred/graphalg/encoders/encoders.hpp"
#include "linkpred/graphalg/shortestpaths/shortestpaths.hpp"
#include "linkpred/graphalg/traversal/traversal.hpp"
```

Include dependency graph for graphalg.hpp:



This graph shows which files directly or indirectly include this file:



10.23.1 Detailed Description

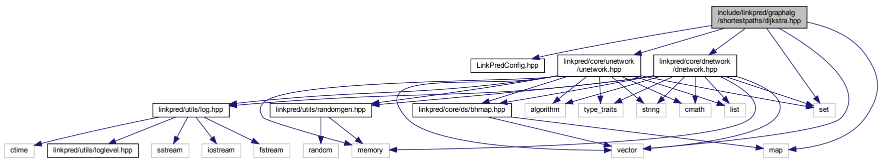
Includes the headers related to graph algorithms.

10.24 include/linkpred/graphalg/shortestpaths/dijkstra.hpp File Reference

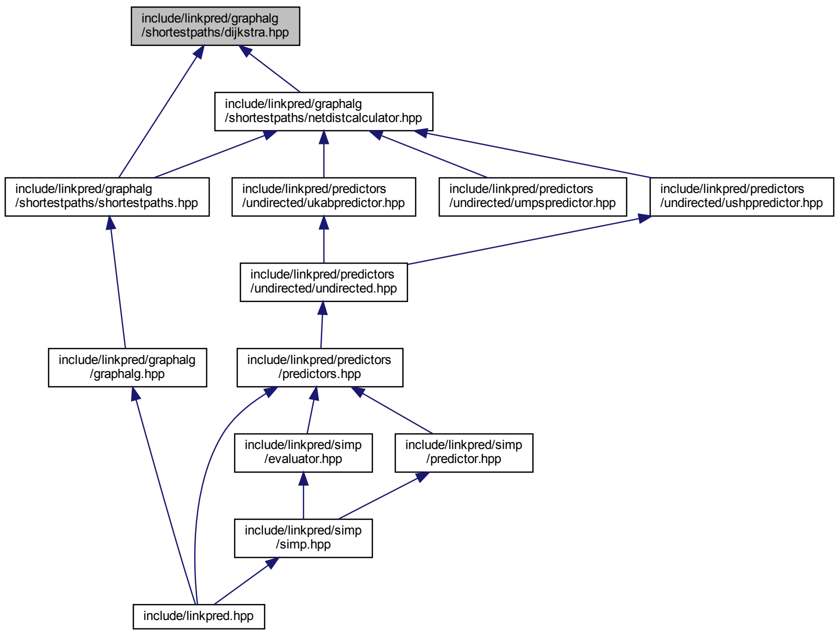
Contains an implementation of Dijkstra's algorithm.

```
#include "LinkPredConfig.hpp"
#include "linkpred/core/unetwork/unetwork.hpp"
#include "linkpred/core/dnetwork/dnetwork.hpp"
#include <map>
#include <set>
#include <vector>
```

Include dependency graph for dijkstra.hpp:


include/linkpred/graphalg/shortestpaths/dijkstra.hpp
LinkPredConfig.hpp
linkpred/core/unetwork/unetwork.hpp
linkpred/core/dnetwork/dnetwork.hpp
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
linkpred/core/ds/bhmap.hpp
algorithm
type_traits
string
cmath
list
set
ctime
linkpred/utils/loglevel.hpp
sstream
iostream
fstream
random
memory
vector
map

This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg/shortestpaths/dijkstra.hpp
include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp
include/linkpred/graphalg/shortestpaths/shortestpaths.hpp
include/linkpred/predictors/undirected/ukabpredictor.hpp
include/linkpred/predictors/undirected/umpspredictor.hpp
include/linkpred/predictors/undirected/ushppredictor.hpp
include/linkpred/predictors/undirected/undirected.hpp
include/linkpred/graphalg/graphalg.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::Dijkstra< Network, DistType, NbHopsType >

  An implementation of Dijkstra's algorithm.

Namespaces

- LinkPred

  Main namespace.

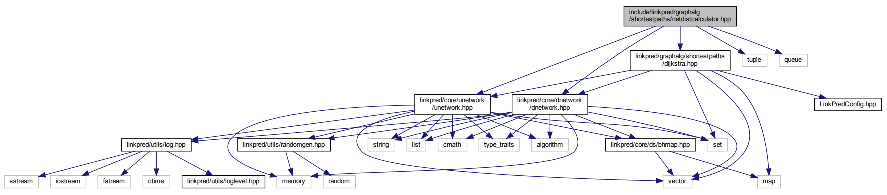
10.24.1 Detailed Description

Contains an implementation of Dijkstra's algorithm.

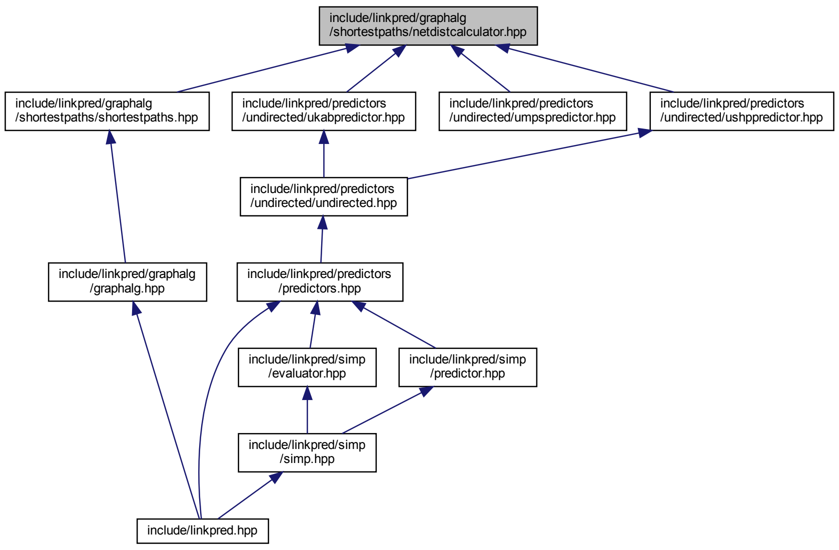
10.25 include/linkpred/graphalg/shortestpaths/netdistcalculator.hpp File Reference

Contains the implementation of classes for computing distances in network.

```
#include "linkpred/core/unetwork/unetwork.hpp"
#include "linkpred/core/dnetwork/dnetwork.hpp"
#include "linkpred/graphalg/shortestpaths/dijkstra.hpp"
#include <tuple>
#include <queue>
```
Include dependency graph for netdistcalculator.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg /shortestpaths/netdistcalculator.hpp
include/linkpred/graphalg /shortestpaths/shortestpaths.hpp
include/linkpred/predictors /undirected/ukabpredictor.hpp
include/linkpred/predictors /undirected/umpspredictor.hpp
include/linkpred/predictors /undirected/ushppredictor.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/graphalg /graphalg.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::NetDistCalculator< Network, DistType, NbHopsType >

  Interface for calculating the distance between nodes in a network.
- class LinkPred::NetSimlCalculator< Network, DistType, NbHopsType >

  Interface for calculating the similarity between nodes in a network.
- class LinkPred::NetIndSimlCalculator< Network, DistType, NbHopsType >

  Interface for calculating the indirect similarity between nodes in a network.
- class LinkPred::ESPDistCalculator< Network, DistType, NbHopsType >

  Exact shortest path distance calculator.
- class LinkPred::ESPLDistCalculator< Network, DistType, NbHopsType >

  Exact shortest path distance calculator with limits on the number of hops.
- class LinkPred::ASPDistCalculator< Network, DistType, NbHopsType >

  Approximate shortest path distance calculator.
- class LinkPred::ESPDsimCalculator< Network, DsimType, NbHopsType >

  Exact shortest path dissimilarity calculator.
- class LinkPred::ASPDsimCalculator< Network, DsimType, NbHopsType >

  Approximate shortest path dissimilarity calculator.
- class LinkPred::ESPSimlCalculator< Network, DistType, NbHopsType >

  Exact shortest path distance calculator.
- class LinkPred::ESPLSimlCalculator< Network, DistType, NbHopsType >

  Exact shortest path distance calculator.
- class LinkPred::ESPIndSimlCalculator< Network, DistType, NbHopsType >

  Exact shortest path distance calculator.
- class LinkPred::DESPLDistCalculator< Network, DistType, NbHopsType >

  Exact shortest path distance calculator on a directed network with limits on the number of hops.

Namespaces

- LinkPred

  Main namespace.

Enumerations

- enum LinkPred::CacheLevel { LinkPred::NoCache, LinkPred::NodeCache, LinkPred::NetworkCache }

  Cache levels.

10.25.1 Detailed Description

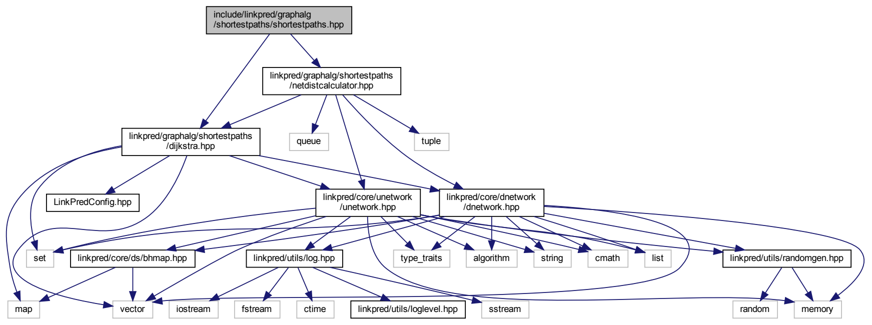
Contains the implementation of classes for computing distances in network.

10.26 include/linkpred/graphalg/shortestpaths/shortestpaths.hpp File Reference

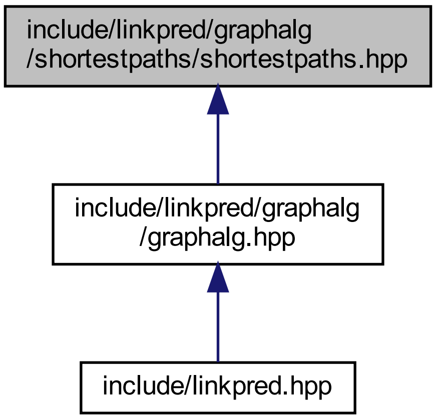
Includes the headers related to shortest paths algorithms.

```
#include "linkpred/graphalg/shortestpaths/dijkstra.hpp"
#include "linkpred/graphalg/shortestpaths/netdistcalculator.hpp"
```

Include dependency graph for shortestpaths.hpp:


include/linkpred/graphalg/shortestpaths/shortestpaths.hpp
linkpred/graphalg/shortestpaths/netdistcalculator.hpp
linkpred/graphalg/shortestpaths/dijkstra.hpp
queue
tuple
LinkPredConfig.hpp
linkpred/core/unetwork/unetwork.hpp
linkpred/core/dnetwork/dnetwork.hpp
set
linkpred/core/ds/bhmap.hpp
linkpred/utils/log.hpp
type_traits
algorithm
string
cmath
list
linkpred/utils/randomgen.hpp
map
vector
iostream
fstream
ctime
linkpred/utils/loglevel.hpp
sstream
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg
/shortestpaths/shortestpaths.hpp
include/linkpred/graphalg
/graphalg.hpp
include/linkpred.hpp

10.26.1 Detailed Description

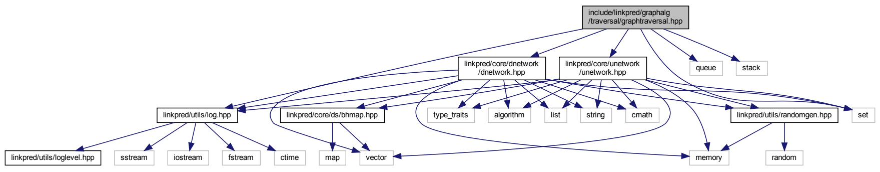
Includes the headers related to shortest paths algorithms.

10.27 include/linkpred/graphalg/traversal/graphtraversal.hpp File Reference

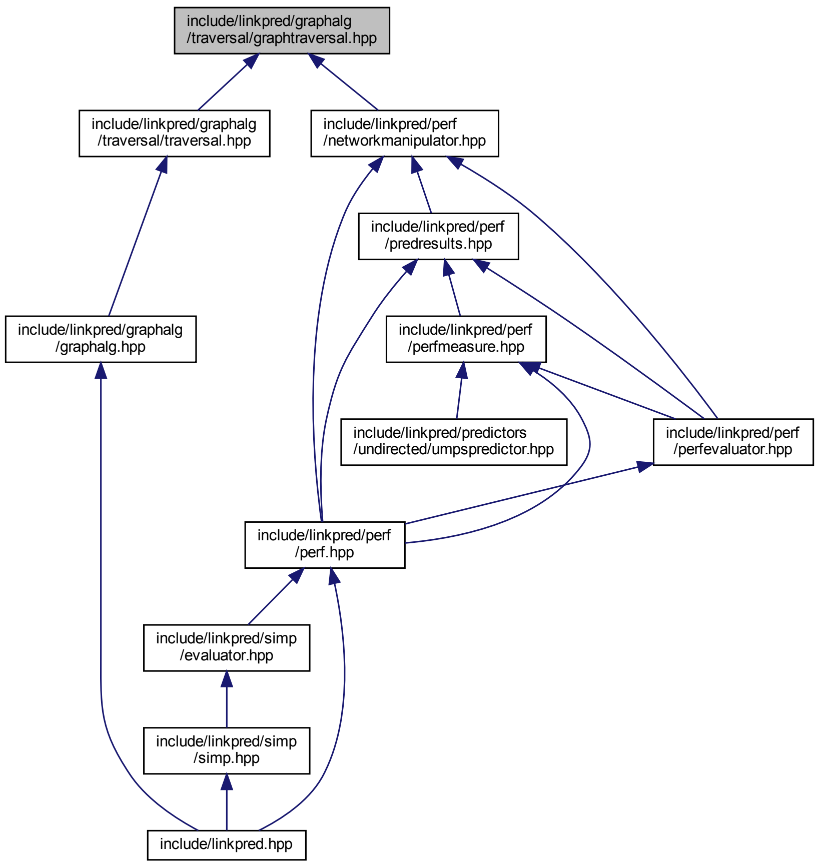
Contains the implementation of graph traversal algorithms.

```
#include "linkpred/core/unetwork/unetwork.hpp"
#include "linkpred/core/dnetwork/dnetwork.hpp"
#include "linkpred/utils/log.hpp"
#include <queue>
#include <stack>
#include <set>
```

Include dependency graph for graphtraversal.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::Counter< Network >

  A class that counts nodes during traversal.
- class LinkPred::Collector< Network >

  A class that collects nodes during traversal.
- class LinkPred::GraphTraversal< Network, NodeProcessor >

  Graph traversal interface.
- class LinkPred::BFS< Network, NodeProcessor >

  BFS graph traversal.
- class LinkPred::DFS< Network, NodeProcessor >

  DFS graph traversal.

Namespaces

- LinkPred

  Main namespace.

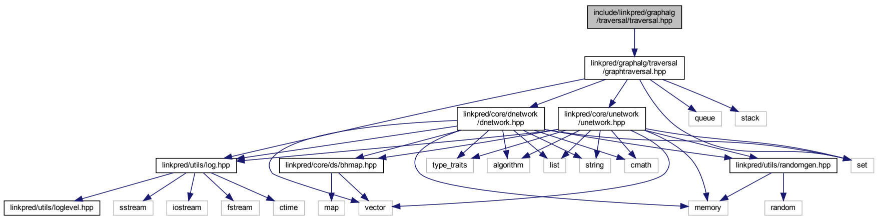
10.27.1 Detailed Description

Contains the implementation of graph traversal algorithms.

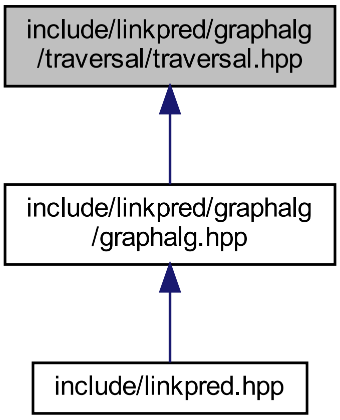
10.28 include/linkpred/graphalg/traversal/traversal.hpp File Reference

Includes the headers related to graph traversal algorithms.

`#include "linkpred/graphalg/traversal/graphtraversal.hpp"`
Include dependency graph for traversal.hpp:


include/linkpred/graphalg/traversal/traversal.hpp
linkpred/graphalg/traversal/graphtraversal.hpp
linkpred/core/dnetwork/dnetwork.hpp
linkpred/core/unetwork/unetwork.hpp
queue
stack
linkpred/utils/log.hpp
linkpred/core/ds/bhmap.hpp
type_traits
algorithm
list
string
cmath
linkpred/utils/randomgen.hpp
set
linkpred/utils/loglevel.hpp
sstream
iostream
fstream
ctime
map
vector
memory
random

This graph shows which files directly or indirectly include this file:


include/linkpred/graphalg/traversal/traversal.hpp
include/linkpred/graphalg/graphalg.hpp
include/linkpred.hpp

10.28.1 Detailed Description

Includes the headers related to graph traversal algorithms.

10.29 include/linkpred/instantiations.hpp File Reference

Contains explicit instantiations of template classes.

10.29.1 Detailed Description

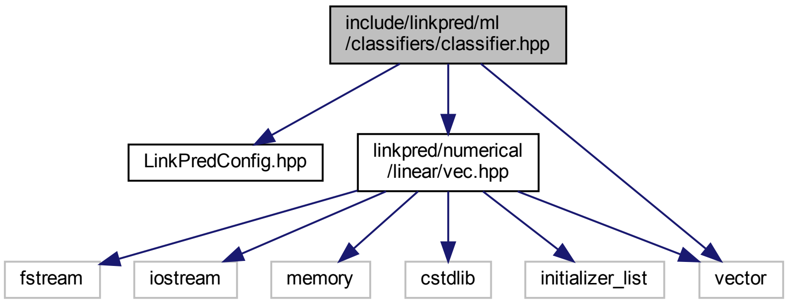
Contains explicit instantiations of template classes.

10.30 include/linkpred/ml/classifiers/classifier.hpp File Reference

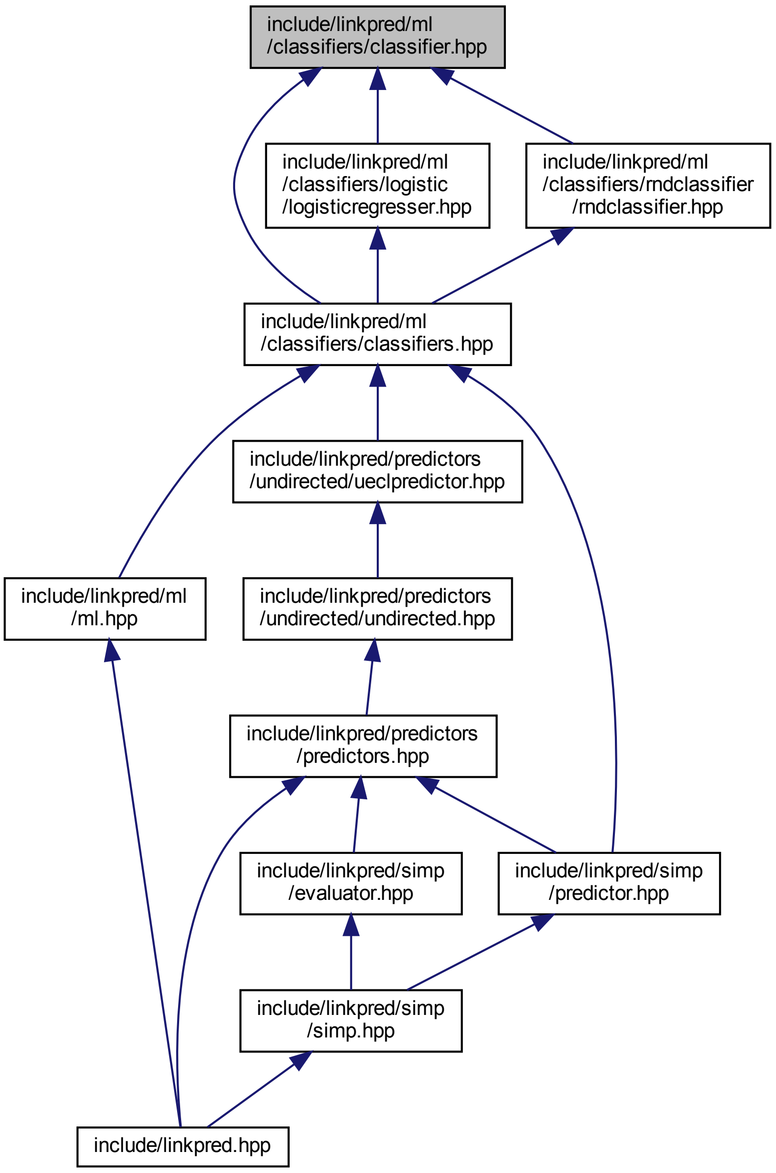
Contains the interface of a classifier.

```
#include "LinkPredConfig.hpp"
#include "linkpred/numerical/linear/vec.hpp"
#include <vector>
```

Include dependency graph for classifier.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/ml/classifiers/classifier.hpp
include/linkpred/ml/classifiers/logistic/logisticregresser.hpp
include/linkpred/ml/classifiers/rndclassifier/rndclassifier.hpp
include/linkpred/ml/classifiers/classifiers.hpp
include/linkpred/predictors/undirected/ueclpredictor.hpp
include/linkpred/ml/ml.hpp
include/linkpred/predictors/undirected/undirected.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::Classifier< InRndIt, OutRndIt, ScoreRndIt >

    Interface of a binary classifier.

Namespaces

- LinkPred

    Main namespace.

10.30.1 Detailed Description

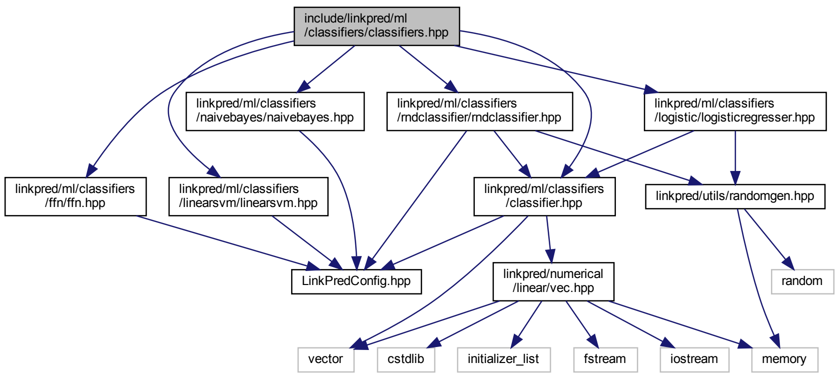
Contains the interface of a classifier.

10.31 include/linkpred/ml/classifiers/classifiers.hpp File Reference

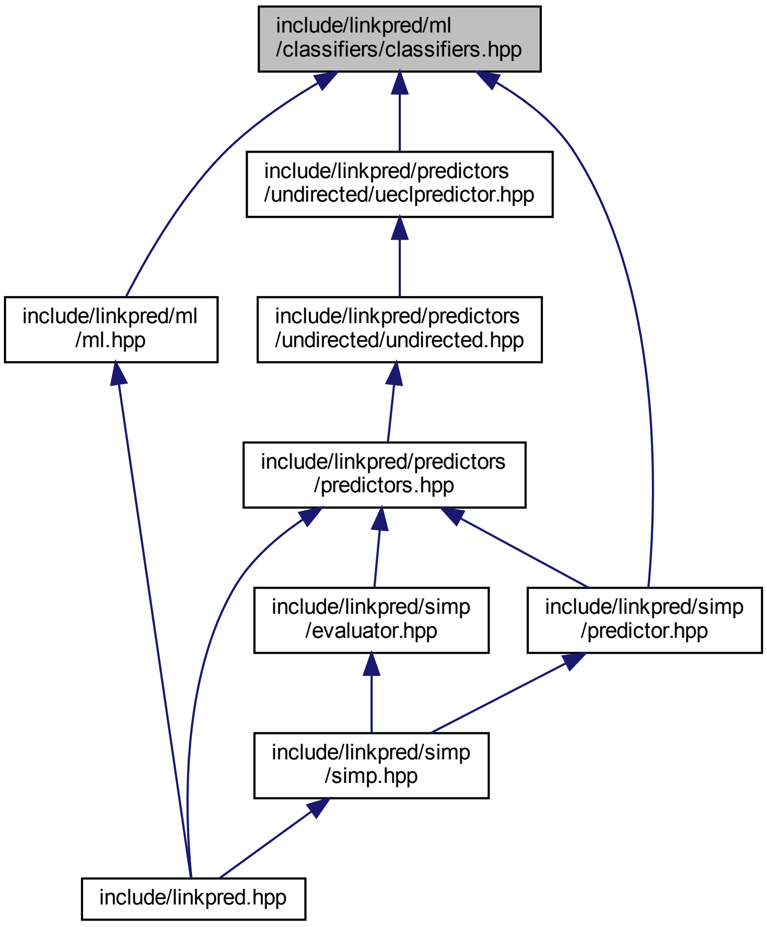
Includes the headers related to classifiers.

```
#include "linkpred/ml/classifiers/classifier.hpp"
#include "linkpred/ml/classifiers/ffn/ffn.hpp"
#include "linkpred/ml/classifiers/logistic/logisticregresser.hpp"
#include "linkpred/ml/classifiers/linearsvm/linearsvm.hpp"
#include "linkpred/ml/classifiers/naivebayes/naivebayes.hpp"
#include "linkpred/ml/classifiers/rndclassifier/rndclassifier.hpp"
```

Include dependency graph for classifiers.hpp:



This graph shows which files directly or indirectly include this file:



10.31.1 Detailed Description

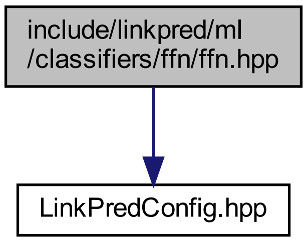
Includes the headers related to classifiers.

10.32 include/linkpred/ml/classifiers/ffn/ffn.hpp File Reference

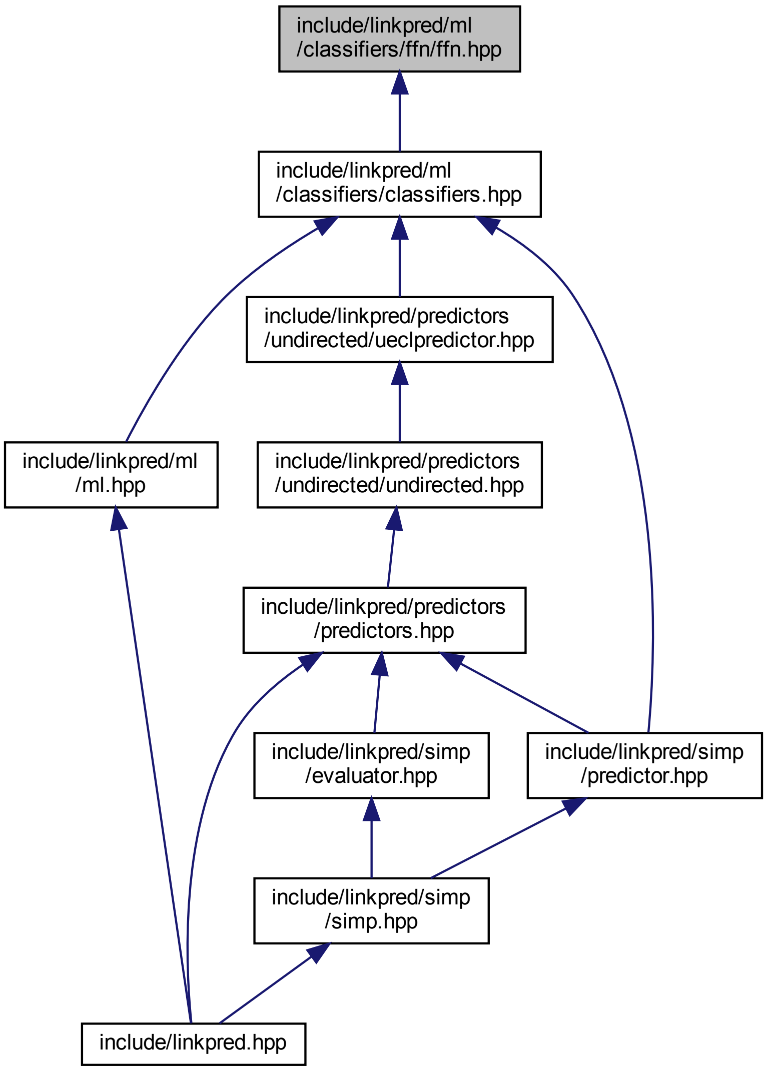
Contains a wrapper of mlpack::ann::FFN (feed-forward neural network).

```
#include "LinkPredConfig.hpp"
```

Include dependency graph for ffn.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/ml /classifiers/ffn/ffn.hpp
include/linkpred/ml /classifiers/classifiers.hpp
include/linkpred/predictors /undirected/ueclpredictor.hpp
include/linkpred/ml /ml.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

10.32.1 Detailed Description

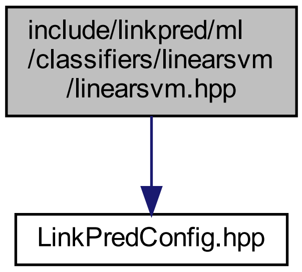
Contains a wrapper of mlpack::ann::FFN (feed-forward neural network).

10.33 include/linkpred/ml/classifiers/linearsvm/linearsvm.hpp File Reference

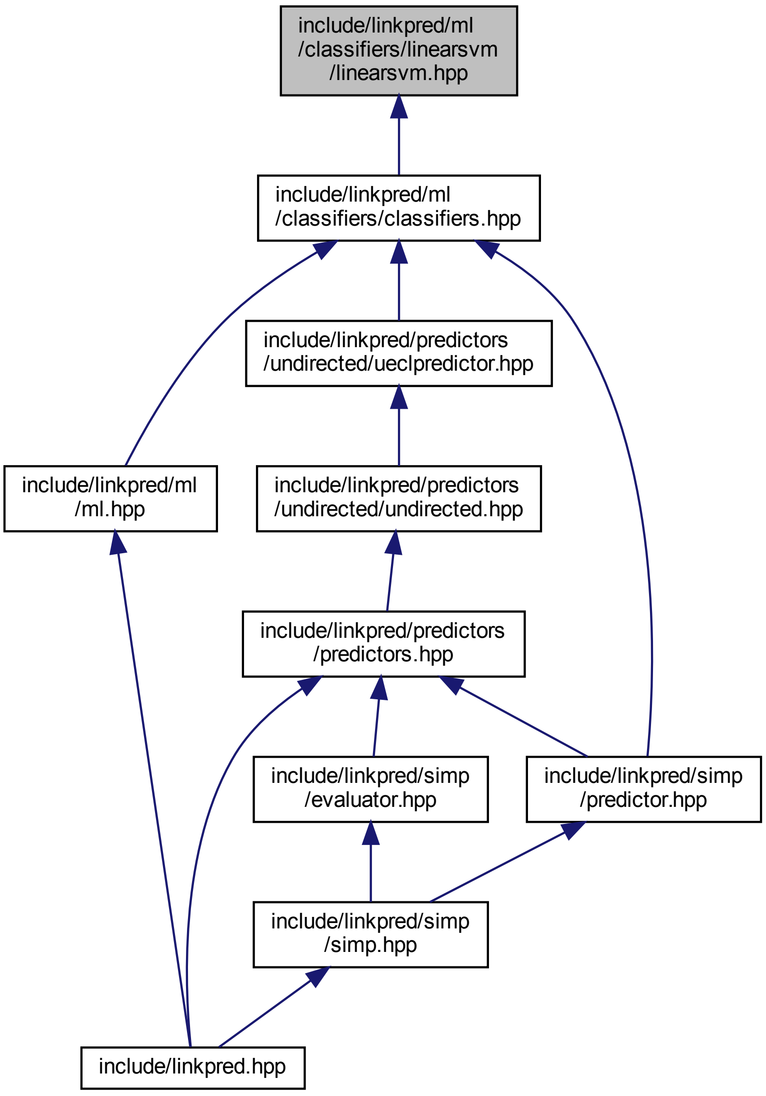
Contains a wrapper of mlpack::smv::LinearSVM.

```
#include "LinkPredConfig.hpp"
```

Include dependency graph for linearsvm.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/ml/classifiers/linearsvm/linearsvm.hpp
include/linkpred/ml/classifiers/classifiers.hpp
include/linkpred/predictors/undirected/ueclpredictor.hpp
include/linkpred/ml/ml.hpp
include/linkpred/predictors/undirected/undirected.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

10.33.1 Detailed Description

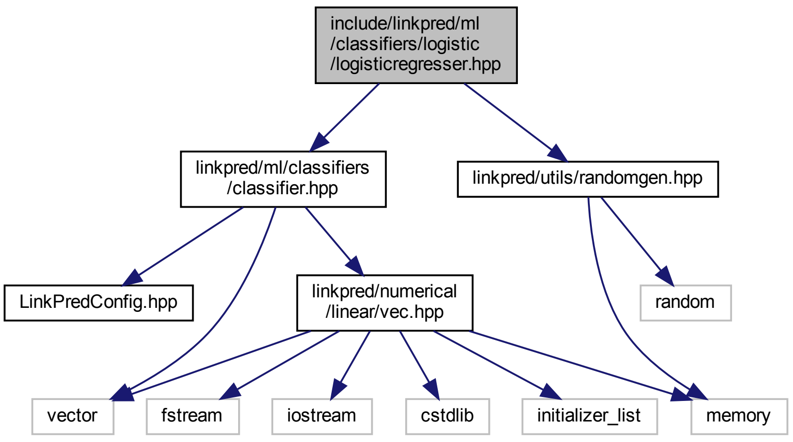
Contains a wrapper of mlpack::smv::LinearSVM.

10.34 include/linkpred/ml/classifiers/logistic/logisticregresser.hpp File Reference

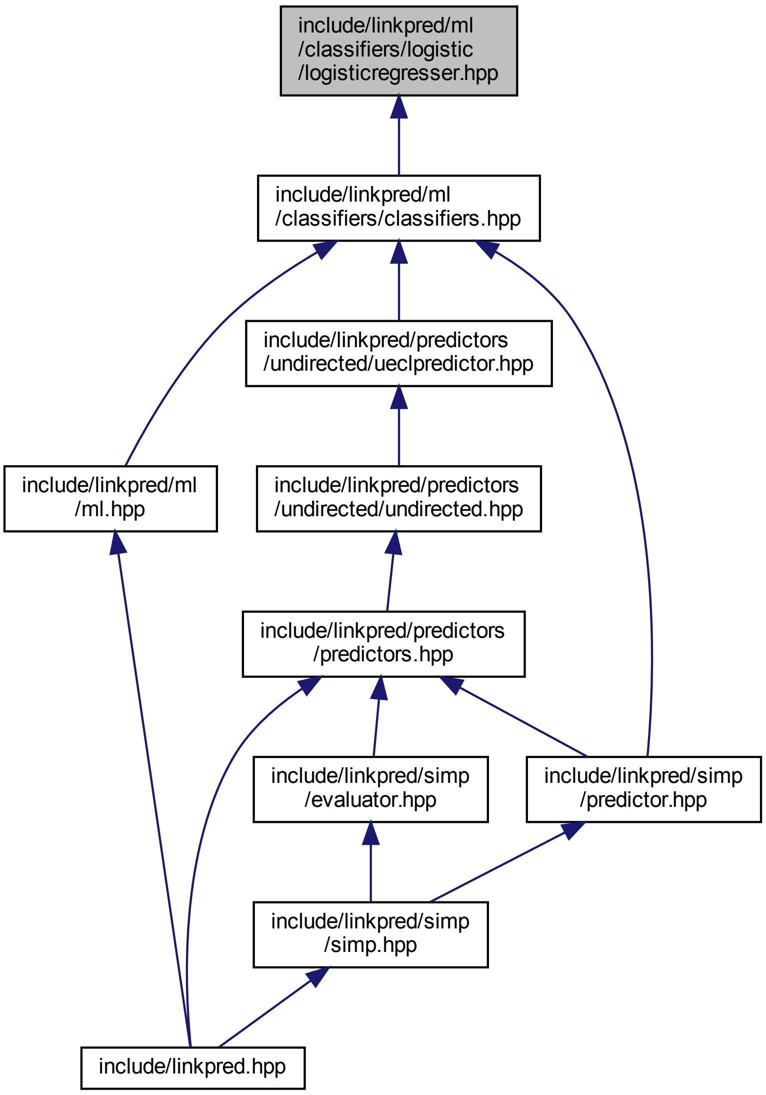
Contains the implementation of a logistic regression algorithm.

```
#include "linkpred/ml/classifiers/classifier.hpp"
#include "linkpred/utils/randomgen.hpp"
```

Include dependency graph for logisticregresser.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::LogisticRegresser< InRndIt, OutRndIt, ScoreRndIt >

  Logistic regression algorithm.

Namespaces

- LinkPred

  Main namespace.

10.34.1 Detailed Description

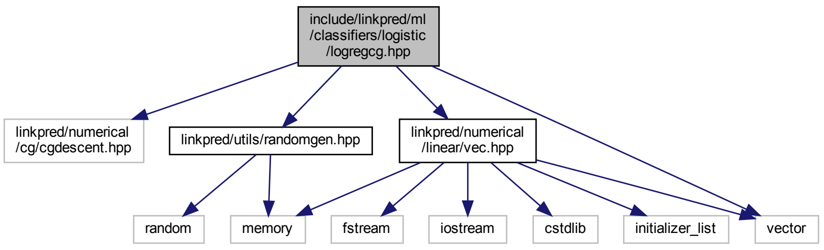
Contains the implementation of a logistic regression algorithm.

10.35 include/linkpred/ml/classifiers/logistic/logregcg.hpp File Reference

Contains the implementation of a logistic regression optimization problem.

```
#include "linkpred/numerical/cg/cgdescent.hpp"
#include "linkpred/utils/randomgen.hpp"
#include "linkpred/numerical/linear/vec.hpp"
#include <vector>
```

Include dependency graph for logregcg.hpp:



Classes

- class LinkPred::LogRegCG< InRndIt, OutRndIt >

    Logistic regression optimization problem.

Namespaces

- LinkPred

    Main namespace.

10.35.1 Detailed Description

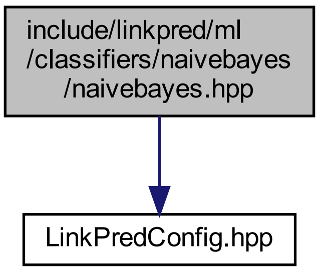
Contains the implementation of a logistic regression optimization problem.

10.36 include/linkpred/ml/classifiers/naivebayes/naivebayes.hpp File Reference

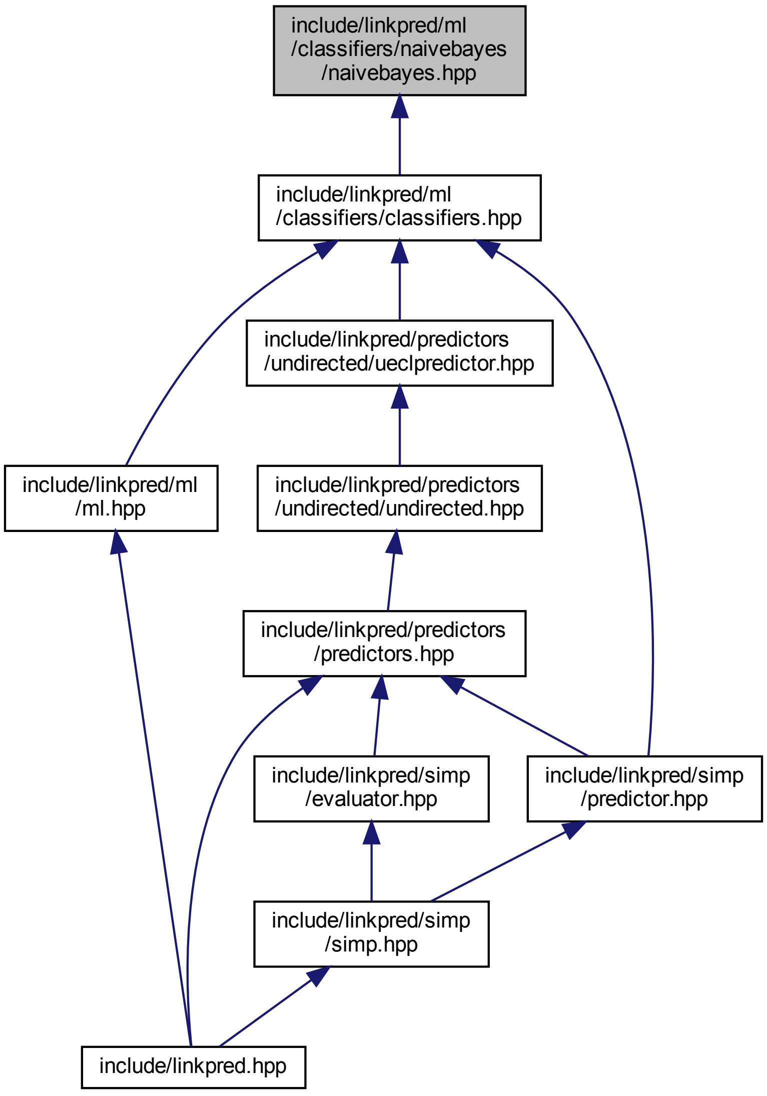
Contains a wrapper of mlpack::maive_bayes::NaiveBayesClassifier.

```
#include "LinkPredConfig.hpp"
```

Include dependency graph for naivebayes.hpp:



This graph shows which files directly or indirectly include this file:



10.36.1 Detailed Description

Contains a wrapper of mlpack::maive_bayes::NaiveBayesClassifier.

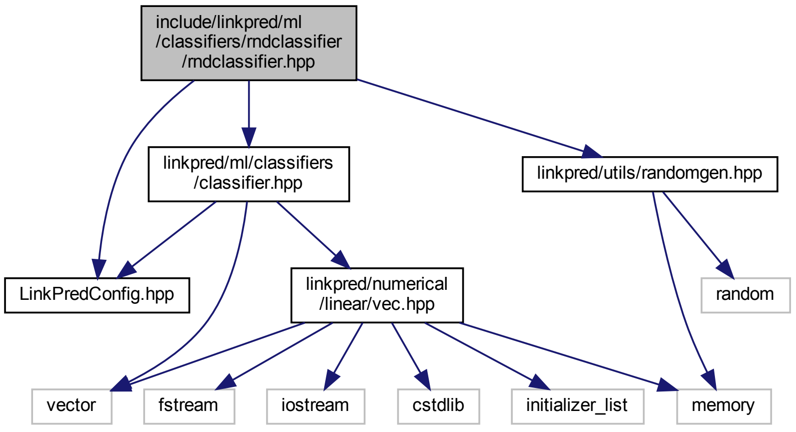
10.37 include/linkpred/ml/classifiers/rndclassifier/rndclassifier.hpp File Reference

Contains a random classiffier (for debugging purposes).

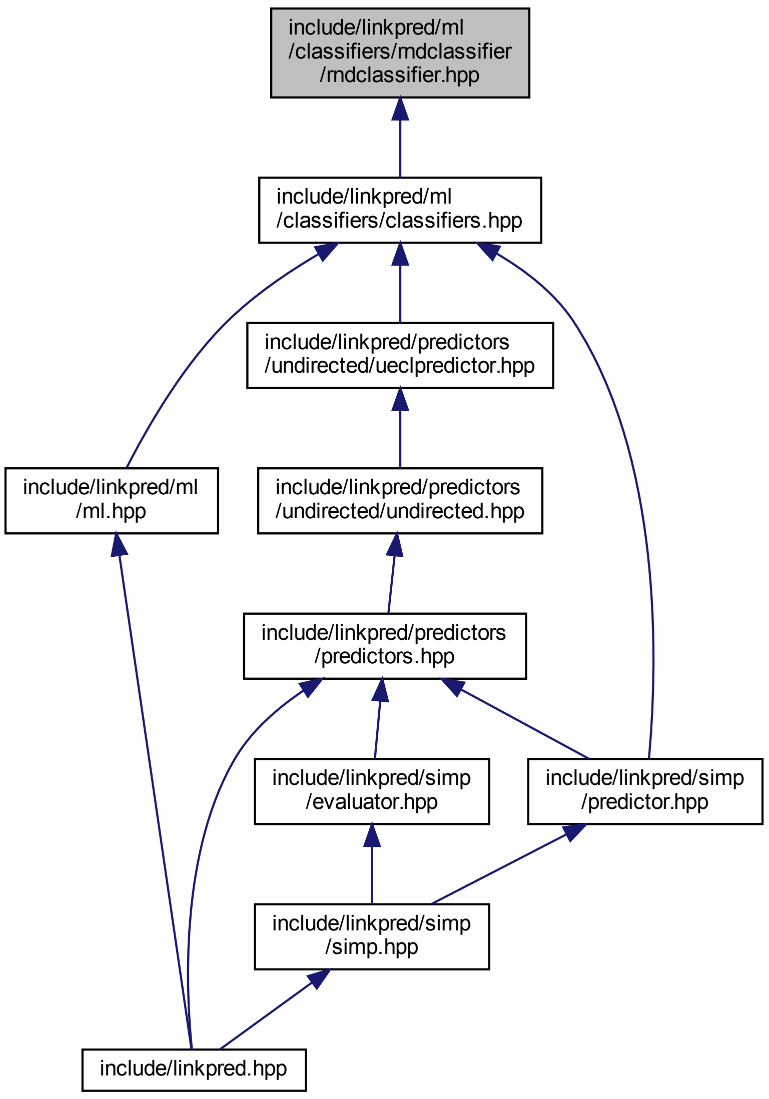
```
#include "LinkPredConfig.hpp"
#include "linkpred/ml/classifiers/classifier.hpp"
```

`#include "linkpred/utils/randomgen.hpp"`

Include dependency graph for rndclassifier.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::RndClassifier< InRndIt, OutRndIt, ScoreRndIt >

    Random classifier.

Namespaces

- LinkPred

    Main namespace.

10.37.1 Detailed Description

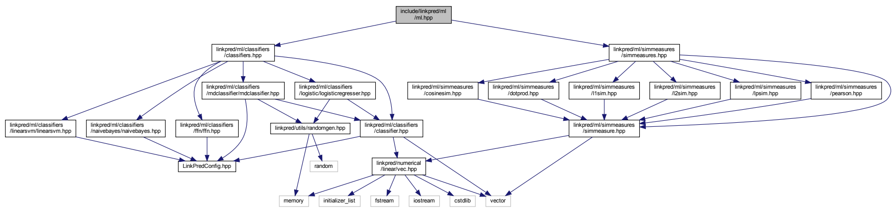
Contains a random classiffier (for debugging purposes).

10.38 include/linkpred/ml/ml.hpp File Reference

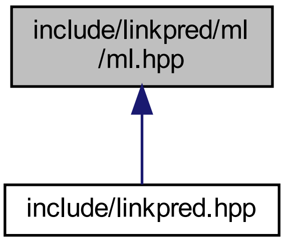
Includes the headers related to learning-based predictors.

```
#include "linkpred/ml/classifiers/classifiers.hpp"
#include "linkpred/ml/simmeasures/simmeasures.hpp"
```

Include dependency graph for ml.hpp:



This graph shows which files directly or indirectly include this file:



10.38.1 Detailed Description

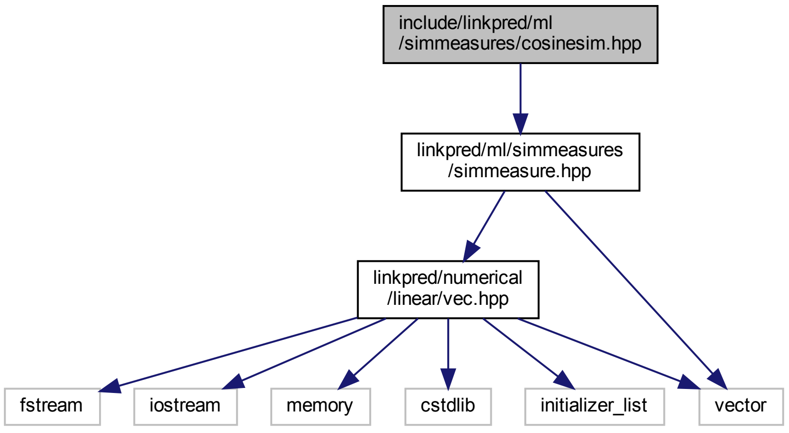
Includes the headers related to learning-based predictors.

10.39 include/linkpred/ml/simmeasures/cosinesim.hpp File Reference

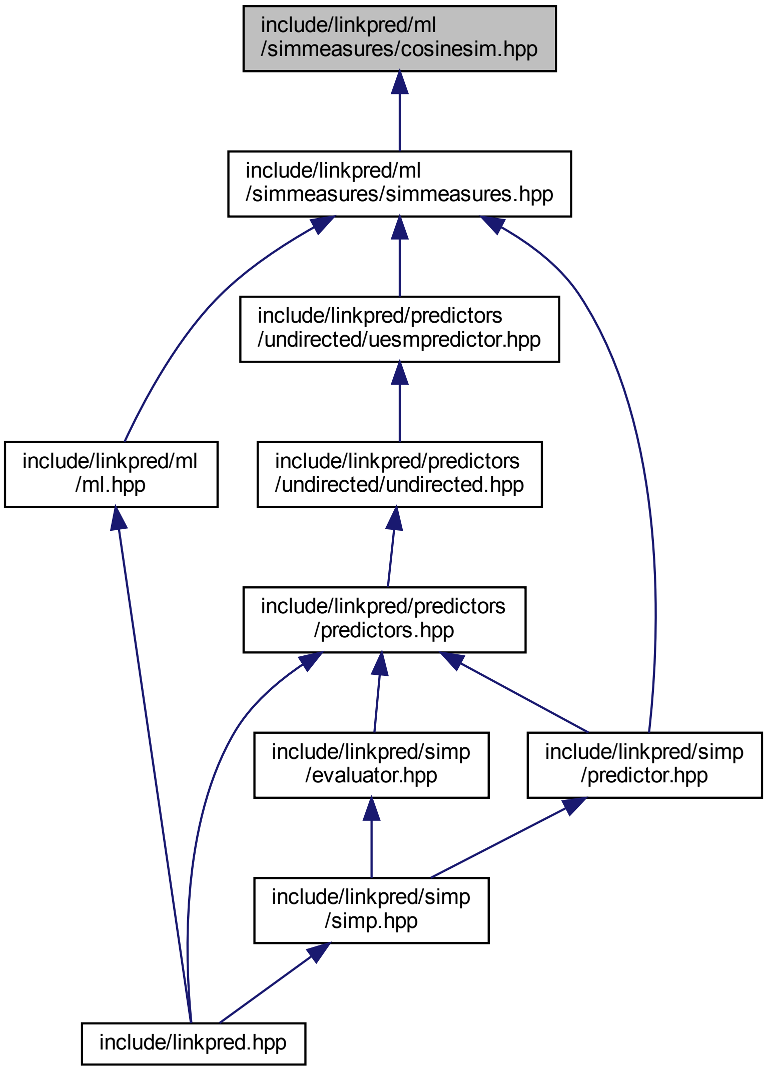
Contains the implementation of cosine similarity.

`#include "linkpred/ml/simmeasures/simmeasure.hpp"`

Include dependency graph for cosinesim.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/ml /simmeasures/cosinesim.hpp
include/linkpred/ml /simmeasures/simmeasures.hpp
include/linkpred/predictors /undirected/uesmpredictor.hpp
include/linkpred/ml /ml.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::CosineSim

  Cosine similarity.

Namespaces

- LinkPred

  Main namespace.

10.39.1 Detailed Description

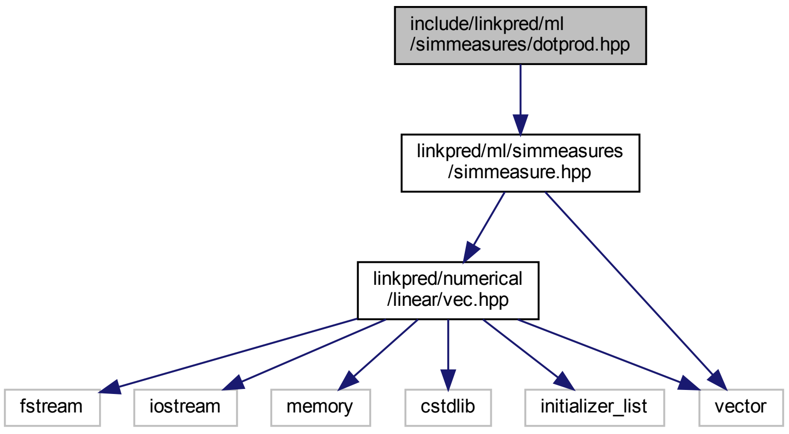
Contains the implementation of cosine similarity.

10.40 include/linkpred/ml/simmeasures/dotprod.hpp File Reference

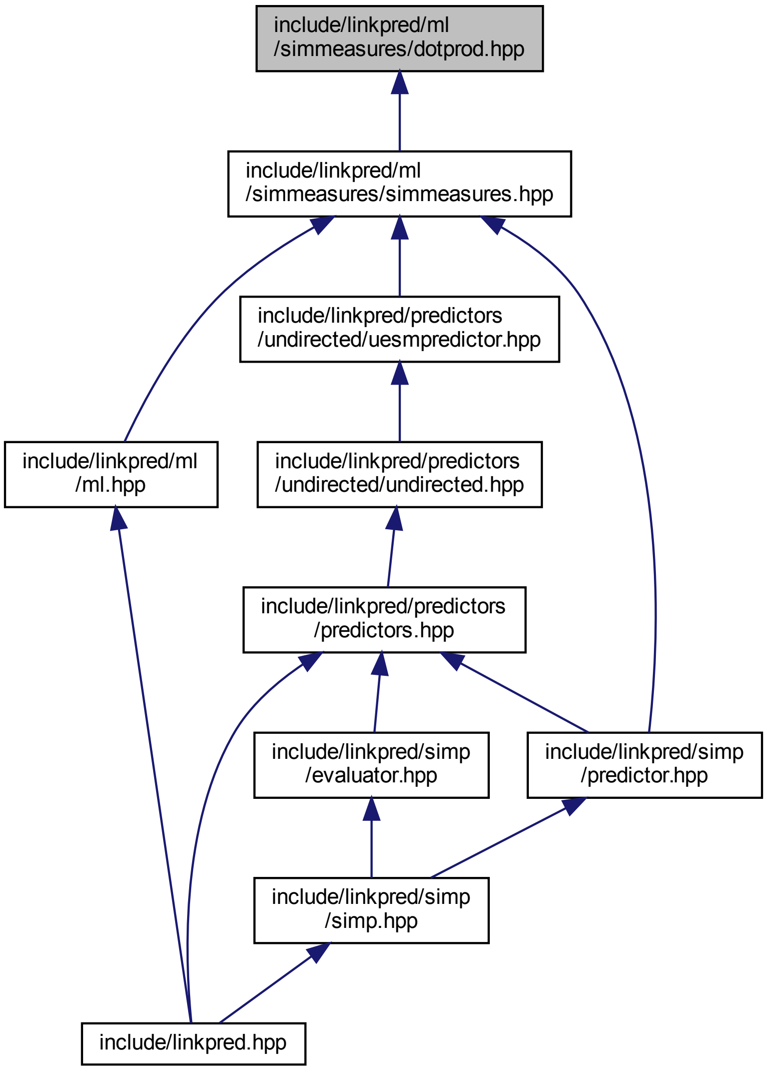
Contains the implementation of the dot product similarity measure.

```
#include "linkpred/ml/simmeasures/simmeasure.hpp"
```

Include dependency graph for dotprod.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::DotProd

  A simple dot product similarity measure.

Namespaces

- LinkPred

  Main namespace.

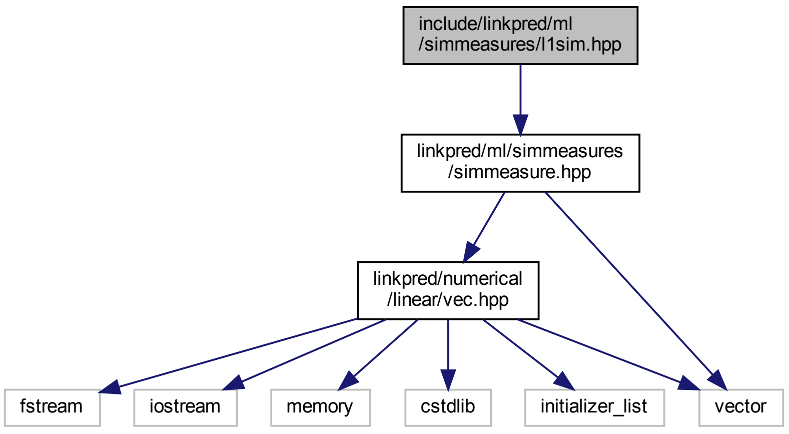
10.40.1 Detailed Description

Contains the implementation of the dot product similarity measure.

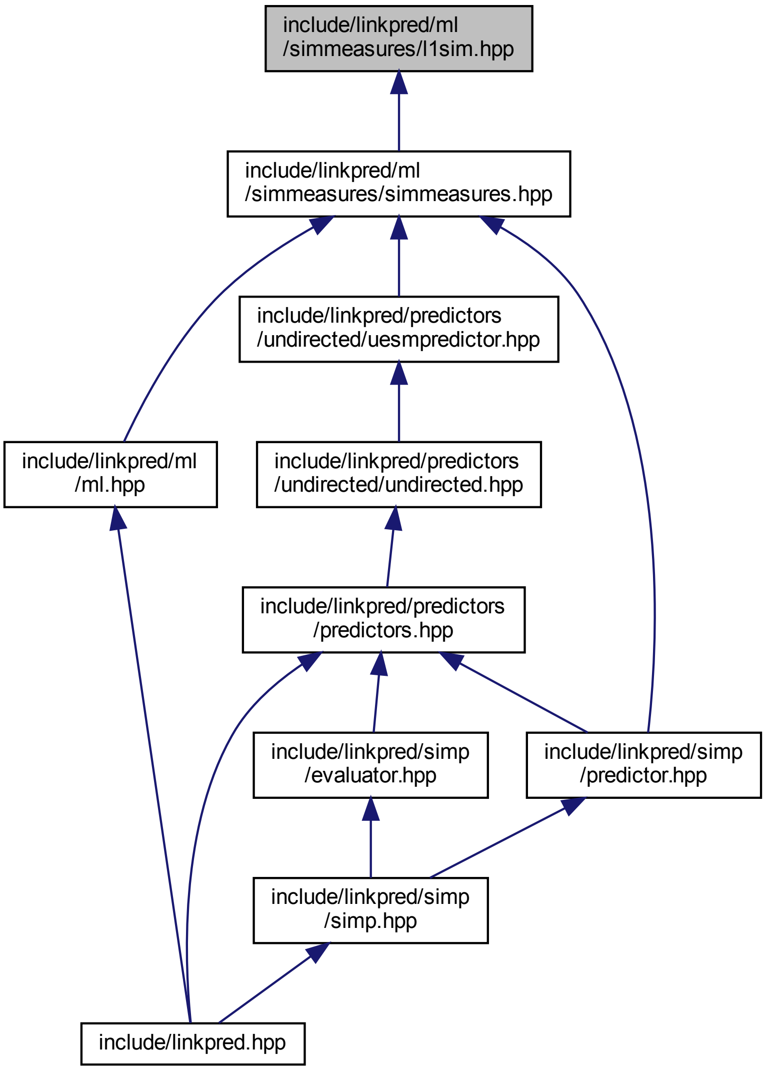
10.41 include/linkpred/ml/simmeasures/l1sim.hpp File Reference

Contains the implementation of L1 similarity.

```
#include "linkpred/ml/simmeasures/simmeasure.hpp"
```
Include dependency graph for l1sim.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::L1Sim

  L1 similarity (negative the L1 norm or Manhattan distance).

Namespaces

- LinkPred

  Main namespace.

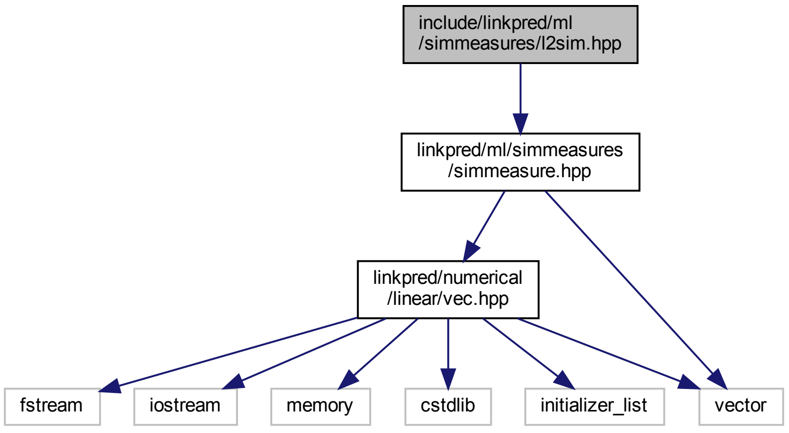
10.41.1 Detailed Description

Contains the implementation of L1 similarity.

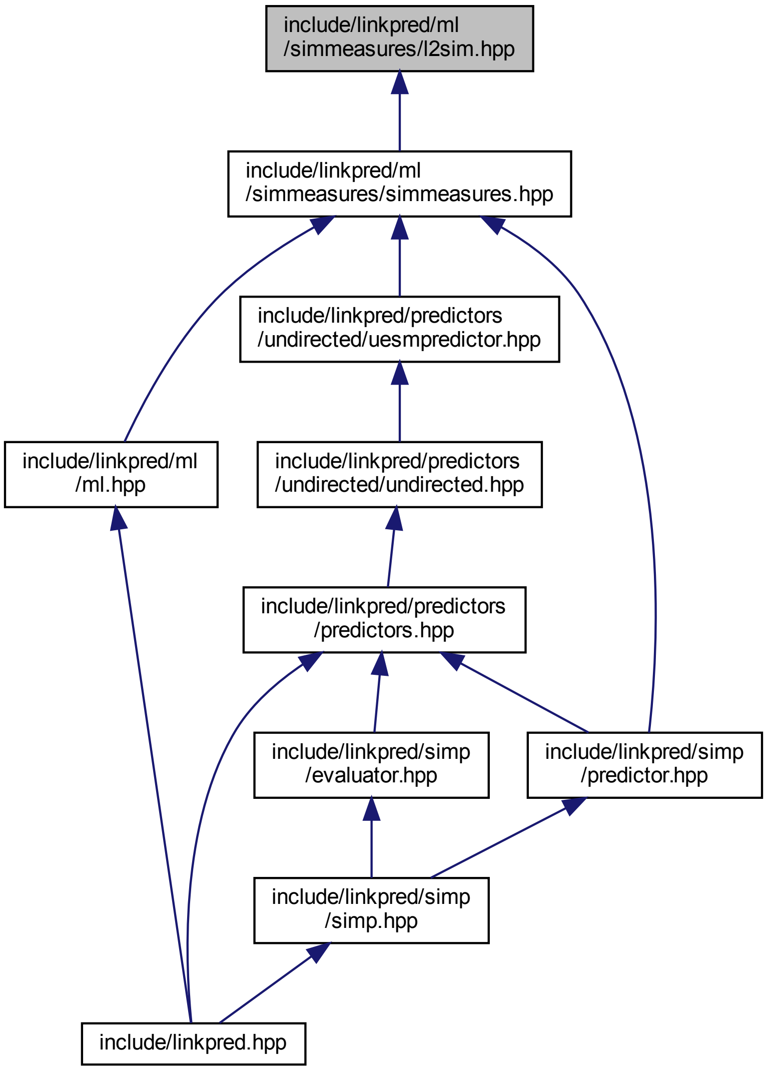
10.42 include/linkpred/ml/simmeasures/l2sim.hpp File Reference

Contains the implementation of L2 similarity.

```
#include "linkpred/ml/simmeasures/simmeasure.hpp"
```
Include dependency graph for l2sim.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::L2Sim

    L2 similarity (negative the Euclidean distance).

Namespaces

- LinkPred

    Main namespace.

10.42.1 Detailed Description

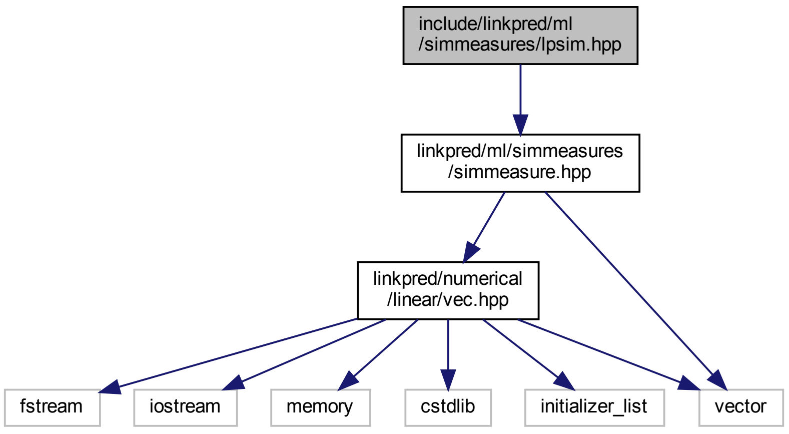
Contains the implementation of L2 similarity.

10.43 include/linkpred/ml/simmeasures/lpsim.hpp File Reference

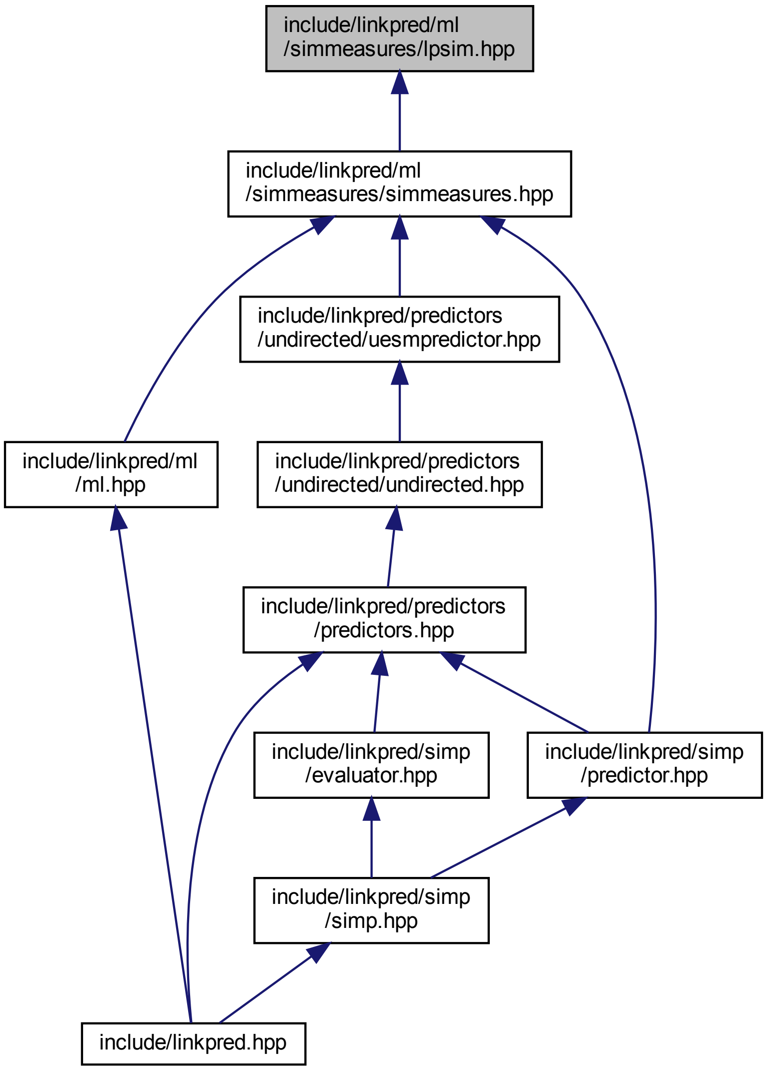
Contains the implementation of LP similarity.

```
#include "linkpred/ml/simmeasures/simmeasure.hpp"
```

Include dependency graph for lpsim.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/ml /simmeasures/lpsim.hpp
include/linkpred/ml /simmeasures/simmeasures.hpp
include/linkpred/predictors /undirected/uesmpredictor.hpp
include/linkpred/ml /ml.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::LPSim

  LP similarity (negative the Lp norm).

Namespaces

- LinkPred

  Main namespace.

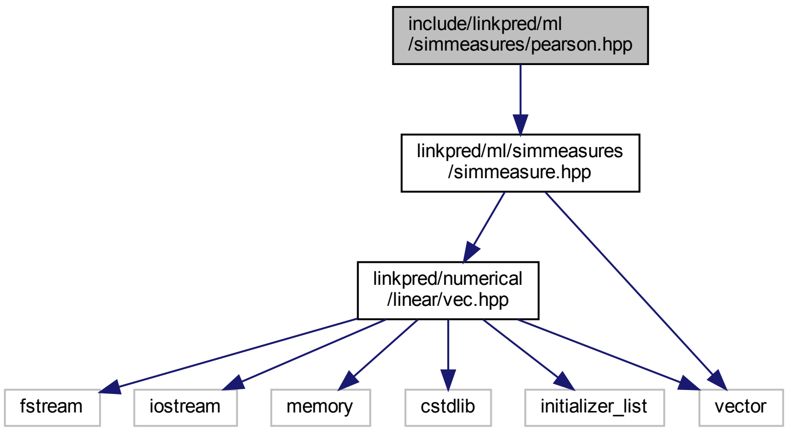
10.43.1 Detailed Description

Contains the implementation of LP similarity.

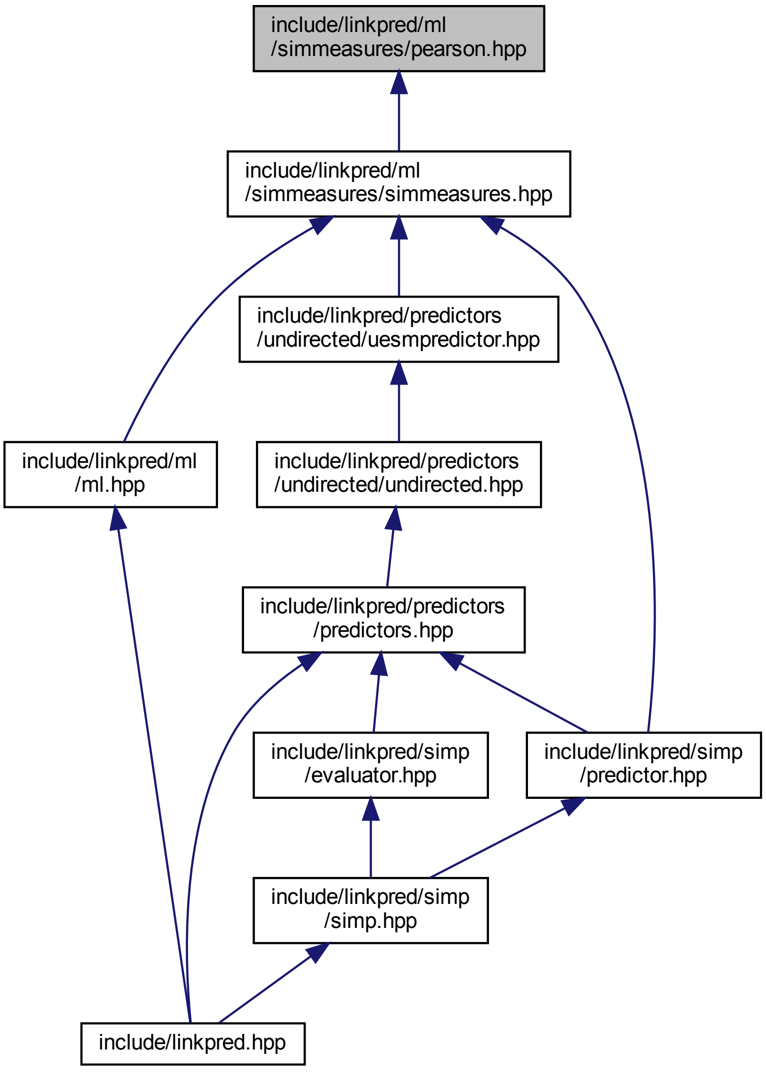
10.44 include/linkpred/ml/simmeasures/pearson.hpp File Reference

Contains the implementation of Perason similarity.

```
#include "linkpred/ml/simmeasures/simmeasure.hpp"
```
Include dependency graph for pearson.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::Pearson

  Pearson similarity (Pearson correlation coefficient).

Namespaces

- LinkPred

  Main namespace.

10.44.1 Detailed Description

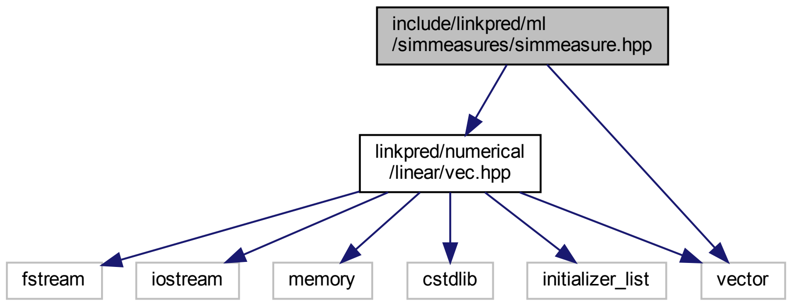
Contains the implementation of Perason similarity.

10.45 include/linkpred/ml/simmeasures/simmeasure.hpp File Reference

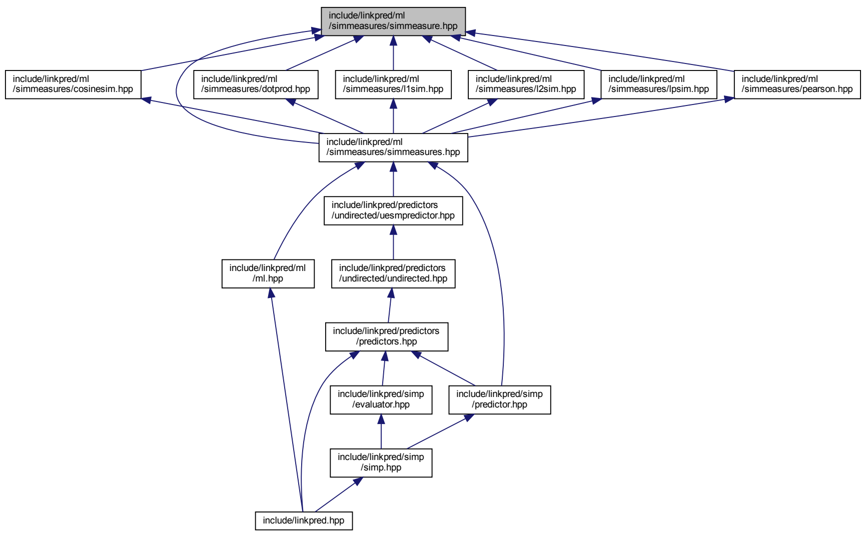
Contains the interface of a similarity measure.

```
#include "linkpred/numerical/linear/vec.hpp"
#include <vector>
```

Include dependency graph for simmeasure.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::SimMeasure

  Interface of a similarity measure.

Namespaces

- LinkPred

  Main namespace.

10.45.1 Detailed Description

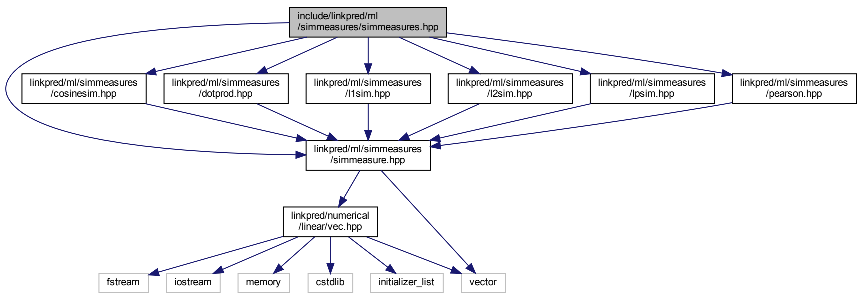
Contains the interface of a similarity measure.

10.46 include/linkpred/ml/simmeasures/simmeasures.hpp File Reference

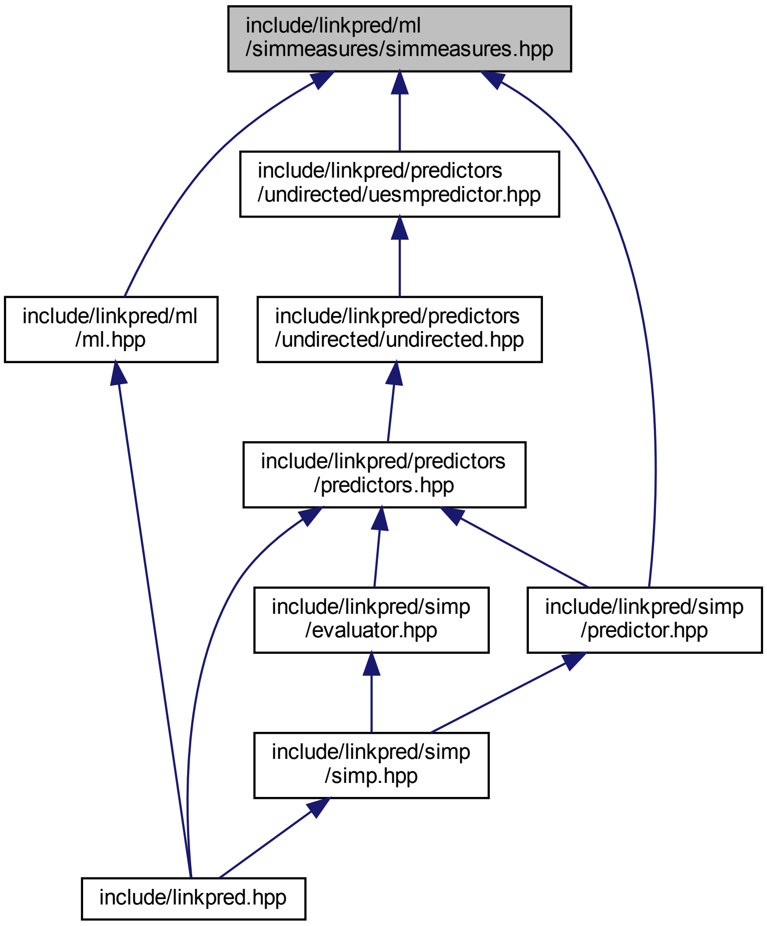
Includes the headers related to similarity measures.

```
#include "linkpred/ml/simmeasures/simmeasure.hpp"
#include "linkpred/ml/simmeasures/cosinesim.hpp"
#include "linkpred/ml/simmeasures/dotprod.hpp"
#include "linkpred/ml/simmeasures/l1sim.hpp"
#include "linkpred/ml/simmeasures/l2sim.hpp"
#include "linkpred/ml/simmeasures/lpsim.hpp"
#include "linkpred/ml/simmeasures/pearson.hpp"
```

Include dependency graph for simmeasures.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/ml /simmeasures/simmeasures.hpp
include/linkpred/predictors /undirected/uesmpredictor.hpp
include/linkpred/ml /ml.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

10.46.1 Detailed Description

Includes the headers related to similarity measures.

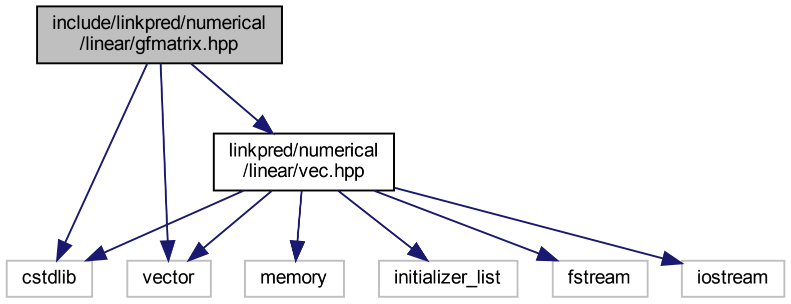
10.47 include/linkpred/numerical/linear/gfmatrix.hpp File Reference

Contains the implementation of a full matrix.

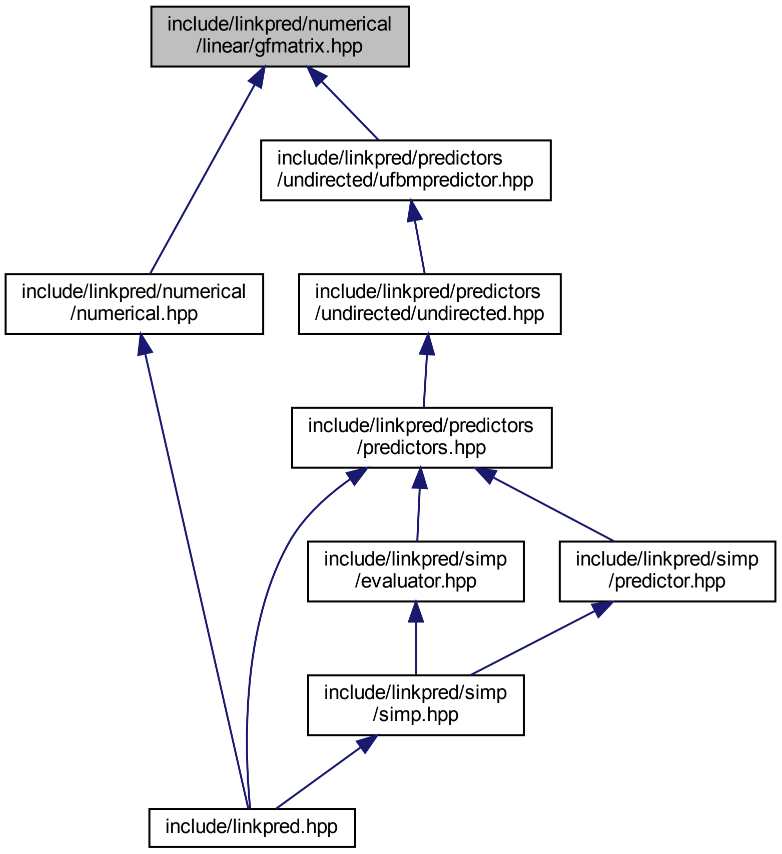
```
#include <cstdlib>
#include <vector>
```

`#include "linkpred/numerical/linear/vec.hpp"`

Include dependency graph for gfmatrix.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/numerical
/linear/gfmatrix.hpp
include/linkpred/predictors
/undirected/ufbmpredictor.hpp
include/linkpred/numerical
/numerical.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::GFMatrix

Generalized full matrix. The storage scheme used is column-major.

Namespaces

- LinkPred

  Main namespace.

10.47.1 Detailed Description

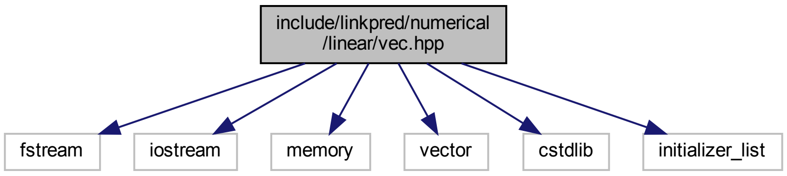
Contains the implementation of a full matrix.

10.48 include/linkpred/numerical/linear/vec.hpp File Reference

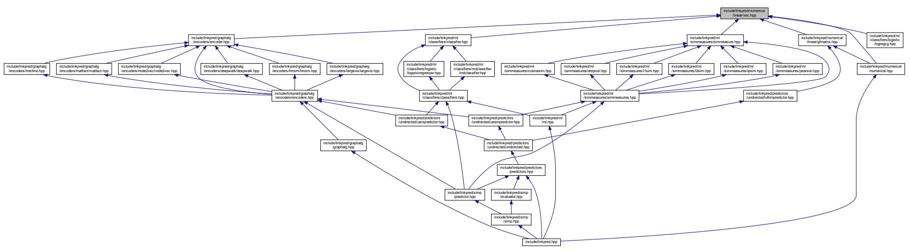
Contains the implementation of a vector (in the sense of linear algebra).

```
#include <fstream>
#include <iostream>
#include <memory>
#include <vector>
#include <cstdlib>
#include <initializer_list>
```

Include dependency graph for vec.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::Vec

  This class represent a vector (in the sense of linear algebra).

Namespaces

- LinkPred

  Main namespace.

Functions

- Vec LinkPred::operator+ (Vec const &v1, Vec const &v2)
- Vec LinkPred::operator- (Vec const &v1, Vec const &v2)
- Vec LinkPred::operator* (Vec const &v1, Vec const &v2)
- Vec LinkPred::operator/ (Vec const &v1, Vec const &v2)
- Vec LinkPred::operator+ (double a, Vec const &v)
- Vec LinkPred::operator- (double a, Vec const &v)
- Vec LinkPred::operator* (double a, Vec const &v)
- Vec LinkPred::operator/ (double a, Vec const &v)
- Vec LinkPred::operator+ (Vec const &v, double a)
- Vec LinkPred::operator- (Vec const &v, double a)
- Vec LinkPred::operator* (Vec const &v, double a)
- Vec LinkPred::operator/ (Vec const &v, double a)
- double LinkPred::operator^ (Vec const &v1, Vec const &v2)

10.48.1 Detailed Description

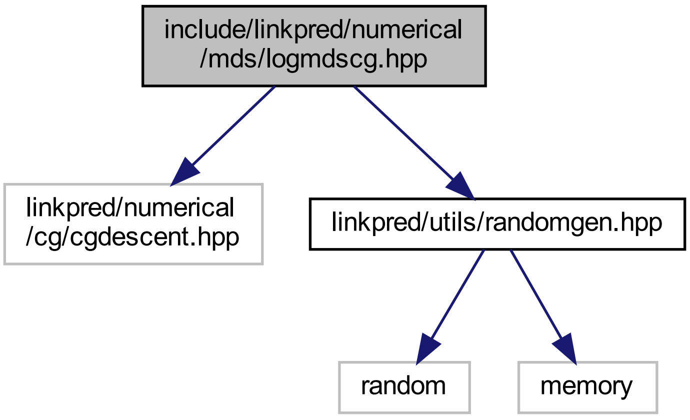
Contains the implementation of a vector (in the sense of linear algebra).

10.49 include/linkpred/numerical/mds/logmdscg.hpp File Reference

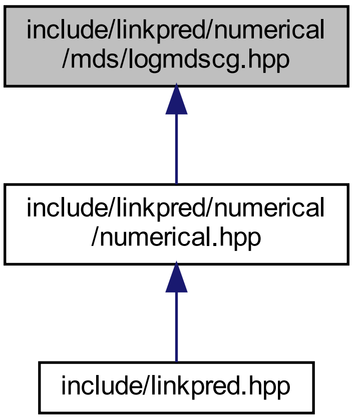
Contains the implementation of the optimization problem associated with multidimensional scaling using the logarithmic (MULTISCALE) loss function.

```
#include "linkpred/numerical/cg/cgdescent.hpp"
#include "linkpred/utils/randomgen.hpp"
```

Include dependency graph for logmdscg.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::LogMDSCG

  Optimization problem associated with multidimensional scaling using the logarithmic (MULTISCALE) loss function.

Namespaces

- LinkPred

  Main namespace.

10.49.1 Detailed Description

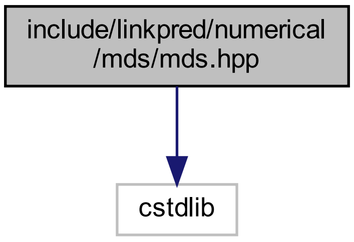
Contains the implementation of the optimization problem associated with multidimensional scaling using the logarithmic (MULTISCALE) loss function.

10.50 include/linkpred/numerical/mds/mds.hpp File Reference

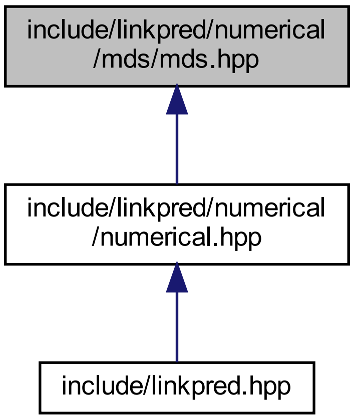
Contains the implementation of a solver of the multidimensional scaling problem using the logarithmic (MULTISC↩ALE) loss function.

`#include <cstdlib>`

Include dependency graph for mds.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::MDS

  Solve the MDS problem.

Namespaces

- LinkPred

  Main namespace.

Enumerations

- enum LinkPred::MDSAlg { LinkPred::IpoptMDS, LinkPred::CGMDS }

  MDS solution methods.

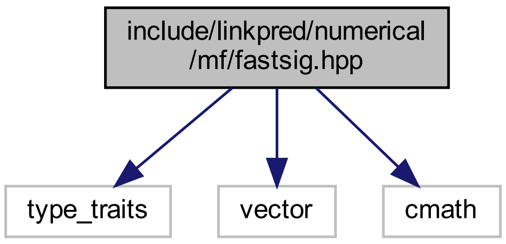
10.50.1 Detailed Description

Contains the implementation of a solver of the multidimensional scaling problem using the logarithmic (MULTISC↩
ALE) loss function.

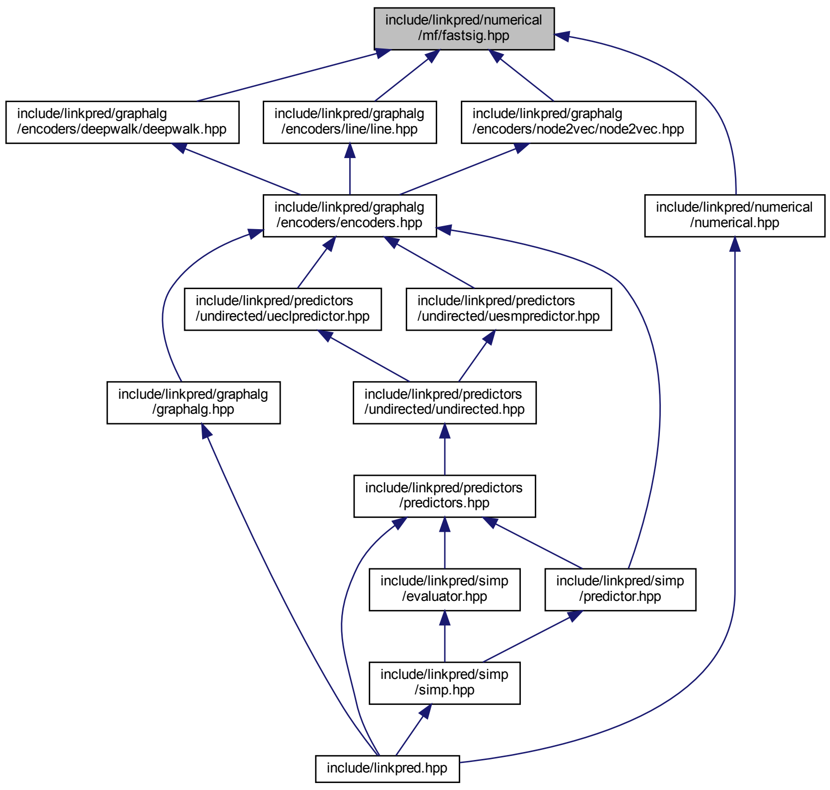
10.51 include/linkpred/numerical/mf/fastsig.hpp File Reference

Contains the implementation of a fast sigmoid.

```
#include <type_traits>
#include <vector>
#include <cmath>
```
Include dependency graph for fastsig.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/numerical
/mf/fastsig.hpp
include/linkpred/graphalg
/encoders/deepwalk/deepwalk.hpp
include/linkpred/graphalg
/encoders/line/line.hpp
include/linkpred/graphalg
/encoders/node2vec/node2vec.hpp
include/linkpred/graphalg
/encoders/encoders.hpp
include/linkpred/numerical
/numerical.hpp
include/linkpred/predictors
/undirected/ueclpredictor.hpp
include/linkpred/predictors
/undirected/uesmpredictor.hpp
include/linkpred/graphalg
/graphalg.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::FastSig< T >

  A fast sigmoid.

Namespaces

- LinkPred

  Main namespace.

10.51.1 Detailed Description

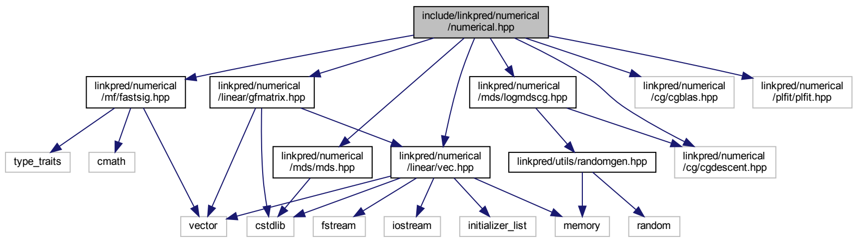
Contains the implementation of a fast sigmoid.

10.52 include/linkpred/numerical/numerical.hpp File Reference

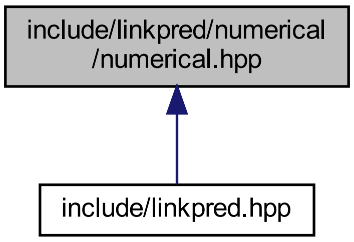
Includes the headers related to numerical algorithms.

```
#include "linkpred/numerical/mf/fastsig.hpp"
#include "linkpred/numerical/mds/logmdscg.hpp"
#include "linkpred/numerical/mds/mds.hpp"
#include "linkpred/numerical/linear/gfmatrix.hpp"
#include "linkpred/numerical/linear/vec.hpp"
#include "linkpred/numerical/cg/cgblas.hpp"
#include "linkpred/numerical/cg/cgdescent.hpp"
#include "linkpred/numerical/plfit/plfit.hpp"
```

Include dependency graph for numerical.hpp:


include/linkpred/numerical/numerical.hpp
linkpred/numerical/mf/fastsig.hpp
linkpred/numerical/linear/gfmatrix.hpp
linkpred/numerical/mds/logmdscg.hpp
linkpred/numerical/cg/cgblas.hpp
linkpred/numerical/plfit/plfit.hpp
type_traits
cmath
linkpred/numerical/mds/mds.hpp
linkpred/numerical/linear/vec.hpp
linkpred/utils/randomgen.hpp
linkpred/numerical/cg/cgdescent.hpp
vector
cstdlib
fstream
iostream
initializer_list
memory
random

This graph shows which files directly or indirectly include this file:



10.52.1 Detailed Description

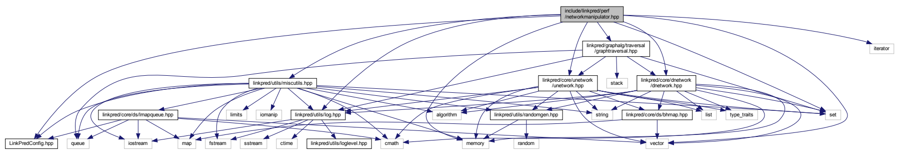
Includes the headers related to numerical algorithms.

10.53 include/linkpred/perf/networkmanipulator.hpp File Reference

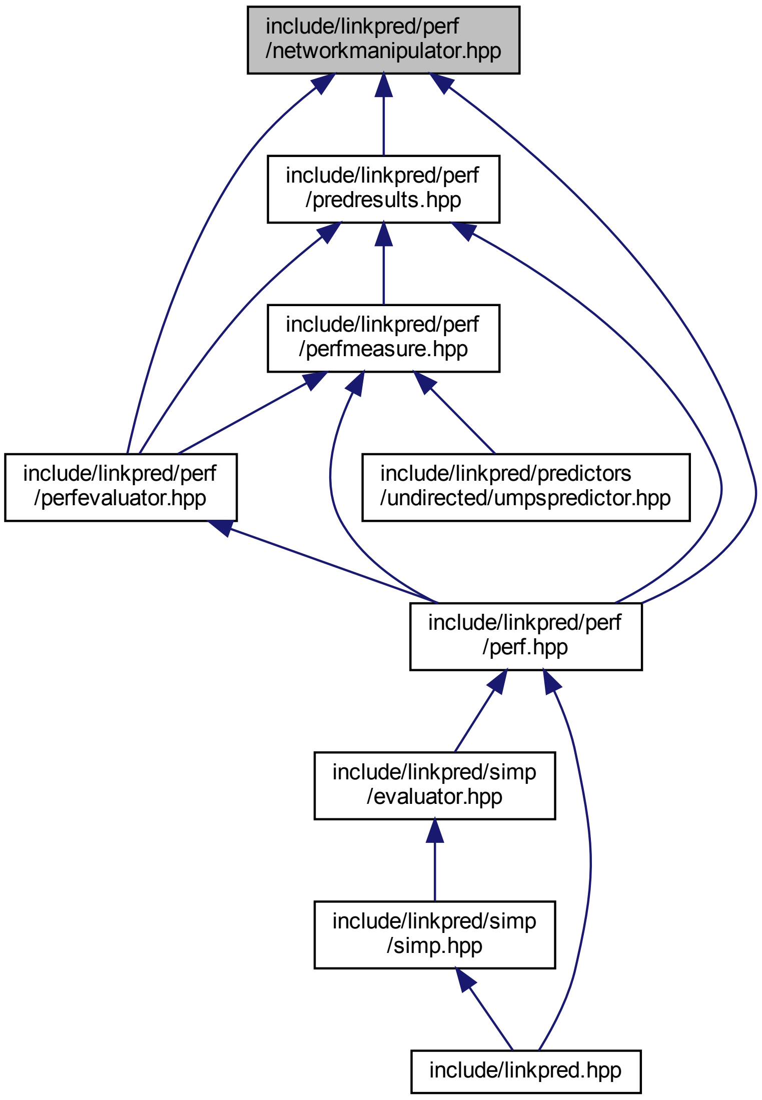
Contains the implementation of test data related classes.

```
#include "LinkPredConfig.hpp"
#include <linkpred/utils/miscutils.hpp>
#include "linkpred/core/unetwork/unetwork.hpp"
#include "linkpred/core/dnetwork/dnetwork.hpp"
#include "linkpred/graphalg/traversal/graphtraversal.hpp"
#include "linkpred/utils/log.hpp"
#include <memory>
#include <vector>
#include <set>
#include <iterator>
```

Include dependency graph for networkmanipulator.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::TestEdgeGen< Network, EdgeContT >

  Generate true positives and true negatives.
- class LinkPred::TestEdgeGen< Network, EdgeContT >::TPEdgeIt

  TP edges iterator.
- class LinkPred::TestEdgeGen< Network, EdgeContT >::TNEdgeIt

  TN edges iterator.
- class LinkPred::TestData< Network, EdgeContT >

  Test data.
- class LinkPred::TestData< Network, EdgeContT >::TestEdgeIt

  Test edges iterator.

- class LinkPred::NetworkManipulator< Network >

    Class to manipulate network by removing or adding edges.

Namespaces

- LinkPred

    Main namespace.

Enumerations

- enum LinkPred::LinkClass { LinkPred::TP, LinkPred::FN, LinkPred::FP, LinkPred::TN }

    Enumeration of all classes of links.

10.53.1 Detailed Description

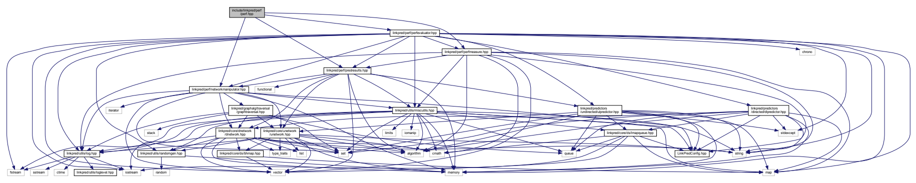
Contains the implementation of test data related classes.

10.54 include/linkpred/perf/perf.hpp File Reference

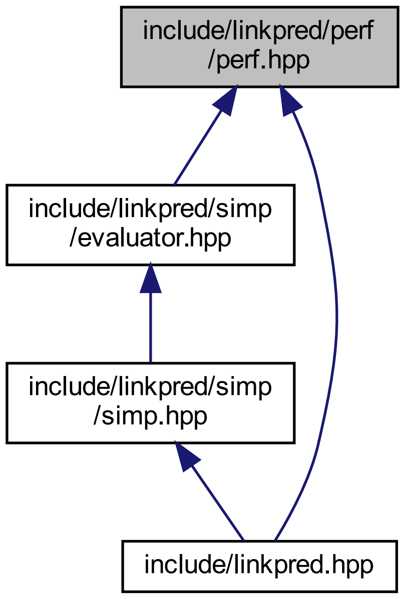
Includes the headers related to performance evaluation classes.

```
#include "linkpred/perf/predresults.hpp"
#include "linkpred/perf/perfmeasure.hpp"
#include "linkpred/perf/networkmanipulator.hpp"
#include "linkpred/perf/perfevaluator.hpp"
```

Include dependency graph for perf.hpp:



This graph shows which files directly or indirectly include this file:



10.54.1 Detailed Description

Includes the headers related to performance evaluation classes.

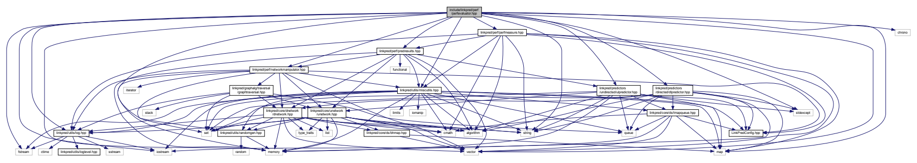
10.55 include/linkpred/perf/perfevaluator.hpp File Reference

Includes the headers related to core classes.

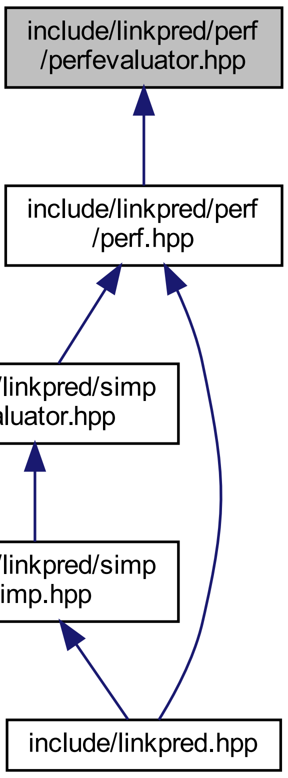
```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <linkpred/utils/miscutils.hpp>
#include "linkpred/predictors/directed/dlpredictor.hpp"
#include "linkpred/perf/predresults.hpp"
#include "linkpred/perf/perfmeasure.hpp"
#include "linkpred/perf/networkmanipulator.hpp"
#include "linkpred/utils/randomgen.hpp"
#include "linkpred/utils/log.hpp"
#include <string>
#include <memory>
#include <vector>
#include <chrono>
#include <map>
#include <stdexcept>
#include <iostream>
```

`#include <fstream>`

Include dependency graph for perfevaluator.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::PerfEvaluator< TestDataT, LPredictorT, PredResultsT, PerfMeasureT >

    Performance evaluator.
- struct LinkPred::PerfeEvalExpDescp< Network >

    Structure storing experiment description.
- class LinkPred::PEFactory< Network, LPredictorT, TestDataT, PerfMeasureT >

    Factory class to create link predictors and performance measures.
- class LinkPred::PerfEvalExp< Network, TestDataT, LPredictorT, PredResultsT, PerfMeasureT >

    Performance evaluation experiment.

Namespaces

- LinkPred

  Main namespace.

10.55.1 Detailed Description

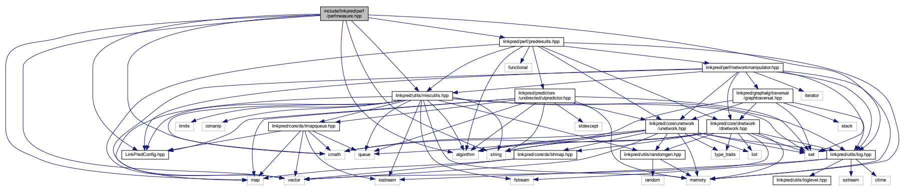
Includes the headers related to core classes.

10.56 include/linkpred/perf/perfmeasure.hpp File Reference

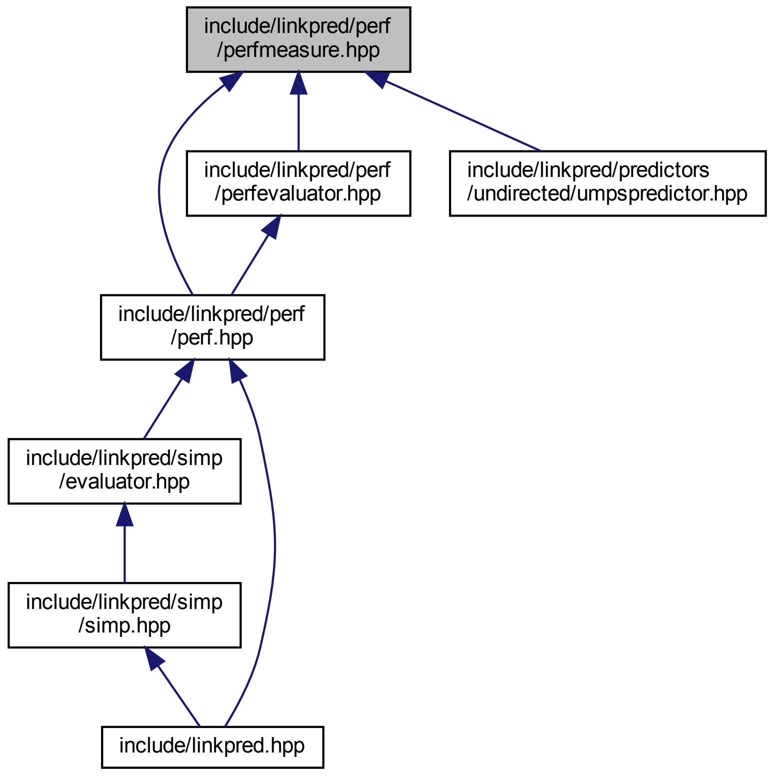
Contains the implementation of several performance measures.

```
#include "LinkPredConfig.hpp"
#include <linkpred/utils/miscutils.hpp>
#include "linkpred/perf/predresults.hpp"
#include "linkpred/utils/log.hpp"
#include <vector>
#include <algorithm>
#include <map>
#include <string>
#include <cmath>
```

Include dependency graph for perfmeasure.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/perf /perfmeasure.hpp
include/linkpred/perf /perfevaluator.hpp
include/linkpred/predictors /undirected/umpspredictor.hpp
include/linkpred/perf /perf.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::PerfMeasure< PredResultsT >

  Abstract performance measure.
- class LinkPred::PerfCurve< PredResultsT >

  Abstract performance curve.
- class LinkPred::ROC< PredResultsT >

  Receiver Operating Characteristic curve.
- class LinkPred::PR< PredResultsT >

  The precision recall curve.
- class LinkPred::TPR< PredResultsT >

  Compute top precision.
- class LinkPred::GCurve< PredResultsT >

  General performance curve.

Namespaces

- LinkPred

  Main namespace.

Typedefs

- using LinkPred::PerfResults = std::map< std::string, double >
- using LinkPred::PerfLambda::PerfLambdaT = std::function< double(std::size_t tp, std::size_t fn, std::size_t tn, std::size_t fp, std::size_t P, std::size_t N)>

Variables

- auto LinkPred::PerfLambda::rec
- auto LinkPred::PerfLambda::fpr
- auto LinkPred::PerfLambda::pre
- auto LinkPred::PerfLambda::fnr
- auto LinkPred::PerfLambda::tnr
- auto LinkPred::PerfLambda::fmr
- auto LinkPred::PerfLambda::acc
- auto LinkPred::PerfLambda::fdr
- auto LinkPred::PerfLambda::npv

10.56.1 Detailed Description

Contains the implementation of several performance measures.

10.56.2 Typedef Documentation

10.56.2.1 PerfLambdaT

```
using LinkPred::PerfLambda::PerfLambdaT = typedef std::function<double(std::size_t tp, std↩
::size_t fn, std::size_t tn, std::size_t fp, std::size_t P, std::size_t N)>
```

Signature of performance lambdas.

10.56.3 Variable Documentation

10.56.3.1 acc

```
auto LinkPred::PerfLambda::acc
```

Initial value:

```
= [](std::size_t tp, std::size_t fn, std::size_t tn, std::size_t fp,
        std::size_t P, std::size_t N) {
    return (double) (tp + tn) / (P + N);
}
```

Accuracy.

Parameters

tp	The number of true positives.
fn	The number of false negatives.
tn	The number of true negatives.
fp	The number of false positives.
P	The number of positives.
N	The number of negatives.

10.56.3.2 fdr

```
auto LinkPred::PerfLambda::fdr
```

Initial value:

```
= [](std::size_t tp, std::size_t fn, std::size_t tn, std::size_t fp,
        std::size_t P, std::size_t N) {
    return (double) fp / (tp + fp);
}
```

False discovery rate.

Parameters

tp	The number of true positives.
fn	The number of false negatives.
tn	The number of true negatives.
fp	The number of false positives.
P	The number of positives.
N	The number of negatives.

10.56.3.3 fmr

```
auto LinkPred::PerfLambda::fmr
```

Initial value:

```
= [](std::size_t tp, std::size_t fn, std::size_t tn, std::size_t fp,
        std::size_t P, std::size_t N) {
    return (double) fn / (tn + fn);
}
```

False omission rate.

Parameters

tp	The number of true positives.
fn	The number of false negatives.
tn	The number of true negatives.
fp	The number of false positives.
P	The number of positives.
N	The number of negatives.

10.56.3.4 fnr

```
auto LinkPred::PerfLambda::fnr
```

Initial value:
```
= [](std::size_t tp, std::size_t fn, std::size_t tn, std::size_t fp,
        std::size_t P, std::size_t N) {
    return (double) fn / P;
}
```

False negative rate.

Parameters

tp	The number of true positives.
fn	The number of false negatives.
tn	The number of true negatives.
fp	The number of false positives.
P	The number of positives.
N	The number of negatives.

10.56.3.5 fpr

```
auto LinkPred::PerfLambda::fpr
```

Initial value:
```
= [](std::size_t tp, std::size_t fn, std::size_t tn, std::size_t fp,
        std::size_t P, std::size_t N) {
    return (double) fp / N;
}
```

False positive rate.

Parameters

tp	The number of true positives.
fn	The number of false negatives.
tn	The number of true negatives.
fp	The number of false positives.
P	The number of positives.
N	The number of negatives.

10.56.3.6 npv

```
auto LinkPred::PerfLambda::npv
```

Initial value:
```
= [](std::size_t tp, std::size_t fn, std::size_t tn, std::size_t fp,
        std::size_t P, std::size_t N) {
    return (double) tn / (tn + fn);
}
```

Negative predictive value.

Parameters

tp	The number of true positives.
fn	The number of false negatives.
tn	The number of true negatives.
fp	The number of false positives.
P	The number of positives.
N	The number of negatives.

10.56.3.7 pre

```
auto LinkPred::PerfLambda::pre
```

Initial value:
```
= [](std::size_t tp, std::size_t fn, std::size_t tn, std::size_t fp,
        std::size_t P, std::size_t N) {
    return (double) tp / (tp + fp);
}
```

Precision.

Parameters

tp	The number of true positives.
fn	The number of false negatives.
tn	The number of true negatives.
fp	The number of false positives.
P	The number of positives.
N	The number of negatives.

10.56.3.8 rec

```
auto LinkPred::PerfLambda::rec
```

Initial value:
```
= [](std::size_t tp, std::size_t fn, std::size_t tn, std::size_t fp,
        std::size_t P, std::size_t N) {
    return (double) tp / P;
}
```

Recall.

Parameters

tp	The number of true positives.
fn	The number of false negatives.
tn	The number of true negatives.
fp	The number of false positives.
P	The number of positives.
N	The number of negatives.

10.56.3.9 tnr

```
auto LinkPred::PerfLambda::tnr
```

Initial value:

```
= [](std::size_t tp, std::size_t fn, std::size_t tn, std::size_t fp,
        std::size_t P, std::size_t N) {
    return (double) tn / N;
}
```

True negative rate.

Parameters

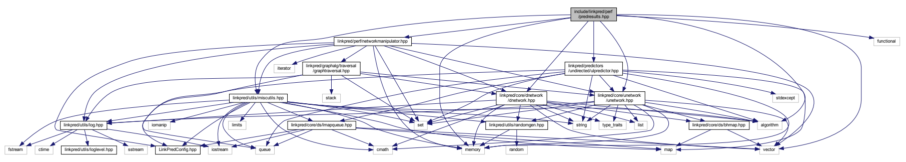
tp	The number of true positives.
fn	The number of false negatives.
tn	The number of true negatives.
fp	The number of false positives.
P	The number of positives.
N	The number of negatives.

10.57 include/linkpred/perf/predresults.hpp File Reference

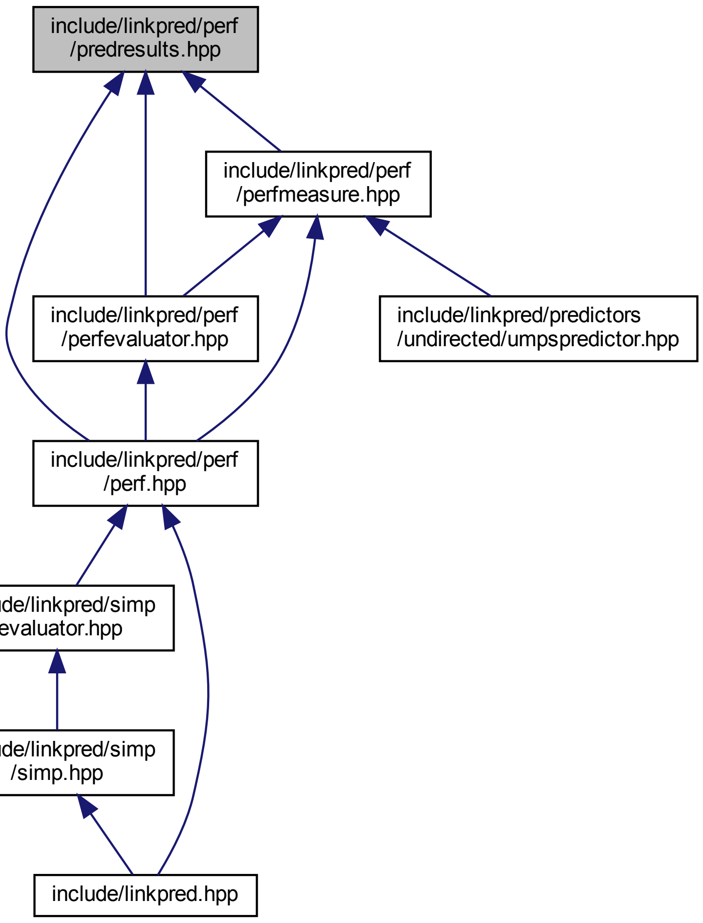
Contains the implementation of a class to store and manage prediction results.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <linkpred/utils/miscutils.hpp>
#include "linkpred/core/unetwork/unetwork.hpp"
#include "linkpred/core/dnetwork/dnetwork.hpp"
#include "linkpred/perf/networkmanipulator.hpp"
#include <vector>
#include <memory>
#include <algorithm>
#include <functional>
```

Include dependency graph for predresults.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >

  A class to store and manage prediction results.
- class LinkPred::PredResults< TestDataT, LPredictorT, ScoresContainerT >::ScoreIterator

  Score iterator.

Namespaces

- LinkPred

  Main namespace.

10.57.1 Detailed Description

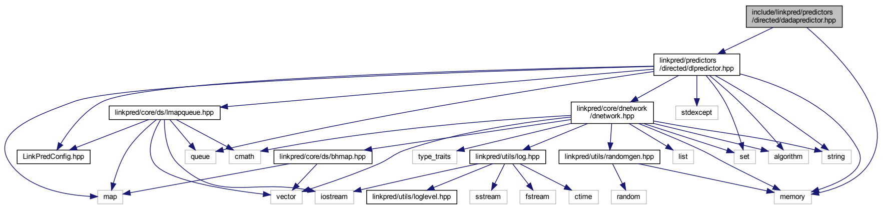
Contains the implementation of a class to store and manage prediction results.

10.58 include/linkpred/predictors/directed/dadapredictor.hpp File Reference

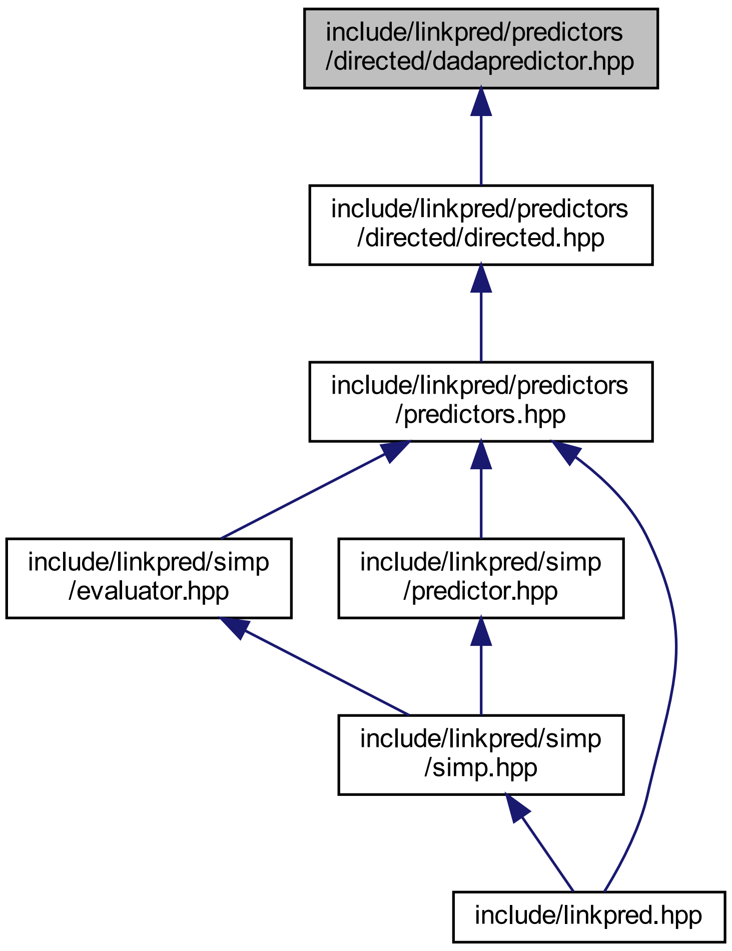
Contains the implementation of a common neighbor link predictor.

```
#include "linkpred/predictors/directed/dlpredictor.hpp"
#include <memory>
```

Include dependency graph for dadapredictor.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/predictors/directed/dadapredictor.hpp
include/linkpred/predictors/directed/directed.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::DADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Common neighbor link predictor adapted to directed networks.

Namespaces

- LinkPred

  Main namespace.

10.58.1 Detailed Description

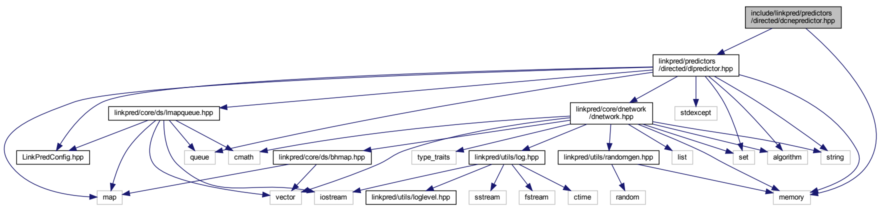
Contains the implementation of a common neighbor link predictor.

10.59 include/linkpred/predictors/directed/dcnepredictor.hpp File Reference

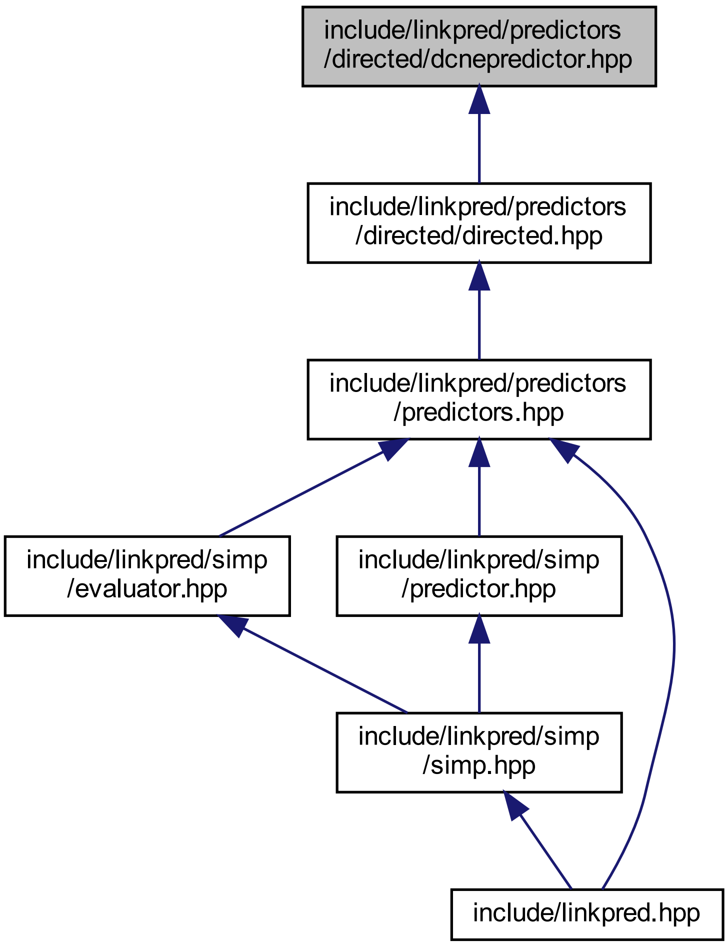
Contains the implementation of a common neighbor link predictor.

```
#include "linkpred/predictors/directed/dlpredictor.hpp"
#include <memory>
```

Include dependency graph for dcnepredictor.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::DCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Common neighbor link predictor adapted to directed networks.

Namespaces

- LinkPred

  Main namespace.

10.59.1 Detailed Description

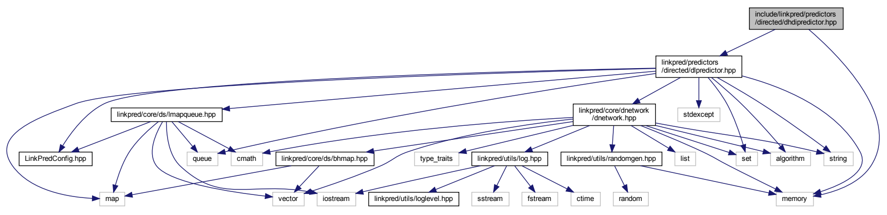
Contains the implementation of a common neighbor link predictor.

10.60 include/linkpred/predictors/directed/dhdipredictor.hpp File Reference

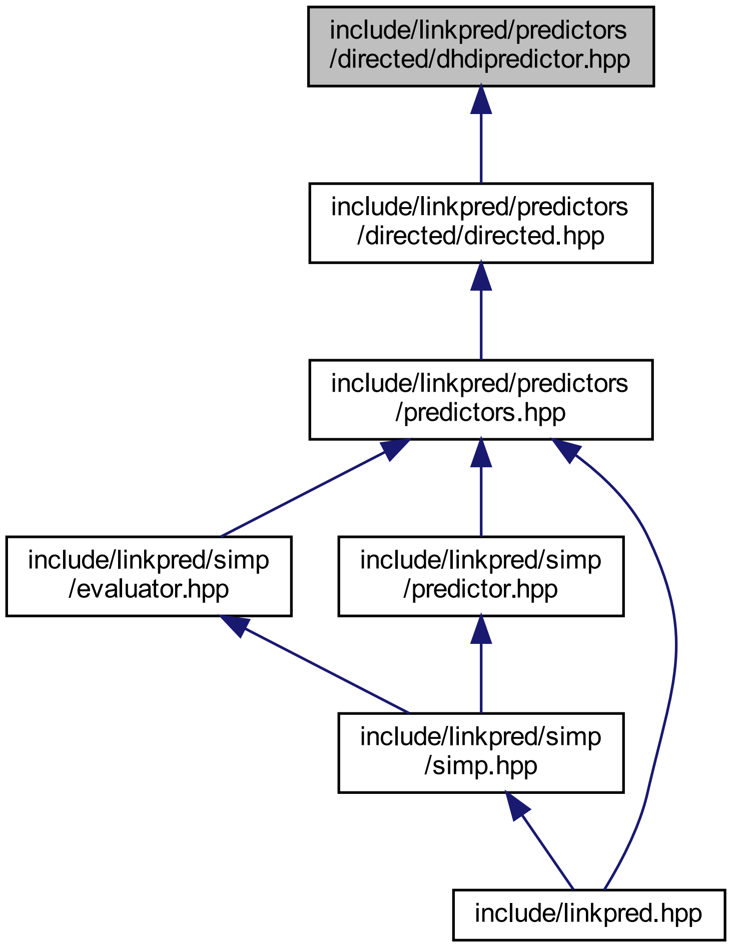
Contains the implementation of a common neighbor link predictor.

```
#include "linkpred/predictors/directed/dlpredictor.hpp"
#include <memory>
```

Include dependency graph for dhdipredictor.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::DHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

    Common neighbor link predictor adapted to directed networks.

Namespaces

- LinkPred

    Main namespace.

10.60.1 Detailed Description

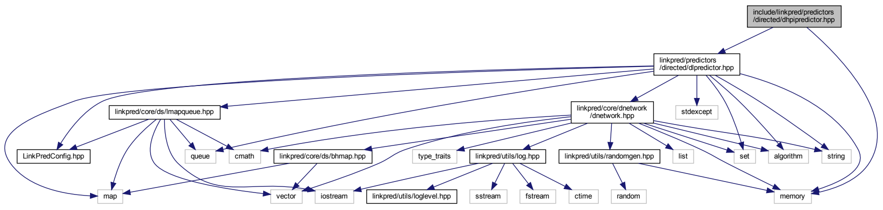
Contains the implementation of a common neighbor link predictor.

10.61 include/linkpred/predictors/directed/dhpipredictor.hpp File Reference

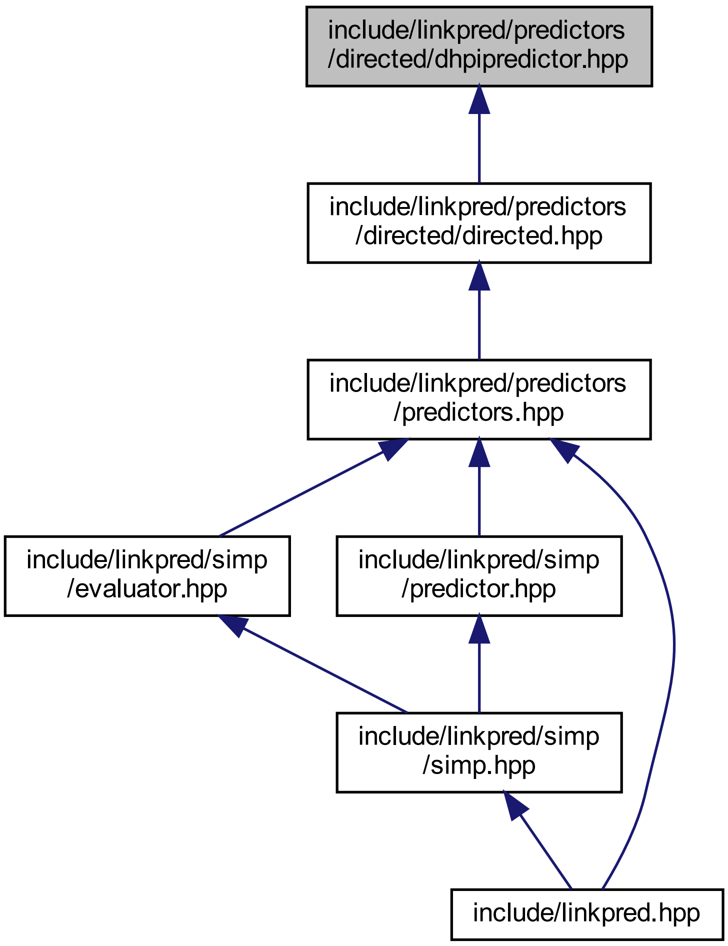
Contains the implementation of a common neighbor link predictor.

```
#include "linkpred/predictors/directed/dlpredictor.hpp"
#include <memory>
```

Include dependency graph for dhpipredictor.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::DHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

    Common neighbor link predictor adapted to directed networks.

Namespaces

- LinkPred

    Main namespace.

10.61.1 Detailed Description

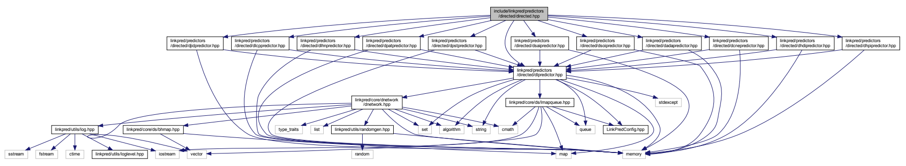
Contains the implementation of a common neighbor link predictor.

10.62 include/linkpred/predictors/directed/directed.hpp File Reference

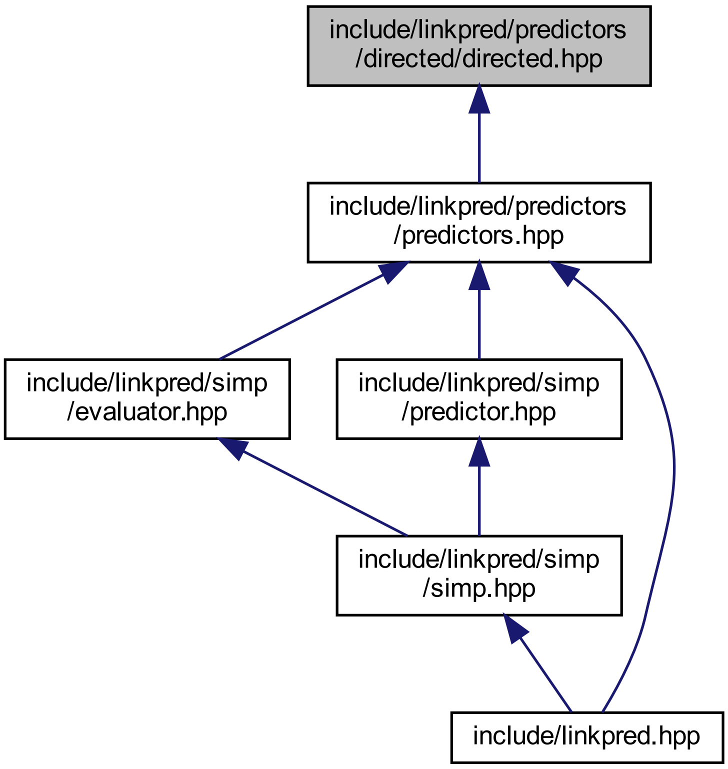
Includes the headers of link predictors for directed networks.

```
#include "linkpred/predictors/directed/dadapredictor.hpp"
#include "linkpred/predictors/directed/dcnepredictor.hpp"
#include "linkpred/predictors/directed/dhdipredictor.hpp"
#include "linkpred/predictors/directed/dhpipredictor.hpp"
#include "linkpred/predictors/directed/djidpredictor.hpp"
#include "linkpred/predictors/directed/dlcppredictor.hpp"
#include "linkpred/predictors/directed/dlhnpredictor.hpp"
#include "linkpred/predictors/directed/dlpredictor.hpp"
#include "linkpred/predictors/directed/dpatpredictor.hpp"
#include "linkpred/predictors/directed/dpstpredictor.hpp"
#include "linkpred/predictors/directed/dsaipredictor.hpp"
#include "linkpred/predictors/directed/dsoipredictor.hpp"
```

Include dependency graph for directed.hpp:


include/linkpred/predictors
/directed/directed.hpp
linkpred/predictors
/directed/djidpredictor.hpp
linkpred/predictors
/directed/dlcppredictor.hpp
linkpred/predictors
/directed/dlhnpredictor.hpp
linkpred/predictors
/directed/dpatpredictor.hpp
linkpred/predictors
/directed/dpstpredictor.hpp
linkpred/predictors
/directed/dsaipredictor.hpp
linkpred/predictors
/directed/dsoipredictor.hpp
linkpred/predictors
/directed/dadapredictor.hpp
linkpred/predictors
/directed/dcnepredictor.hpp
linkpred/predictors
/directed/dhdipredictor.hpp
linkpred/predictors
/directed/dhpipredictor.hpp
linkpred/predictors
/directed/dlpredictor.hpp
linkpred/core/dnetwork
/dnetwork.hpp
linkpred/core/ds/lmapqueue.hpp
stdexcept
linkpred/utils/log.hpp
linkpred/core/ds/bhmap.hpp
type_traits
list
linkpred/utils/randomgen.hpp
set
algorithm
string
cmath
queue
LinkPredConfig.hpp
sstream
fstream
ctime
linkpred/utils/loglevel.hpp
iostream
vector
random
map
memory

This graph shows which files directly or indirectly include this file:



10.62.1 Detailed Description

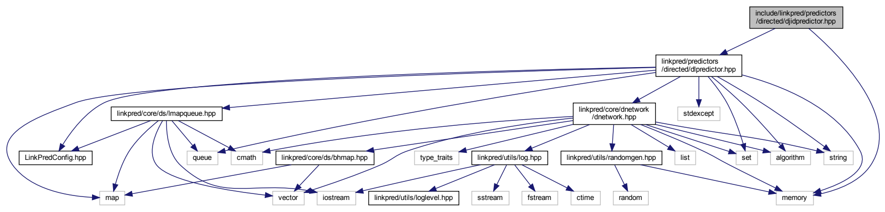
Includes the headers of link predictors for directed networks.

10.63 include/linkpred/predictors/directed/djidpredictor.hpp File Reference

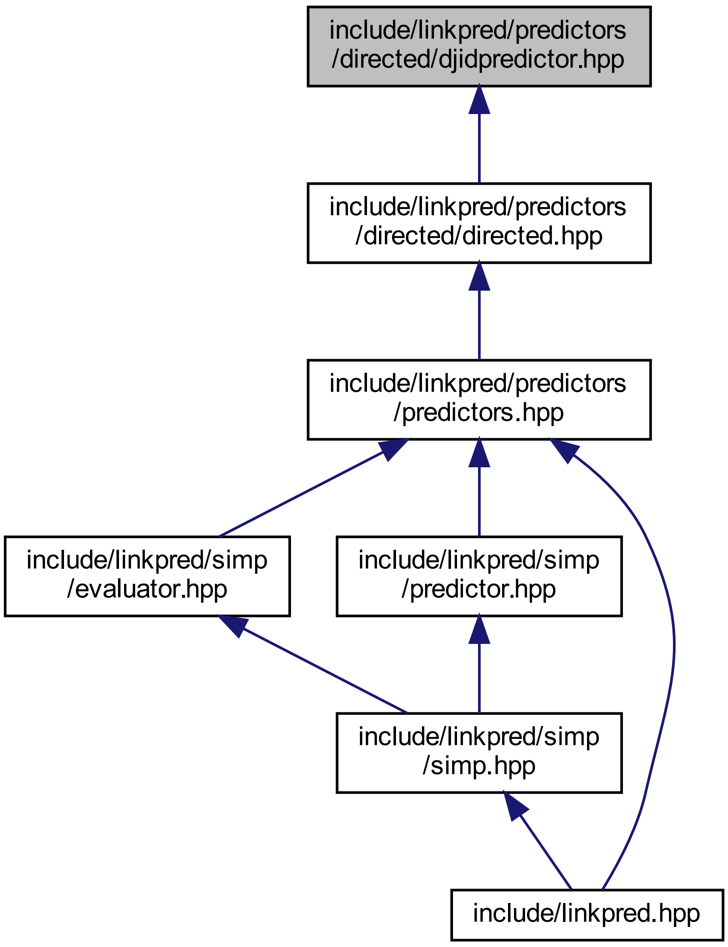
Contains the implementation of a common neighbor link predictor.

```
#include "linkpred/predictors/directed/dlpredictor.hpp"
#include <memory>
```

Include dependency graph for djidpredictor.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/predictors /directed/djidpredictor.hpp
include/linkpred/predictors /directed/directed.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::DJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Common neighbor link predictor adapted to directed networks.

Namespaces

- LinkPred

  Main namespace.

10.63.1 Detailed Description

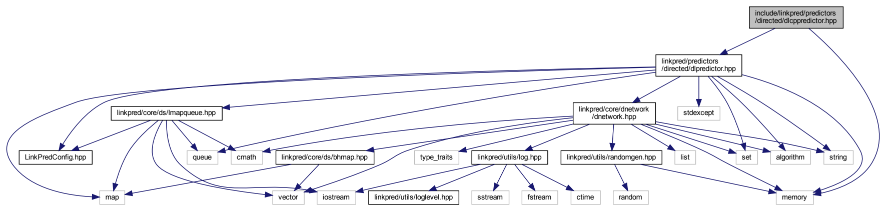
Contains the implementation of a common neighbor link predictor.

10.64 include/linkpred/predictors/directed/dlcppredictor.hpp File Reference

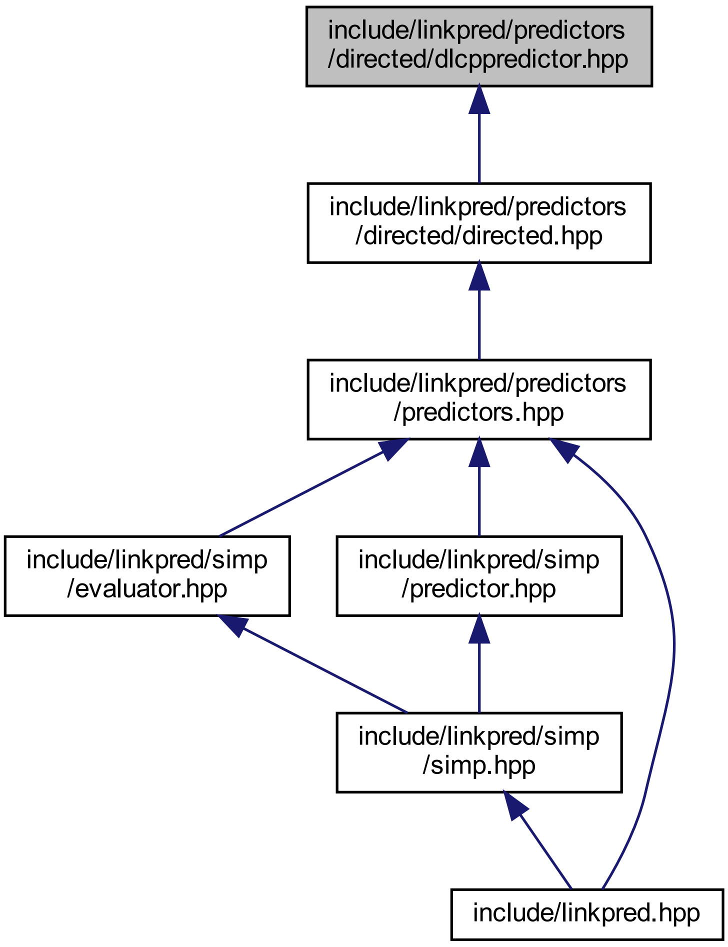
Contains the implementation of a directed LCP link predictor.

```
#include "linkpred/predictors/directed/dlpredictor.hpp"
#include <memory>
```

Include dependency graph for dlcppredictor.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::DLCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Common neighbor link predictor adapted to directed networks.

Namespaces

- LinkPred

  Main namespace.

10.64.1 Detailed Description

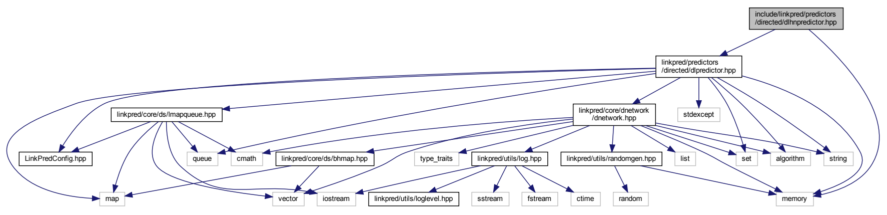
Contains the implementation of a directed LCP link predictor.

10.65 include/linkpred/predictors/directed/dlhnpredictor.hpp File Reference

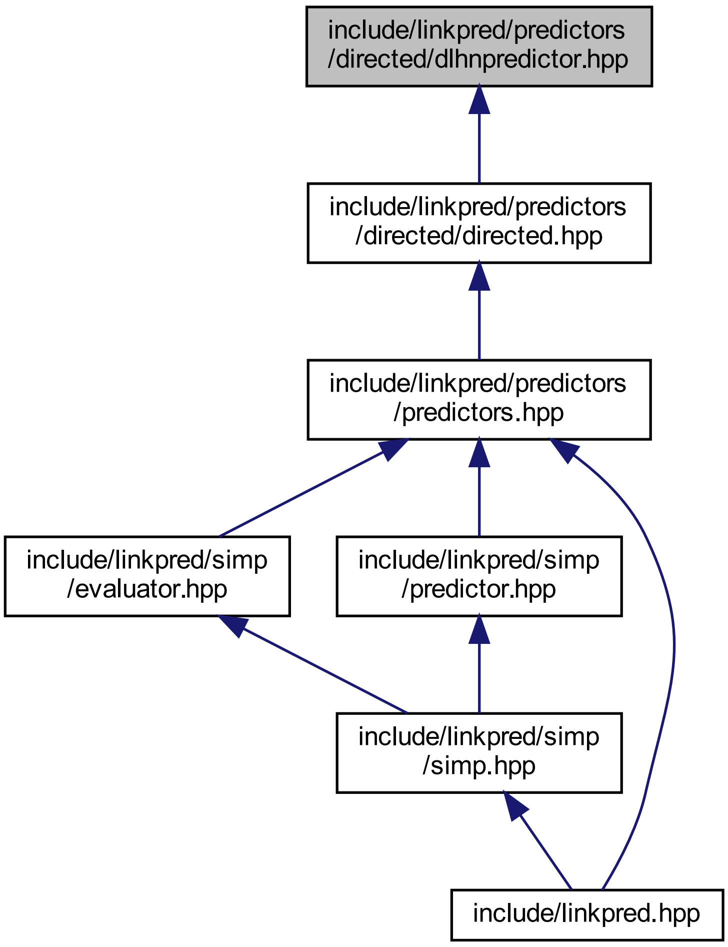
Contains the implementation of a common neighbor link predictor.

```
#include "linkpred/predictors/directed/dlpredictor.hpp"
#include <memory>
```

Include dependency graph for dlhnpredictor.hpp:


include/linkpred/predictors/directed/dlhnpredictor.hpp
linkpred/predictors/directed/dlpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/dnetwork/dnetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::DLHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Common neighbor link predictor adapted to directed networks.

Namespaces

- LinkPred

  Main namespace.

10.65.1 Detailed Description

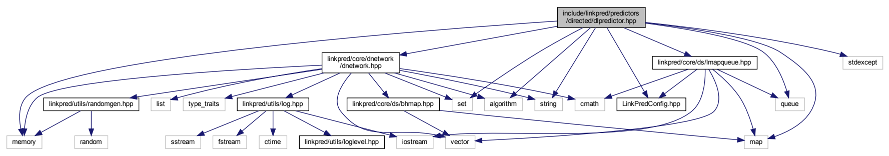
Contains the implementation of a common neighbor link predictor.

10.66 include/linkpred/predictors/directed/dlpredictor.hpp File Reference

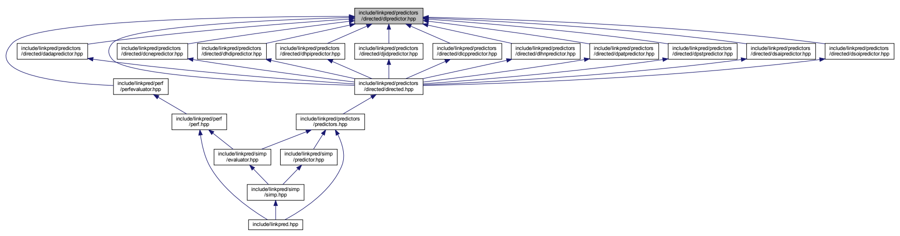
Contains the interface of a link predictor.

```
#include "LinkPredConfig.hpp"
#include "linkpred/core/dnetwork/dnetwork.hpp"
#include "linkpred/core/ds/lmapqueue.hpp"
#include <memory>
#include <map>
#include <string>
#include <stdexcept>
#include <algorithm>
#include <queue>
#include <set>
```

Include dependency graph for dlpredictor.hpp:


include/linkpred/predictors/directed/dlpredictor.hpp
linkpred/core/dnetwork/dnetwork.hpp
linkpred/core/ds/lmapqueue.hpp
stdexcept
linkpred/utils/randomgen.hpp
list
type_traits
linkpred/utils/log.hpp
linkpred/core/ds/bhmap.hpp
set
algorithm
string
cmath
LinkPredConfig.hpp
queue
memory
random
sstream
fstream
ctime
linkpred/utils/loglevel.hpp
iostream
vector
map

This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::DLPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >

  The interface of a link predictor in a directed network.

Namespaces

- LinkPred

  Main namespace.

10.66.1 Detailed Description

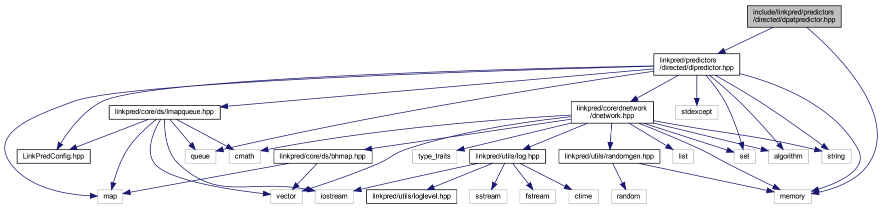
Contains the interface of a link predictor.

10.67 include/linkpred/predictors/directed/dpatpredictor.hpp File Reference

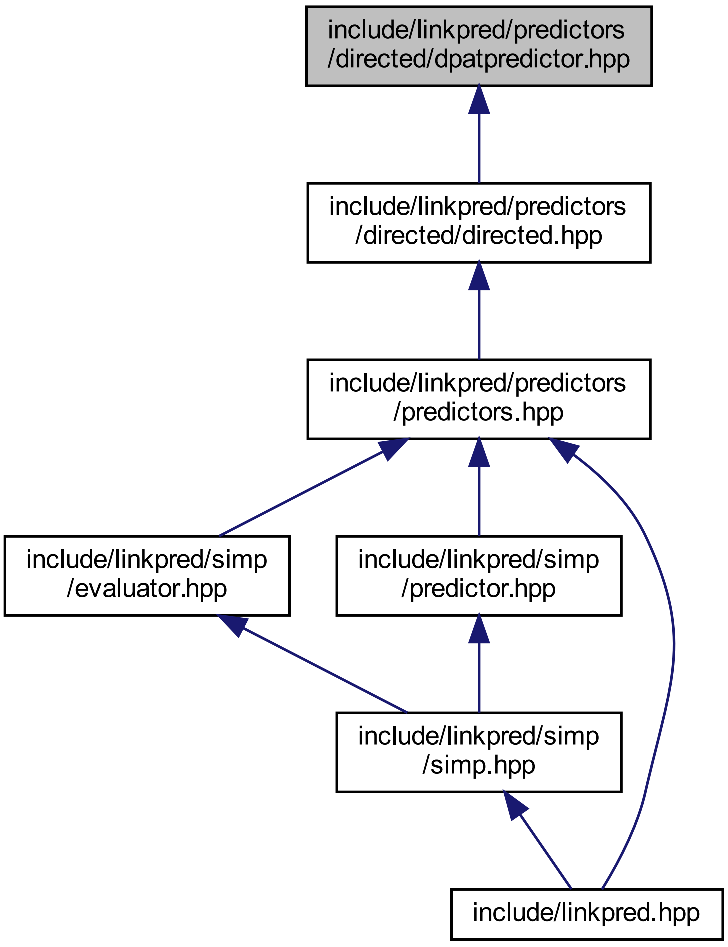
Contains the implementation of a common neighbor link predictor.

```
#include "linkpred/predictors/directed/dlpredictor.hpp"
#include <memory>
```

Include dependency graph for dpatpredictor.hpp:


include/linkpred/predictors/directed/dpatpredictor.hpp
linkpred/predictors/directed/dlpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/dnetwork/dnetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors/directed/dpatpredictor.hpp
include/linkpred/predictors/directed/directed.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::DPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Common neighbor link predictor adapted to directed networks.

Namespaces

- LinkPred

  Main namespace.

10.67.1 Detailed Description

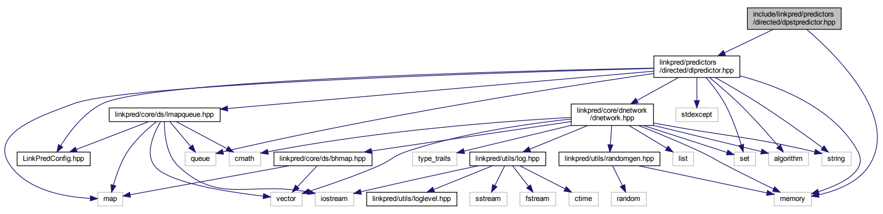
Contains the implementation of a common neighbor link predictor.

10.68 include/linkpred/predictors/directed/dpstpredictor.hpp File Reference

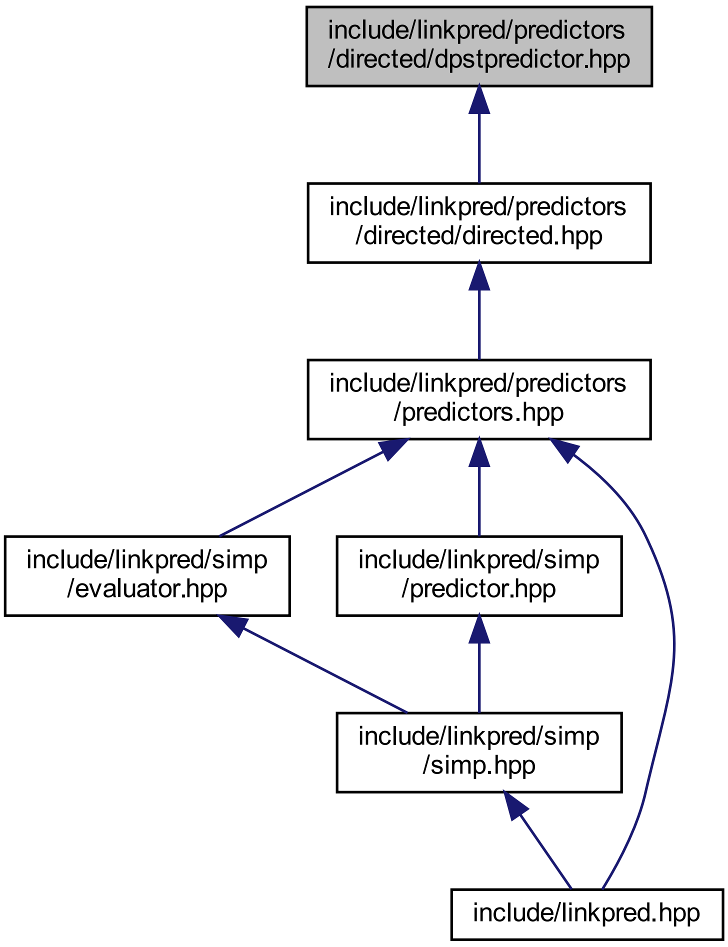
Contains the implementation of a link predictor that prestores the scores of edges.

```
#include <linkpred/predictors/directed/dlpredictor.hpp>
#include <memory>
```

Include dependency graph for dpstpredictor.hpp:


include/linkpred/predictors/directed/dpstpredictor.hpp
linkpred/predictors/directed/dlpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/dnetwork/dnetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::DPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  A link predictor that prestores edge scores. This allows to seemingly integrate results from external link prediction algorithms to LinkPred (for example, users may implement their own link prediction algorithm and then use this link predictor to use compare their results to algorithms available in LinkPred).

Namespaces

- LinkPred

  Main namespace.

10.68.1 Detailed Description

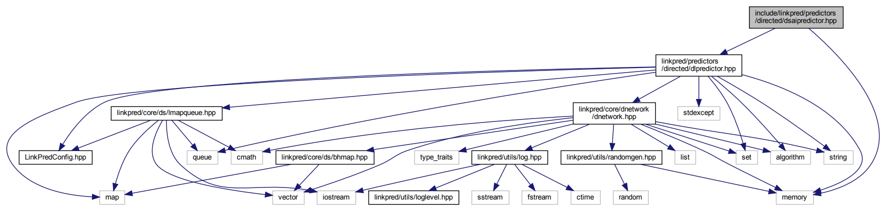
Contains the implementation of a link predictor that prestores the scores of edges.

10.69 include/linkpred/predictors/directed/dsaipredictor.hpp File Reference

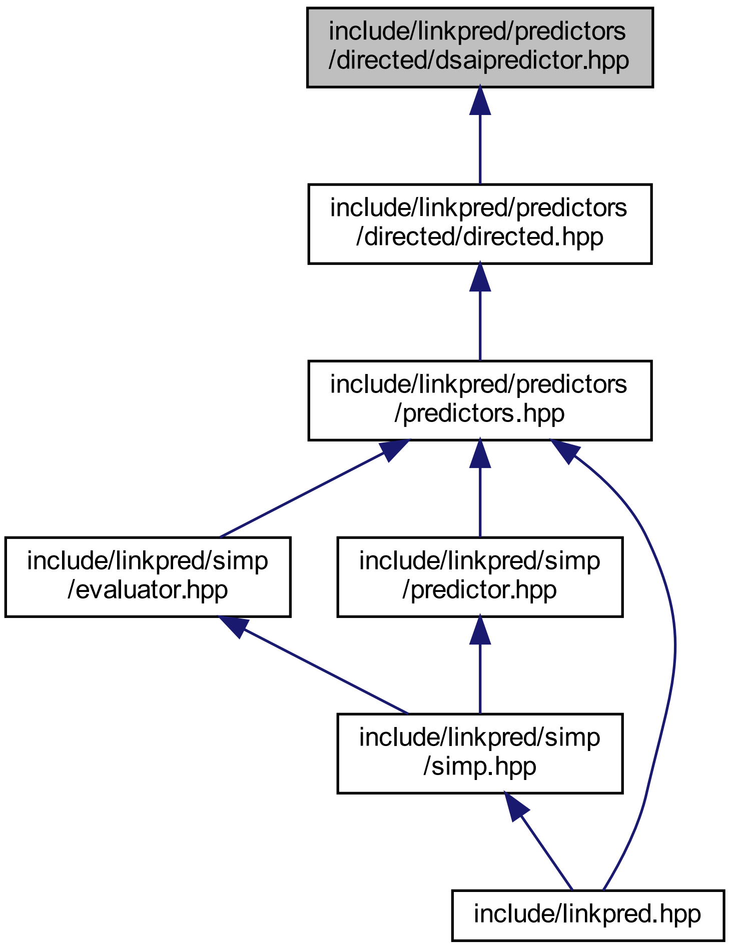
Contains the implementation of a common neighbor link predictor.

```
#include "linkpred/predictors/directed/dlpredictor.hpp"
#include <memory>
```

Include dependency graph for dsaipredictor.hpp:


include/linkpred/predictors/directed/dsaipredictor.hpp
linkpred/predictors/directed/dlpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/dnetwork/dnetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors/directed/dsaipredictor.hpp
include/linkpred/predictors/directed/directed.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::DSAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

    Common neighbor link predictor adapted to directed networks.

Namespaces

- LinkPred

    Main namespace.

10.69.1 Detailed Description

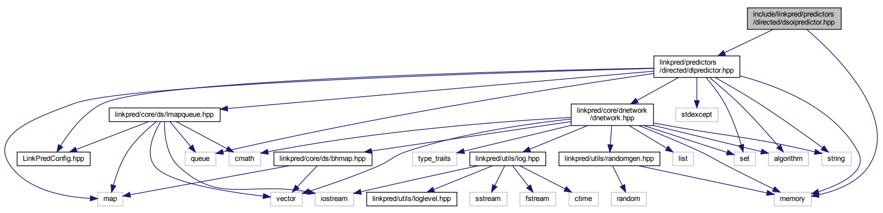
Contains the implementation of a common neighbor link predictor.

10.70 include/linkpred/predictors/directed/dsoipredictor.hpp File Reference

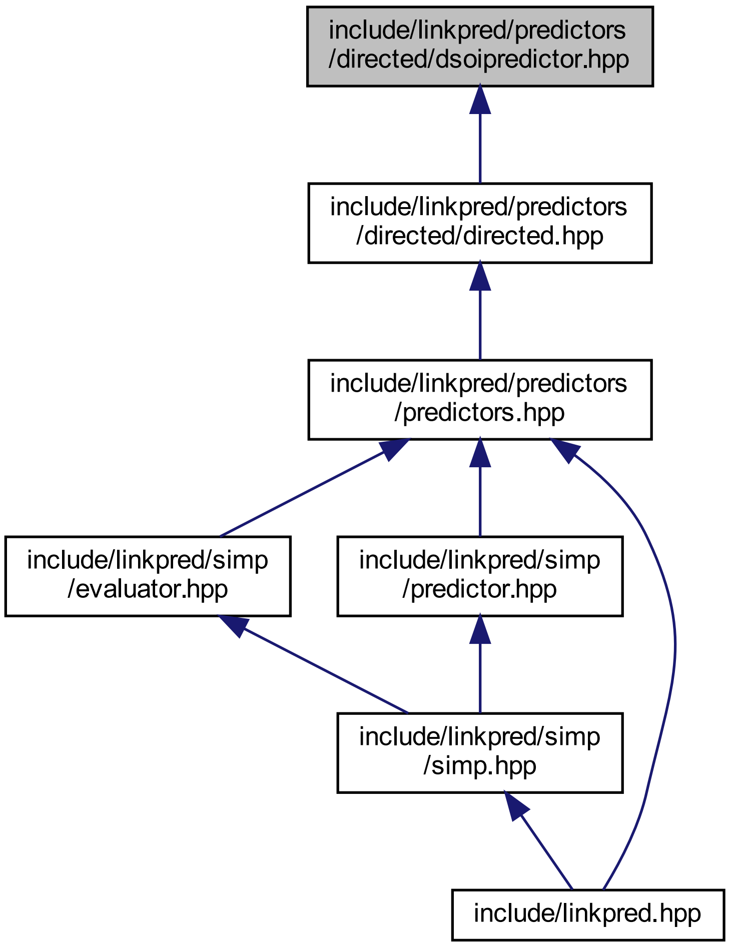
Contains the implementation of a common neighbor link predictor.

```
#include "linkpred/predictors/directed/dlpredictor.hpp"
#include <memory>
```

Include dependency graph for dsoipredictor.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::DSOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Common neighbor link predictor adapted to directed networks.

Namespaces

- LinkPred

  Main namespace.

10.70.1 Detailed Description

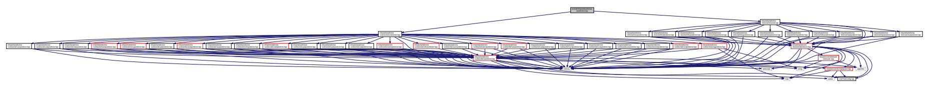
Contains the implementation of a common neighbor link predictor.

10.71 include/linkpred/predictors/predictors.hpp File Reference

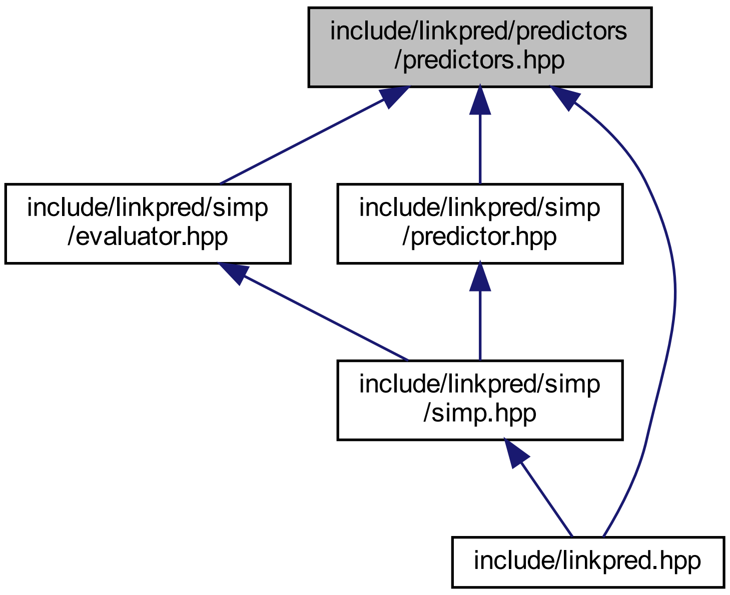
Includes the headers of link predictors.

```
#include "linkpred/predictors/directed/directed.hpp"
#include "linkpred/predictors/undirected/undirected.hpp"
```

Include dependency graph for predictors.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

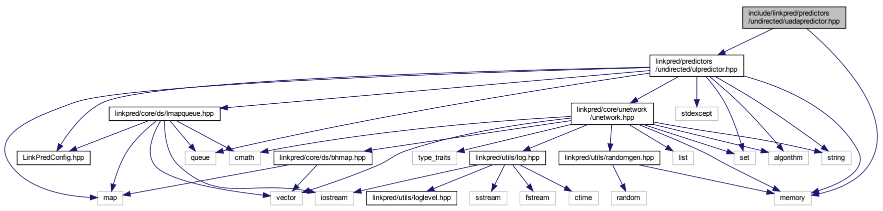
10.71.1 Detailed Description

Includes the headers of link predictors.

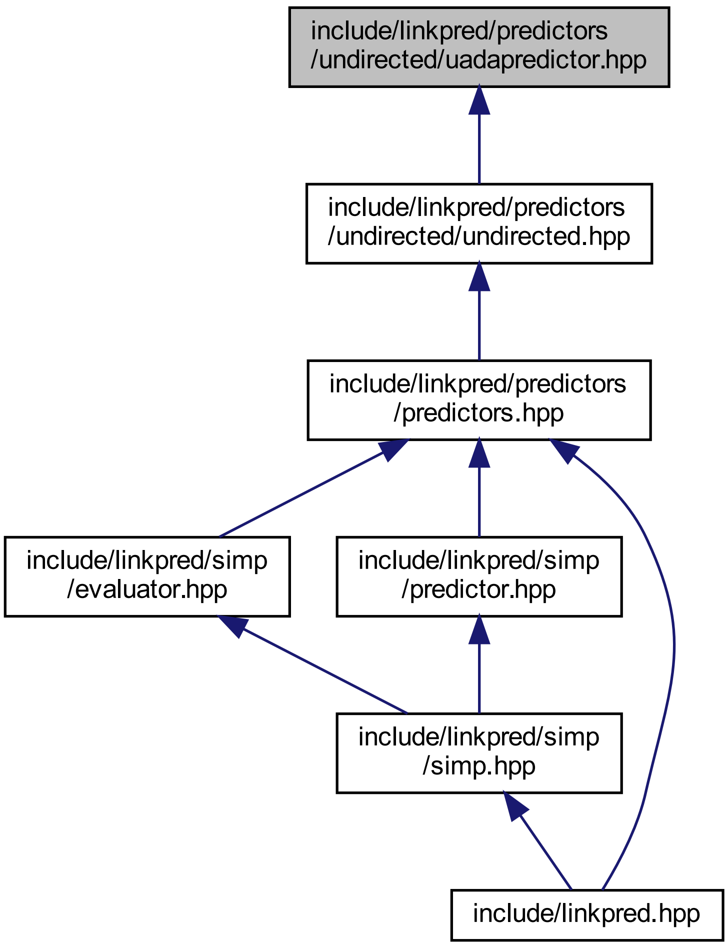
10.72 include/linkpred/predictors/undirected/uadapredictor.hpp File Reference

Contains the implementation of an Adamic Adar index link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```
Include dependency graph for uadapredictor.hpp:


include/linkpred/predictors /undirected/uadapredictor.hpp
linkpred/predictors /undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/unetwork /unetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors /undirected/uadapredictor.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UADAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

    Adamic Adar index link predictor.

Namespaces

- LinkPred

    Main namespace.

10.72.1 Detailed Description

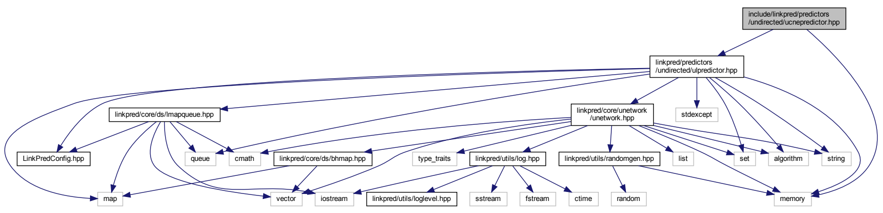
Contains the implementation of an Adamic Adar index link predictor.

10.73 include/linkpred/predictors/undirected/ucnepredictor.hpp File Reference

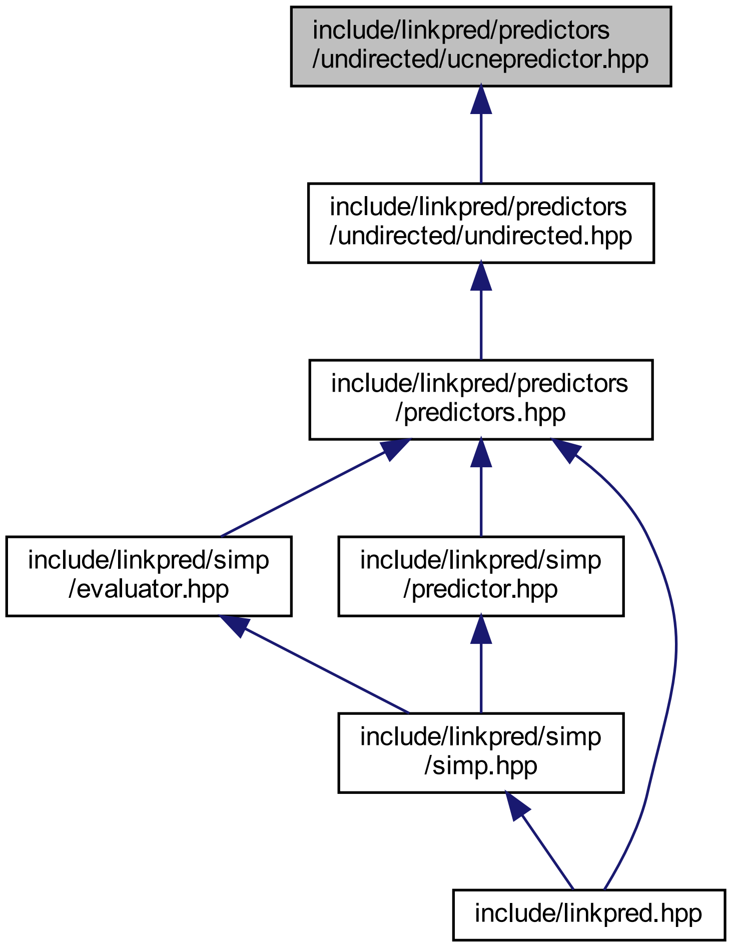
Contains the implementation of a common neighbor link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```

Include dependency graph for ucnepredictor.hpp:


include/linkpred/predictors
/undirected/ucnepredictor.hpp
linkpred/predictors
/undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/unetwork
/unetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/ucnepredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UCNEPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

    Common neighbor link predictor.

Namespaces

- LinkPred

    Main namespace.

10.73.1 Detailed Description

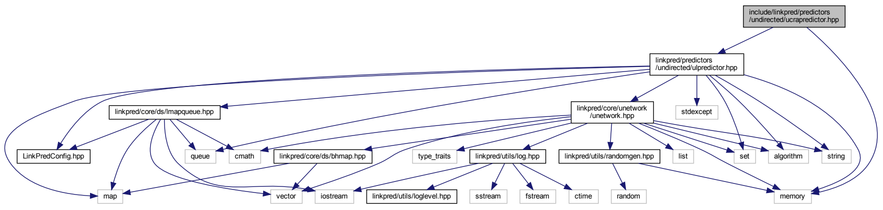
Contains the implementation of a common neighbor link predictor.

10.74 include/linkpred/predictors/undirected/ucrapredictor.hpp File Reference

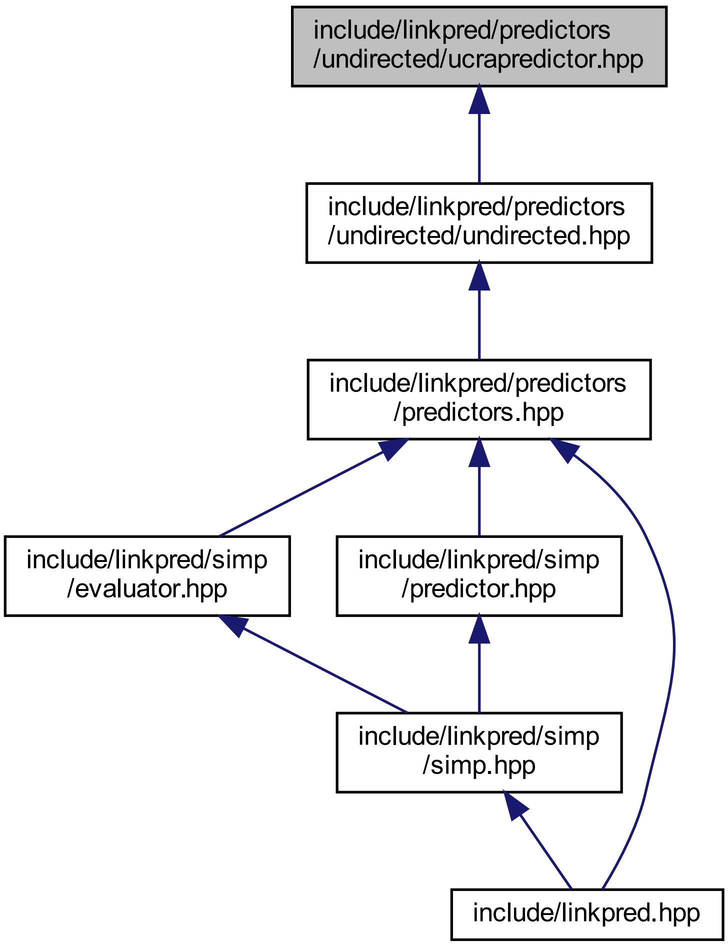
Contains the implementation of the Cannistraci Resource Allocation link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```

Include dependency graph for ucrapredictor.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/ucrapredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UCRAPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Local path link predictor.

Namespaces

- LinkPred

  Main namespace.

10.74.1 Detailed Description

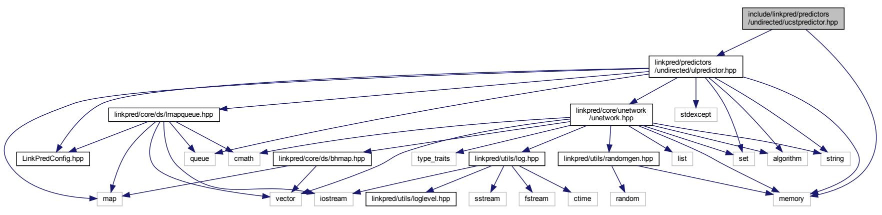
Contains the implementation of the Cannistraci Resource Allocation link predictor.

10.75 include/linkpred/predictors/undirected/ucstpredictor.hpp File Reference

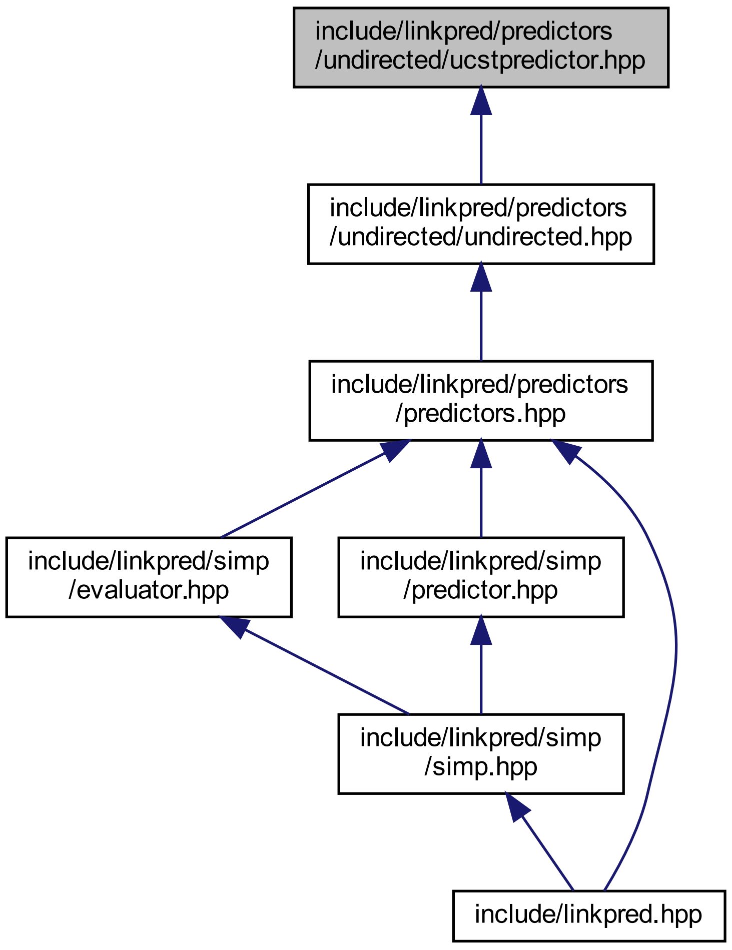
Contains the implementation of a constant link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```

Include dependency graph for ucstpredictor.hpp:


include/linkpred/predictors
/undirected/ucstpredictor.hpp
linkpred/predictors
/undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/unetwork
/unetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/ucstpredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UCSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Constant link predictor.

Namespaces

- LinkPred

  Main namespace.

10.75.1 Detailed Description

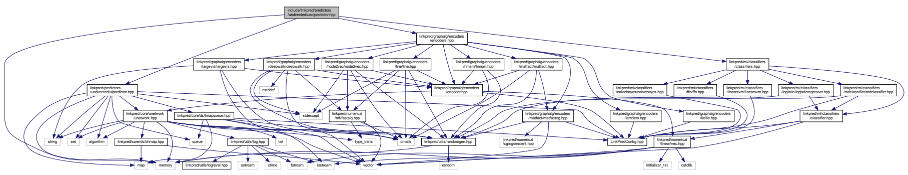
Contains the implementation of a constant link predictor.

10.76 include/linkpred/predictors/undirected/ueclpredictor.hpp File Reference

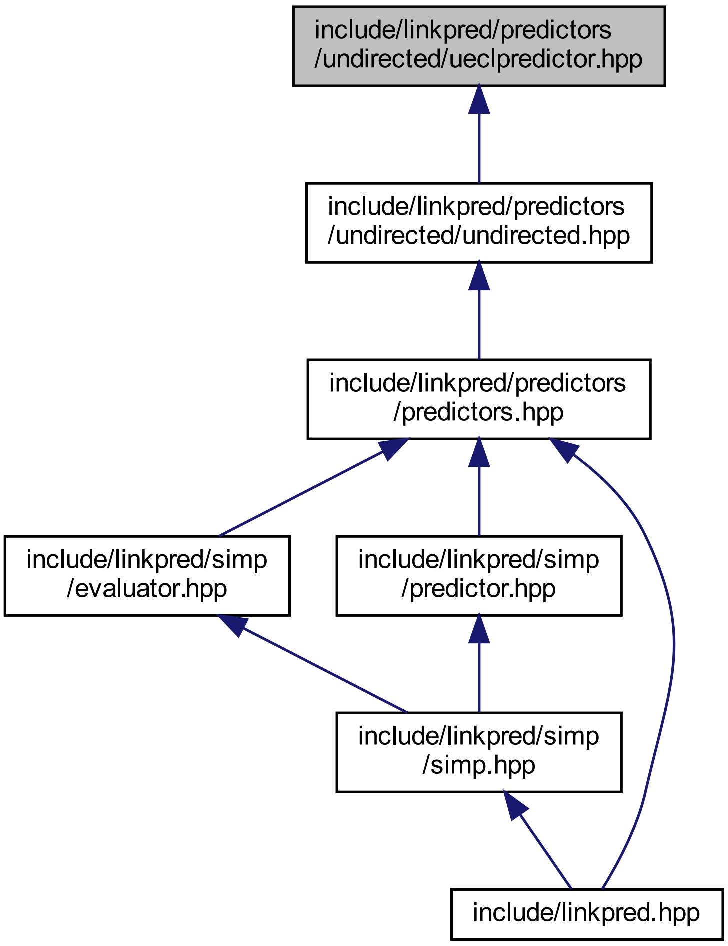
Contains the implementation of an encoder-classifier link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <linkpred/graphalg/encoders/encoders.hpp>
#include <linkpred/ml/classifiers/classifiers.hpp>
#include <memory>
```

Include dependency graph for ueclpredictor.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/ueclpredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UECLPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Encoder-classifier link predictor.

Namespaces

- LinkPred

  Main namespace.

10.76.1 Detailed Description

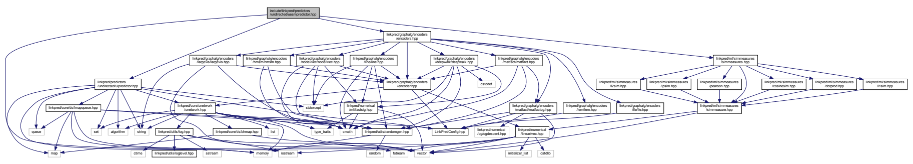
Contains the implementation of an encoder-classifier link predictor.

10.77 include/linkpred/predictors/undirected/uesmpredictor.hpp File Reference

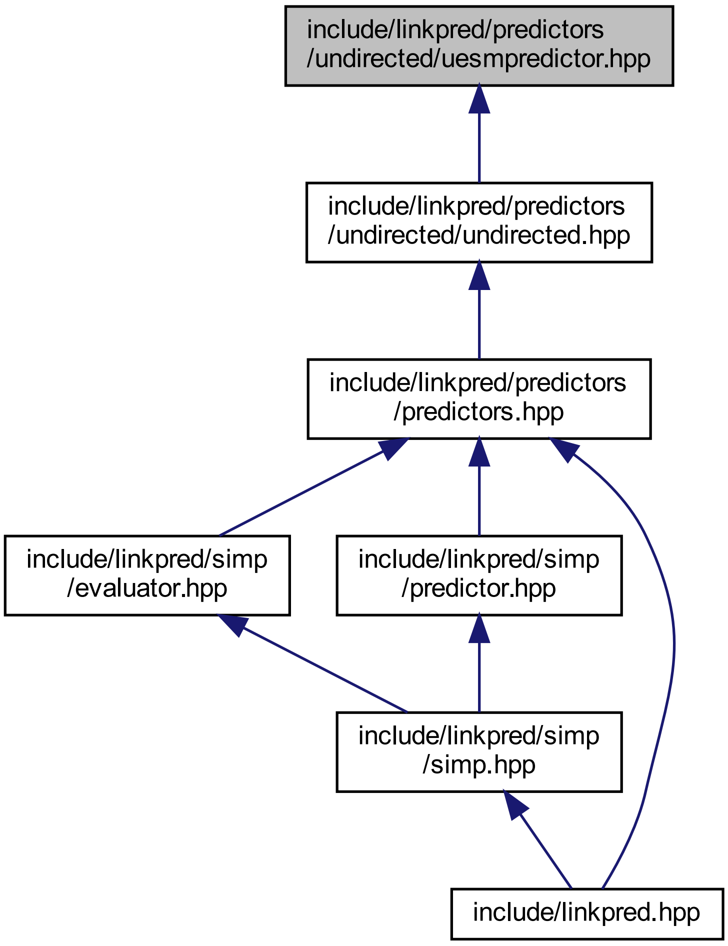
Contains the implementation of an encoder-similarity measure link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <linkpred/graphalg/encoders/encoders.hpp>
#include <linkpred/ml/simmeasures/simmeasures.hpp>
#include <memory>
```

Include dependency graph for uesmpredictor.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/predictors /undirected/uesmpredictor.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UESMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Encoder-Similarity measure link predictor.

Namespaces

- LinkPred

  Main namespace.

10.77.1 Detailed Description

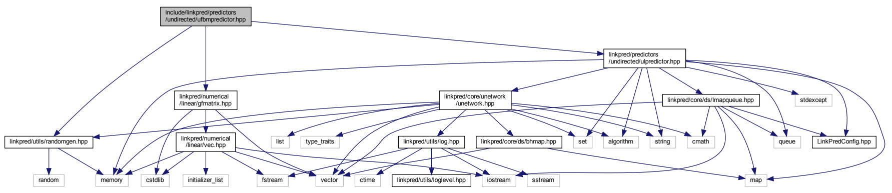
Contains the implementation of an encoder-similarity measure link predictor.

10.78 include/linkpred/predictors/undirected/ufbmpredictor.hpp File Reference

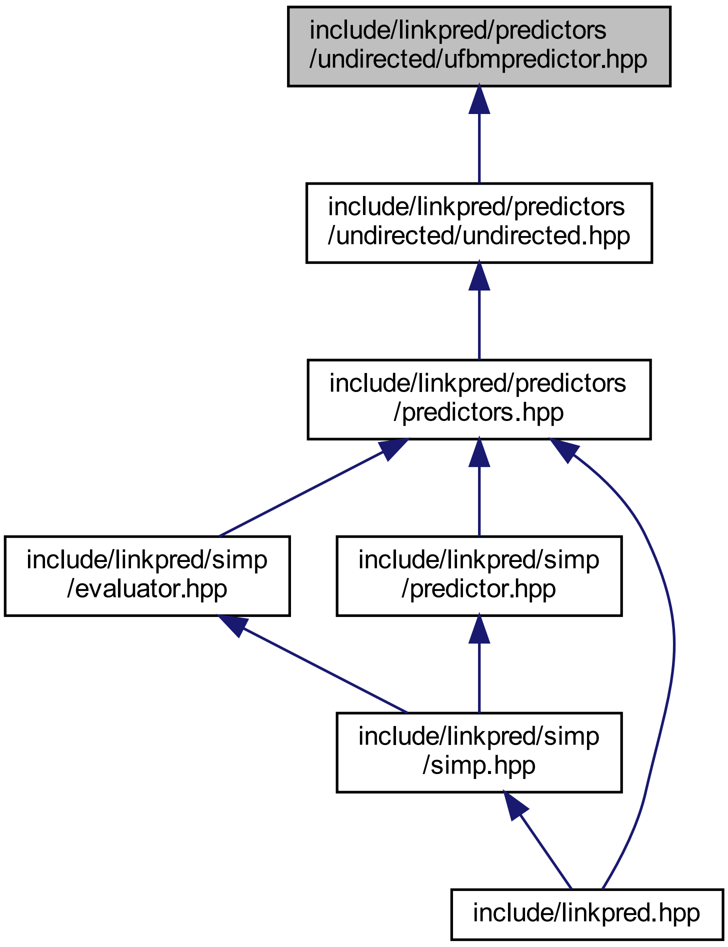
Contains the implementation of the fast blocking model link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include "linkpred/numerical/linear/gfmatrix.hpp"
#include "linkpred/utils/randomgen.hpp"
```

Include dependency graph for ufbmpredictor.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/ufbmpredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UFBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Fast blocking model link predictor.

Namespaces

- LinkPred

  Main namespace.

10.78.1 Detailed Description

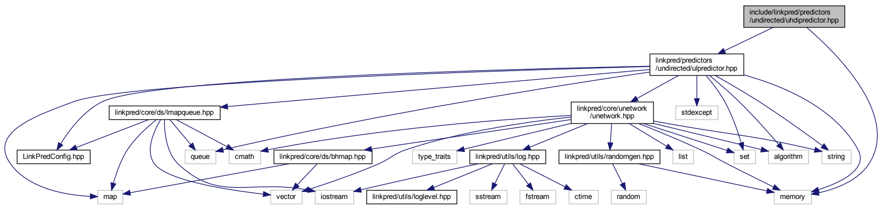
Contains the implementation of the fast blocking model link predictor.

10.79 include/linkpred/predictors/undirected/uhdipredictor.hpp File Reference

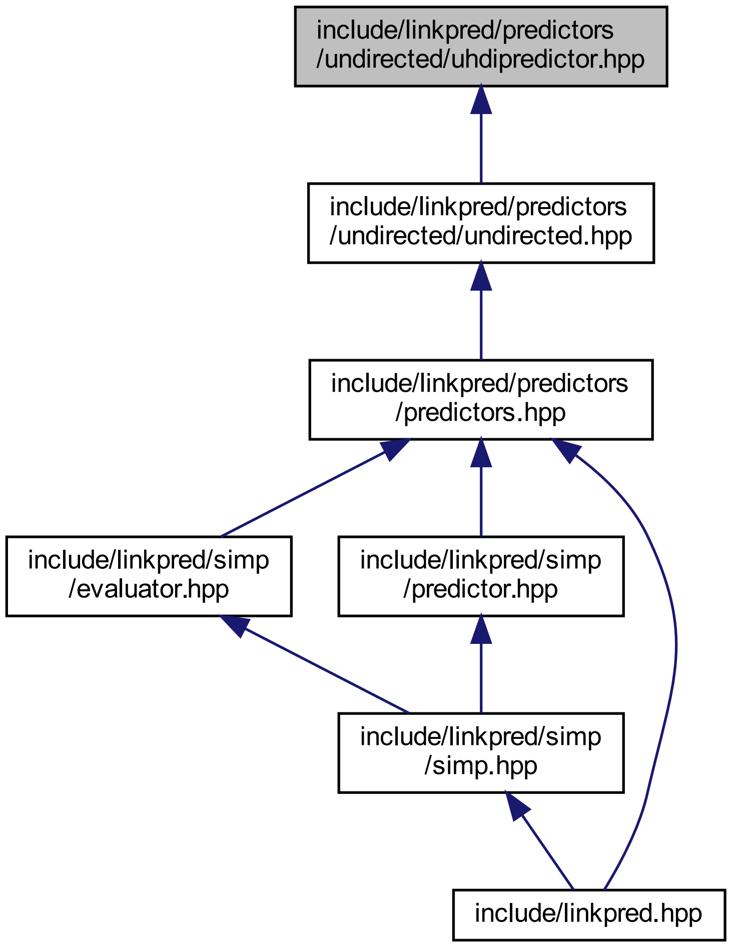
Contains the implementation of a hub depromoted index link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```

Include dependency graph for uhdipredictor.hpp:


include/linkpred/predictors /undirected/uhdipredictor.hpp
linkpred/predictors /undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/unetwork /unetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors /undirected/uhdipredictor.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UHDIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Hub depromoted index link predictor.

Namespaces

- LinkPred

  Main namespace.

10.79.1 Detailed Description

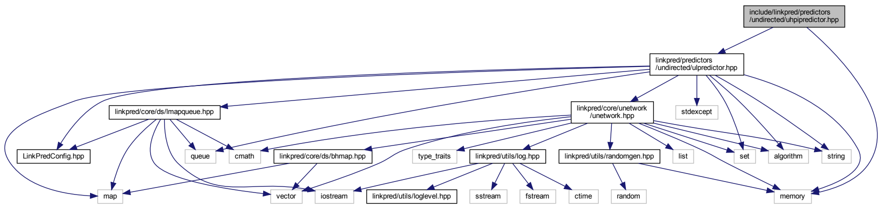
Contains the implementation of a hub depromoted index link predictor.

10.80 include/linkpred/predictors/undirected/uhpipredictor.hpp File Reference

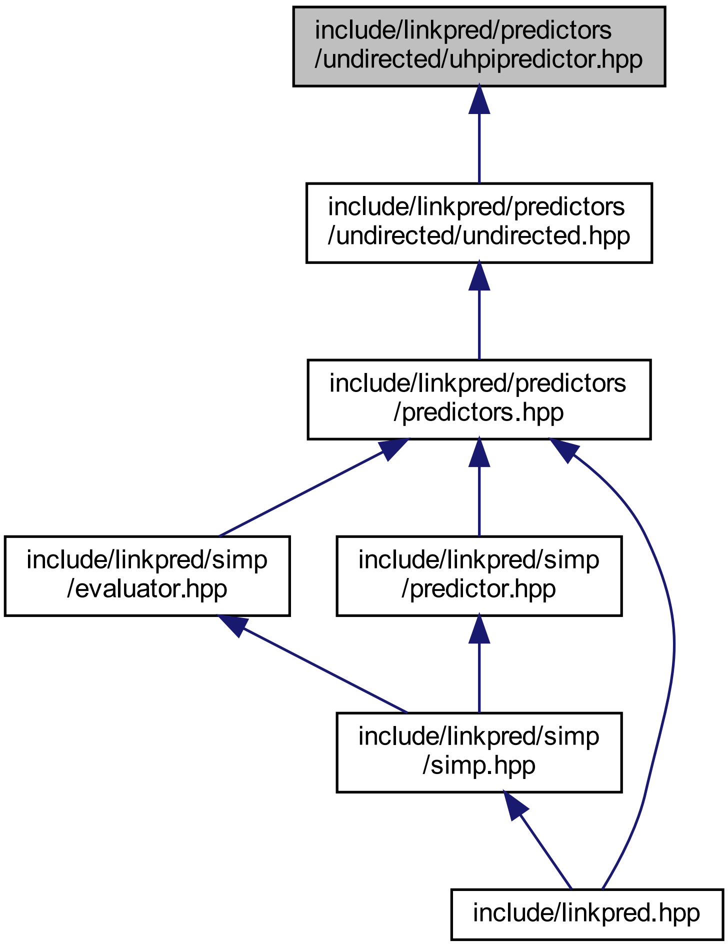
Contains the implementation of a hub promoted index link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```

Include dependency graph for uhpipredictor.hpp:


include/linkpred/predictors
/undirected/uhpipredictor.hpp
linkpred/predictors
/undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/unetwork
/unetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/uhpipredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UHPIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Hub promoted index link predictor.

Namespaces

- LinkPred

  Main namespace.

10.80.1 Detailed Description

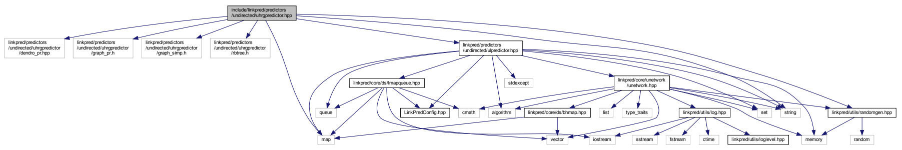
Contains the implementation of a hub promoted index link predictor.

10.81 include/linkpred/predictors/undirected/uhrgpredictor.hpp File Reference

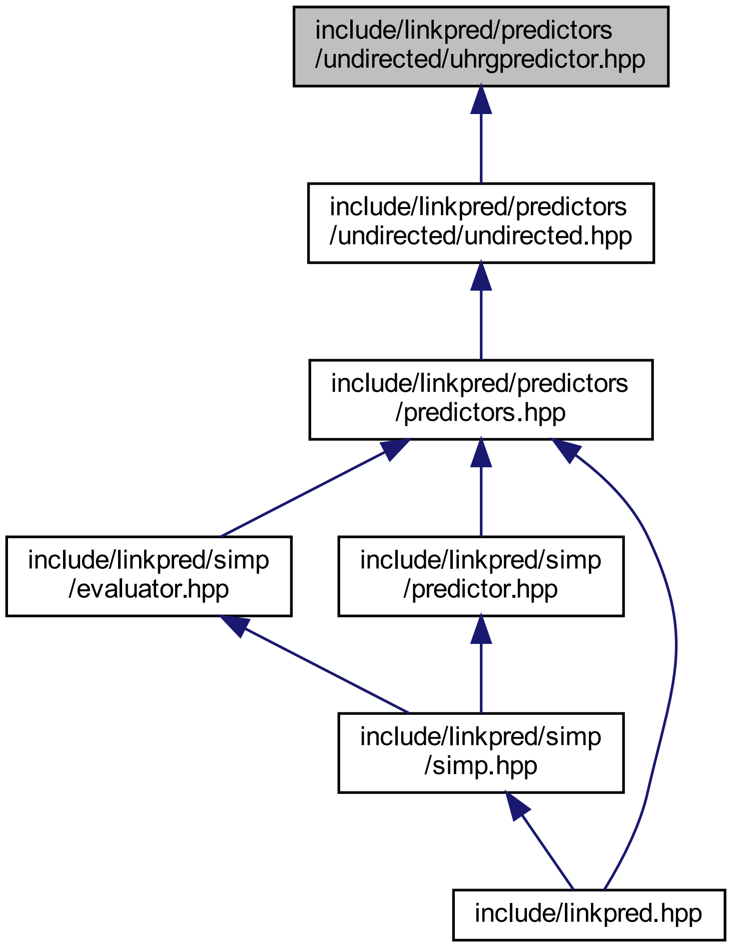
Contains the implementation of the HRG link predictor.

```
#include <linkpred/predictors/undirected/uhrgpredictor/dendro_pr.hpp>
#include <linkpred/predictors/undirected/uhrgpredictor/graph_pr.h>
#include <linkpred/predictors/undirected/uhrgpredictor/graph_simp.h>
#include <linkpred/predictors/undirected/uhrgpredictor/rbtree.h>
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include "linkpred/utils/randomgen.hpp"
#include <string>
#include <map>
```

Include dependency graph for uhrgpredictor.hpp:


include/linkpred/predictors/undirected/uhrgpredictor.hpp
linkpred/predictors/undirected/uhrgpredictor/dendro_pr.hpp
linkpred/predictors/undirected/uhrgpredictor/graph_pr.h
linkpred/predictors/undirected/uhrgpredictor/graph_simp.h
linkpred/predictors/undirected/uhrgpredictor/rbtree.h
linkpred/predictors/undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
stdexcept
linkpred/core/unetwork/unetwork.hpp
queue
LinkPredConfig.hpp
cmath
algorithm
linkpred/core/ds/bhmap.hpp
list
type_traits
linkpred/utils/log.hpp
set
string
linkpred/utils/randomgen.hpp
map
vector
iostream
sstream
fstream
ctime
linkpred/utils/loglevel.hpp
memory
random

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors /undirected/uhrgpredictor.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UHRGPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

    HRG predictor.

Namespaces

- LinkPred

    Main namespace.

10.81.1 Detailed Description

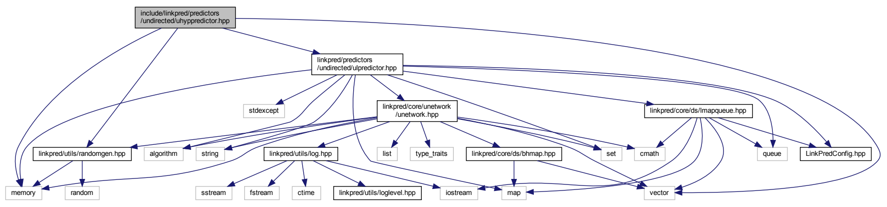
Contains the implementation of the HRG link predictor.

10.82 include/linkpred/predictors/undirected/uhyppredictor.hpp File Reference

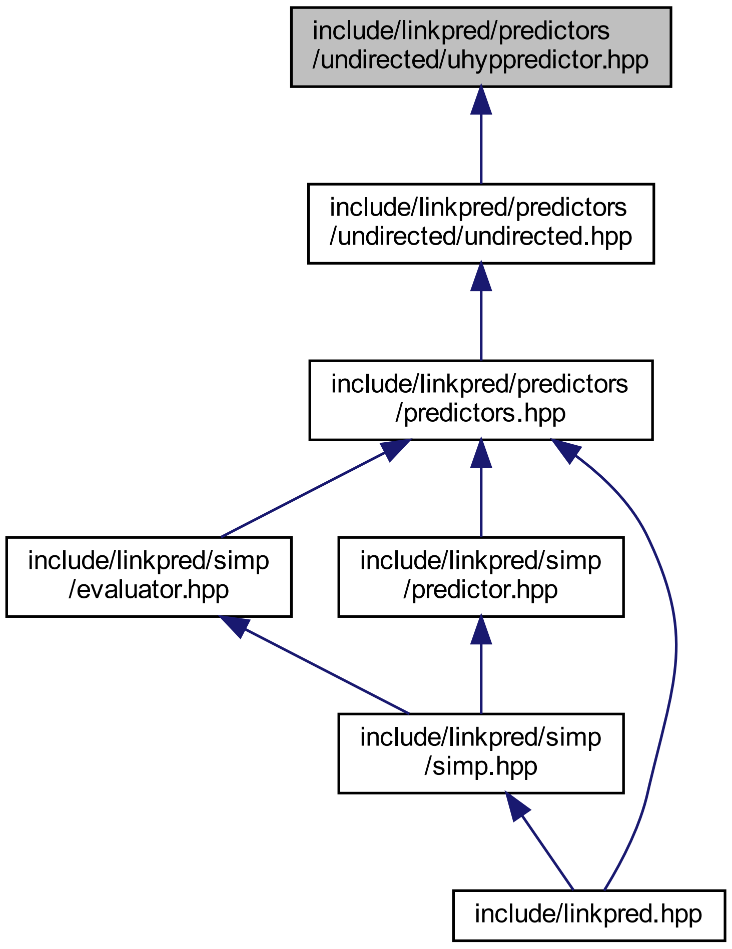
Contains the implementation of the hypermap link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include "linkpred/utils/randomgen.hpp"
#include <vector>
#include <memory>
```

Include dependency graph for uhyppredictor.hpp:


include/linkpred/predictors
/undirected/uhyppredictor.hpp
linkpred/predictors
/undirected/ulpredictor.hpp
stdexcept
linkpred/core/unetwork
/unetwork.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/utils/randomgen.hpp
algorithm
string
linkpred/utils/log.hpp
list
type_traits
linkpred/core/ds/bhmap.hpp
set
cmath
queue
LinkPredConfig.hpp
memory
random
sstream
fstream
ctime
linkpred/utils/loglevel.hpp
iostream
map
vector

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors /undirected/uhyppredictor.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UHYPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

    Hypermap predictor.

Namespaces

- LinkPred

    Main namespace.

Variables

- constexpr double LinkPred::MathPI = 3.141592653589793238462643383279502884L

10.82.1 Detailed Description

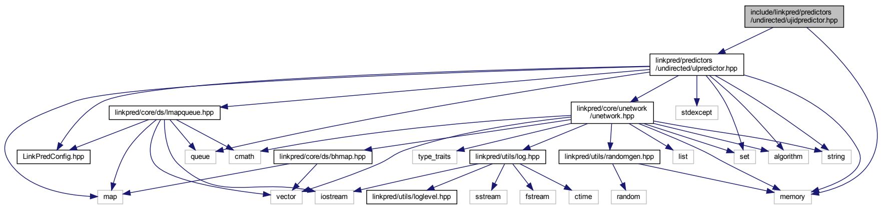
Contains the implementation of the hypermap link predictor.

10.83 include/linkpred/predictors/undirected/ujidpredictor.hpp File Reference

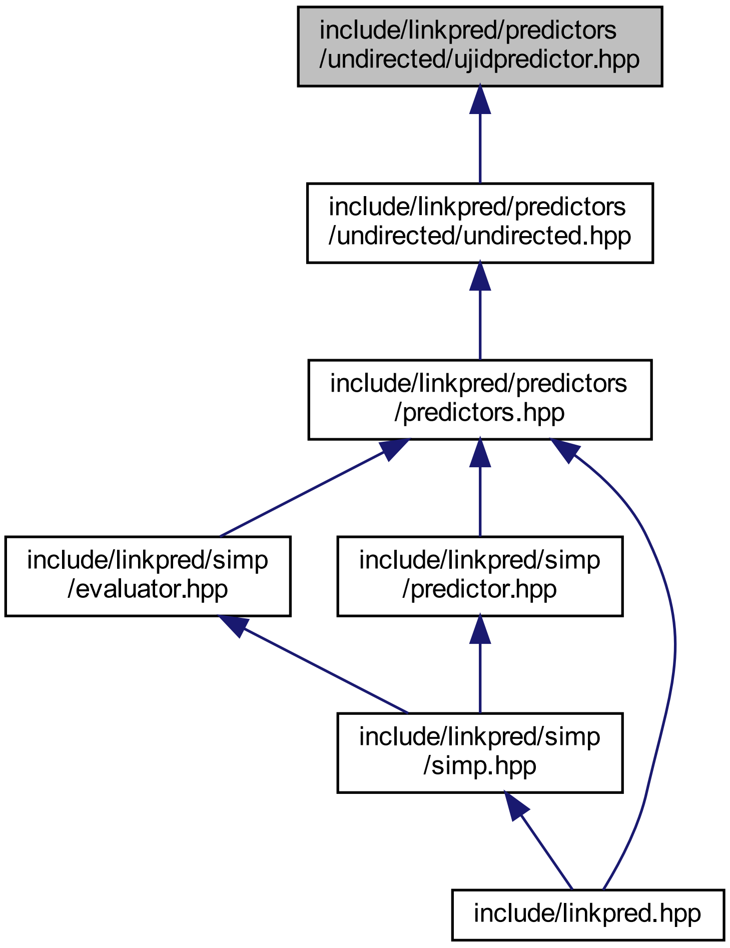
Contains the implementation of a Jackard index link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```

Include dependency graph for ujidpredictor.hpp:


include/linkpred/predictors
/undirected/ujidpredictor.hpp
linkpred/predictors
/undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/unetwork
/unetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors /undirected/ujidpredictor.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UJIDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Jackard index link predictor.

Namespaces

- LinkPred

  Main namespace.

10.83.1 Detailed Description

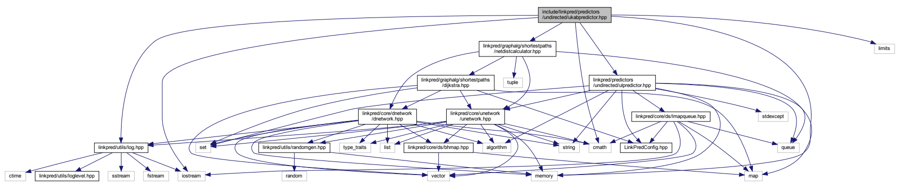
Contains the implementation of a Jackard index link predictor.

10.84 include/linkpred/predictors/undirected/ukabpredictor.hpp File Reference

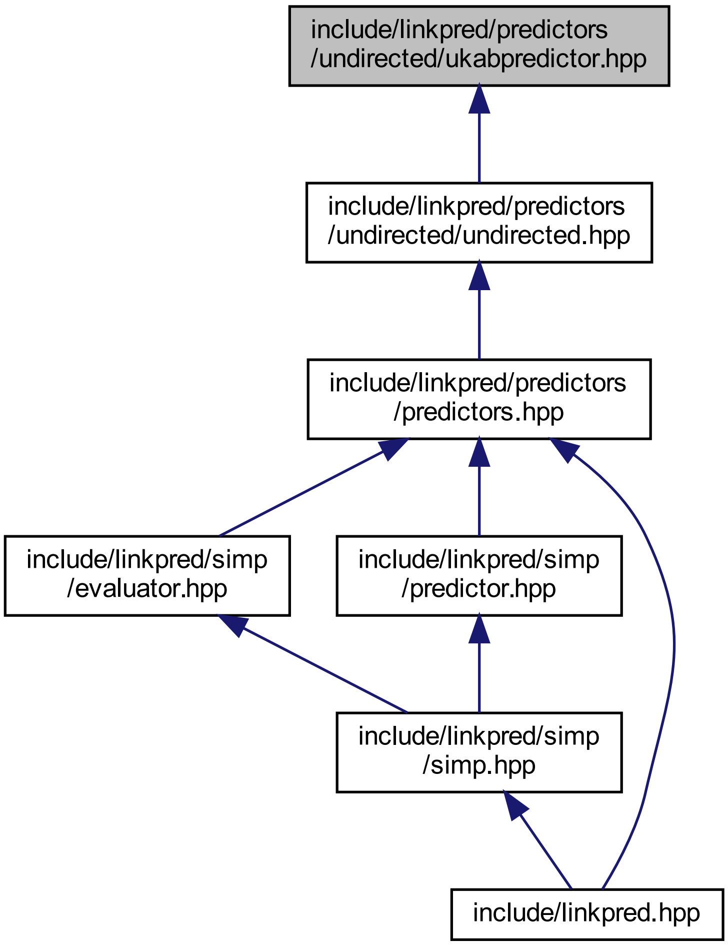
Contains the implementation of a scalable popularity-similarity link predictor.

```
#include "linkpred/predictors/undirected/ulpredictor.hpp"
#include "linkpred/graphalg/shortestpaths/netdistcalculator.hpp"
#include "linkpred/utils/log.hpp"
#include <memory>
#include <cmath>
#include <limits>
#include <iostream>
```

Include dependency graph for ukabpredictor.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/ukabpredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UKABPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

    A scalable popularity similarity link predictor proposed in: "Kerrache, S., Alharbi, R. & Benhidour, H. A Scalable Similarity-Popularity Link Prediction Method. Sci Rep 10, 6394 (2020)". `https://doi.org/10.↩ 1038/s41598-020-62636-1`.

Namespaces

- LinkPred

    Main namespace.

10.84.1 Detailed Description

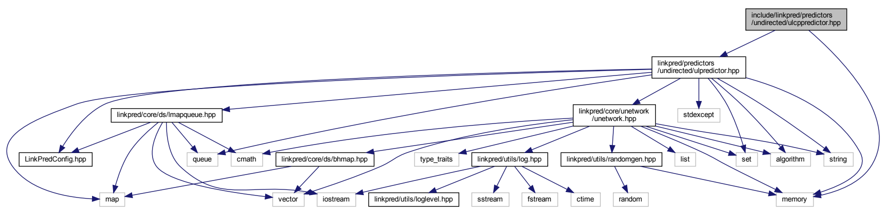
Contains the implementation of a scalable popularity-similarity link predictor.

10.85 include/linkpred/predictors/undirected/ulcppredictor.hpp File Reference

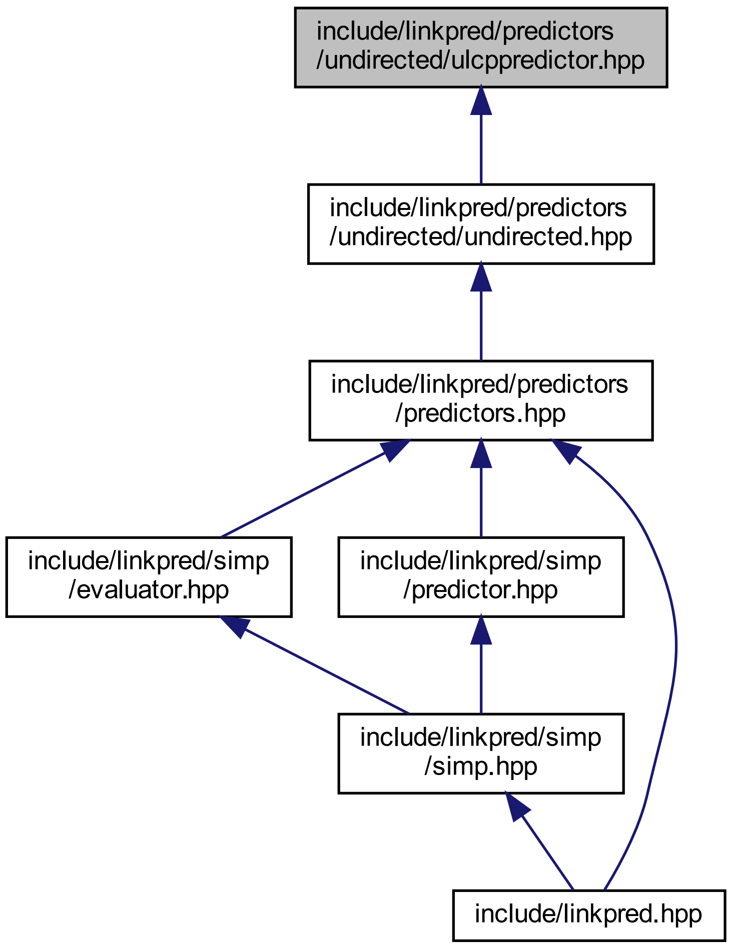
Contains the implementation of a local path link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```

Include dependency graph for ulcppredictor.hpp:


include/linkpred/predictors
/undirected/ulcppredictor.hpp
linkpred/predictors
/undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/unetwork
/unetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/ulcppredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::ULCPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Local path link predictor.

Namespaces

- LinkPred

  Main namespace.

10.85.1 Detailed Description

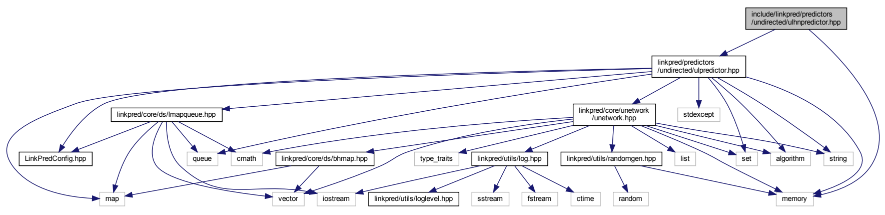
Contains the implementation of a local path link predictor.

10.86 include/linkpred/predictors/undirected/ulhnpredictor.hpp File Reference

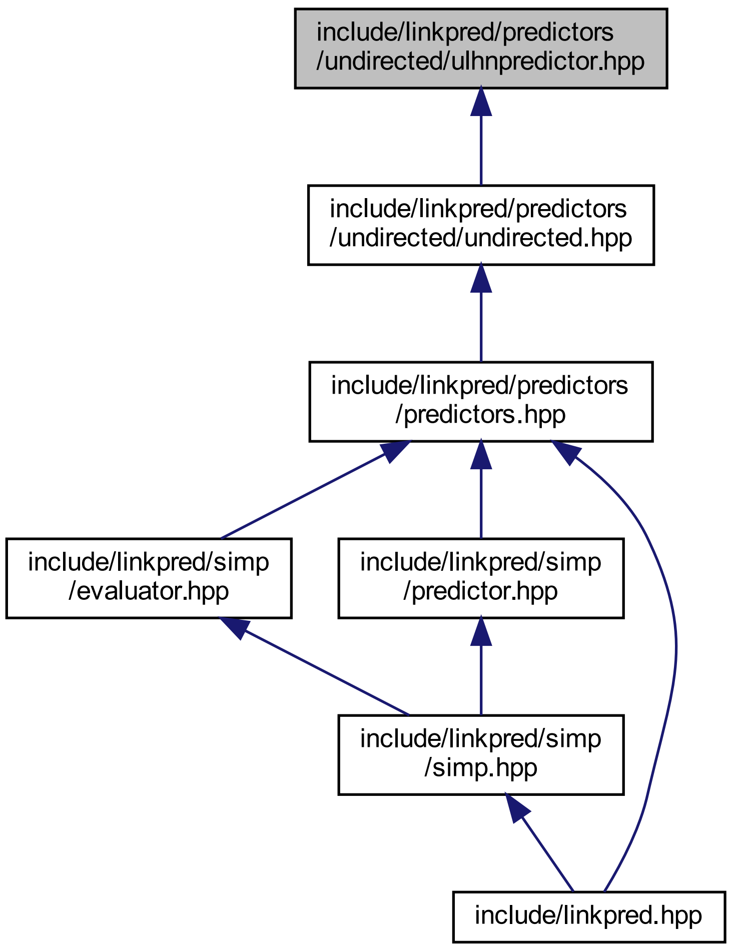
Contains the implementation of a Leicht-Holme-Newman index link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```

Include dependency graph for ulhnpredictor.hpp:


include/linkpred/predictors
/undirected/ulhnpredictor.hpp
linkpred/predictors
/undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/unetwork
/unetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/ulhnpredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::ULHNPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  Leicht-Holme-Newman index link predictor.

Namespaces

- LinkPred

  Main namespace.

10.86.1 Detailed Description

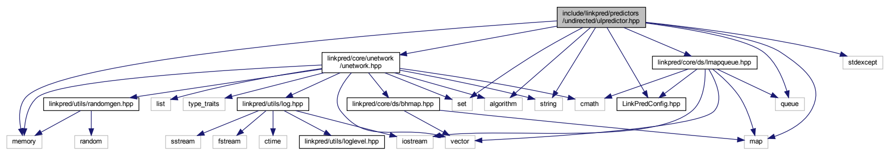
Contains the implementation of a Leicht-Holme-Newman index link predictor.

10.87 include/linkpred/predictors/undirected/ulpredictor.hpp File Reference

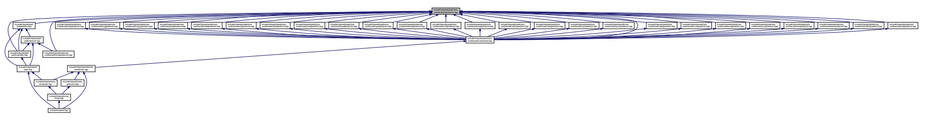
Contains the interface of a link predictor.

```
#include "LinkPredConfig.hpp"
#include "linkpred/core/unetwork/unetwork.hpp"
#include "linkpred/core/ds/lmapqueue.hpp"
#include <memory>
#include <map>
#include <string>
#include <stdexcept>
#include <algorithm>
#include <queue>
#include <set>
```

Include dependency graph for ulpredictor.hpp:


include/linkpred/predictors/undirected/ulpredictor.hpp
linkpred/core/unetwork/unetwork.hpp
linkpred/core/ds/lmapqueue.hpp
stdexcept
linkpred/utils/randomgen.hpp
list
type_traits
linkpred/utils/log.hpp
linkpred/core/ds/bhmap.hpp
set
algorithm
string
cmath
LinkPredConfig.hpp
queue
memory
random
sstream
fstream
ctime
linkpred/utils/loglevel.hpp
iostream
vector
map

This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::ULPredictor< NetworkT, EdgeRndItT, ScoreRndItT, EdgeRndOutItT >

  The interface of a link predictor in an undirected network.

Namespaces

- LinkPred

  Main namespace.

10.87.1 Detailed Description

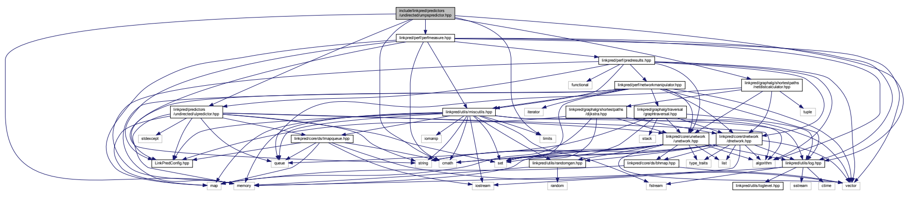
Contains the interface of a link predictor.

10.88 include/linkpred/predictors/undirected/umpspredictor.hpp File Reference

Contains the implementation of a scalable popularity similarity link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include "linkpred/graphalg/shortestpaths/netdistcalculator.hpp"
#include "linkpred/perf/perfmeasure.hpp"
#include "linkpred/utils/log.hpp"
#include <memory>
#include <cmath>
#include <limits>
```

Include dependency graph for umpspredictor.hpp:



Classes

- class LinkPred::UMPSPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  A scalable popularity similarity link predictor.

Namespaces

- LinkPred

  Main namespace.

10.88.1 Detailed Description

Contains the implementation of a scalable popularity similarity link predictor.

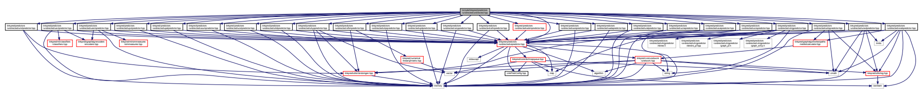
10.89 include/linkpred/predictors/undirected/undirected.hpp File Reference

Includes the headers of link predictors for undirected networks.

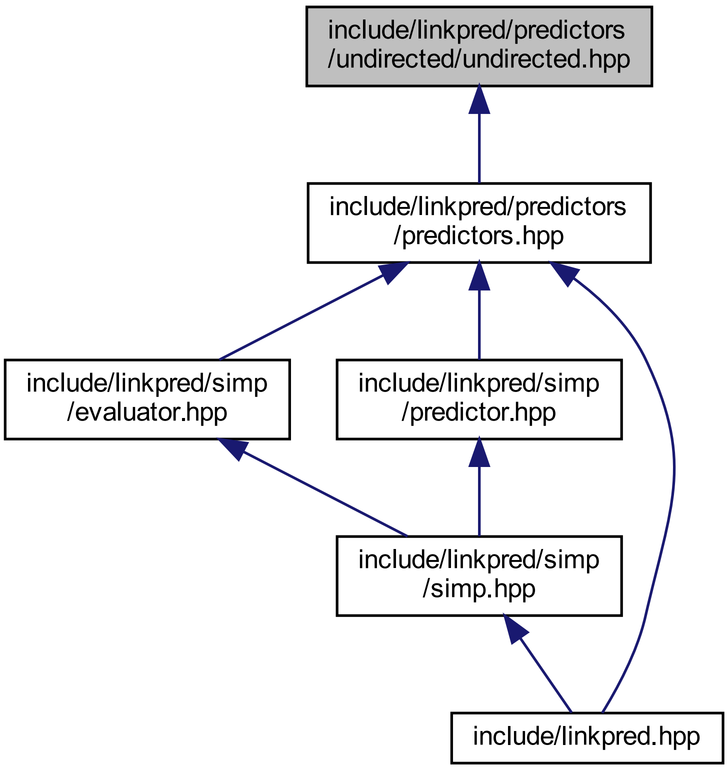
```
#include "linkpred/predictors/undirected/uesmpredictor.hpp"
#include "linkpred/predictors/undirected/ueclpredictor.hpp"
#include "linkpred/predictors/undirected/uadapredictor.hpp"
#include "linkpred/predictors/undirected/ucnepredictor.hpp"
#include "linkpred/predictors/undirected/ucrapredictor.hpp"
#include "linkpred/predictors/undirected/ucstpredictor.hpp"
#include "linkpred/predictors/undirected/ufbmpredictor.hpp"
```

```
#include "linkpred/predictors/undirected/uhdipredictor.hpp"
#include "linkpred/predictors/undirected/uhpipredictor.hpp"
#include "linkpred/predictors/undirected/uhrgpredictor.hpp"
#include "linkpred/predictors/undirected/uhyppredictor.hpp"
#include "linkpred/predictors/undirected/ujidpredictor.hpp"
#include "linkpred/predictors/undirected/ukabpredictor.hpp"
#include "linkpred/predictors/undirected/ulcppredictor.hpp"
#include "linkpred/predictors/undirected/ulhnpredictor.hpp"
#include "linkpred/predictors/undirected/ulpredictor.hpp"
#include "linkpred/predictors/undirected/unedpredictor.hpp"
#include "linkpred/predictors/undirected/upatpredictor.hpp"
#include "linkpred/predictors/undirected/upstpredictor.hpp"
#include "linkpred/predictors/undirected/uralpredictor.hpp"
#include "linkpred/predictors/undirected/urndpredictor.hpp"
#include "linkpred/predictors/undirected/usaipredictor.hpp"
#include "linkpred/predictors/undirected/usbmpredictor.hpp"
#include "linkpred/predictors/undirected/ushppredictor.hpp"
#include "linkpred/predictors/undirected/usoipredictor.hpp"
#include "linkpred/predictors/undirected/usumpredictor.hpp"
```

Include dependency graph for undirected.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

10.89.1 Detailed Description

Includes the headers of link predictors for undirected networks.

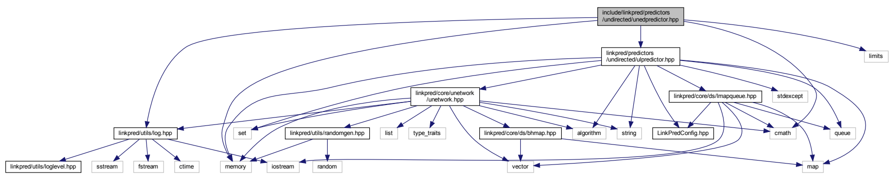
10.90 include/linkpred/predictors/undirected/unedpredictor.hpp File Reference

Contains the implementation of a link prediction algorithm based on the degrees of neighbors.

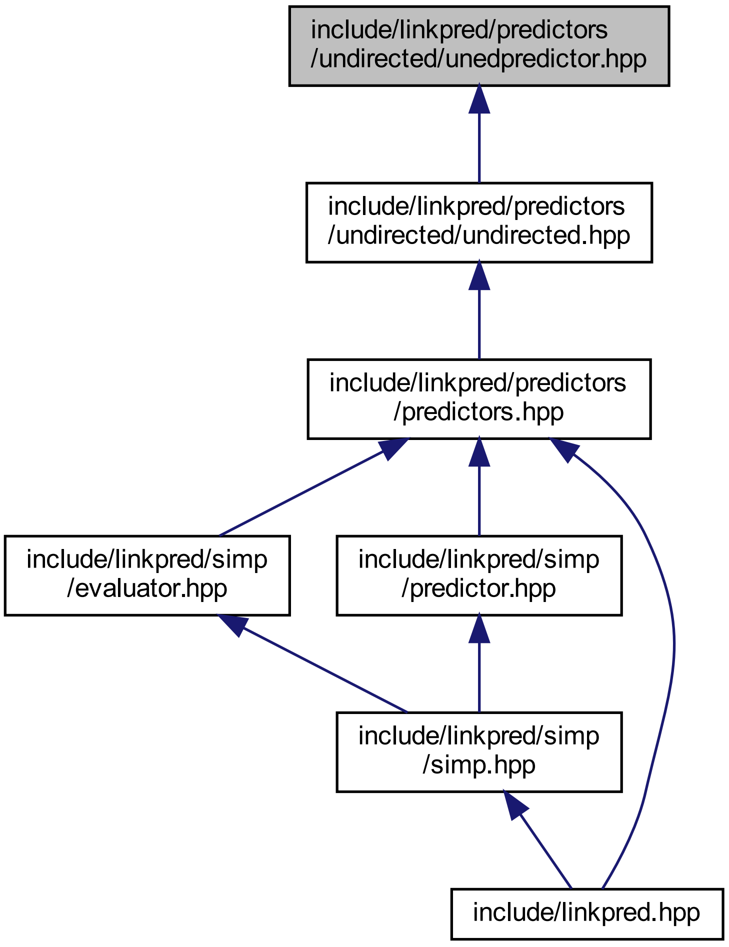
```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include "linkpred/utils/log.hpp"
#include <memory>
#include <cmath>
```

```
#include <limits>
```

Include dependency graph for unedpredictor.hpp:


include/linkpred/predictors/undirected/unedpredictor.hpp
linkpred/predictors/undirected/ulpredictor.hpp
limits
linkpred/core/unetwork/unetwork.hpp
linkpred/core/ds/lmapqueue.hpp
stdexcept
linkpred/utils/log.hpp
set
linkpred/utils/randomgen.hpp
list
type_traits
linkpred/core/ds/bhmap.hpp
algorithm
string
LinkPredConfig.hpp
cmath
queue
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
memory
iostream
random
vector
map

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors/undirected/unedpredictor.hpp
include/linkpred/predictors/undirected/undirected.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UNEDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

    A neighbors degree link predictor.

Namespaces

- LinkPred

  Main namespace.

10.90.1 Detailed Description

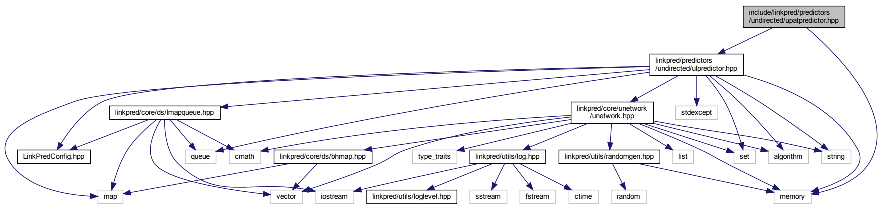
Contains the implementation of a link prediction algorithm based on the degrees of neighbors.

10.91 include/linkpred/predictors/undirected/upatpredictor.hpp File Reference

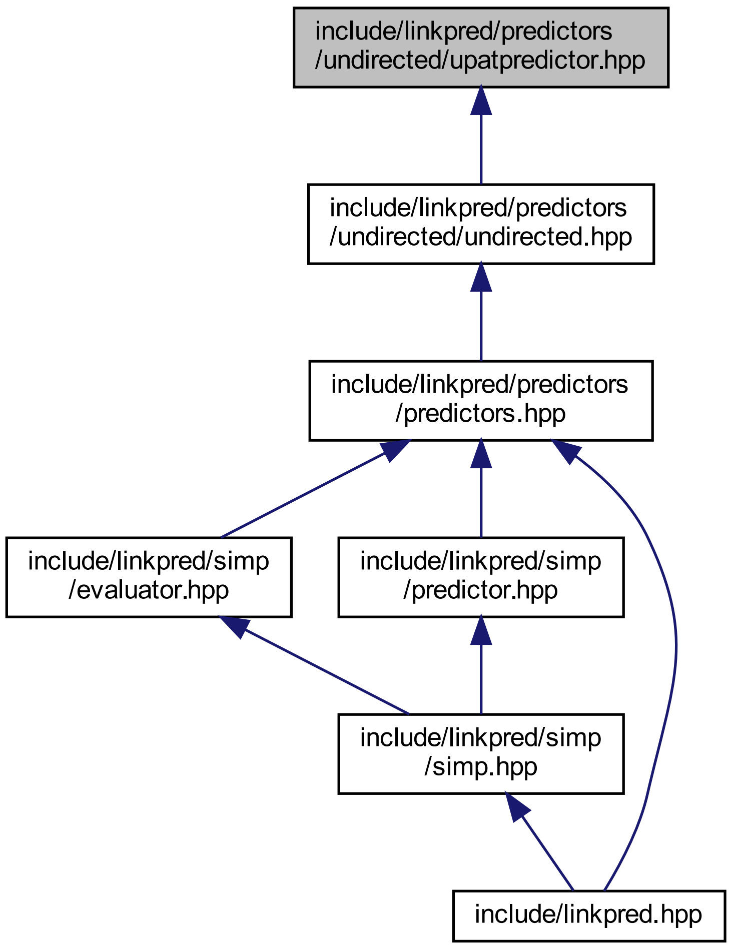
Contains the implementation of a preferential attachment link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```

Include dependency graph for upatpredictor.hpp:


include/linkpred/predictors/undirected/upatpredictor.hpp
linkpred/predictors/undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/unetwork/unetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/upatpredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UPATPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  A preferential attachment link predictor.

Namespaces

- LinkPred

  Main namespace.

10.91.1 Detailed Description

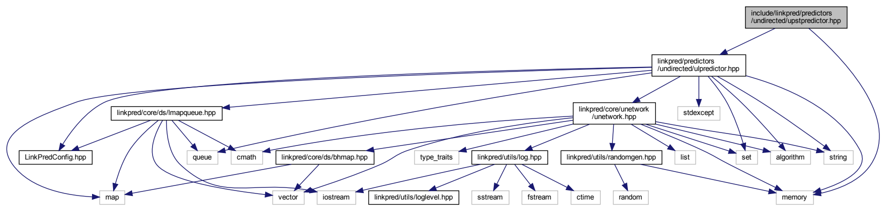
Contains the implementation of a preferential attachment link predictor.

10.92 include/linkpred/predictors/undirected/upstpredictor.hpp File Reference

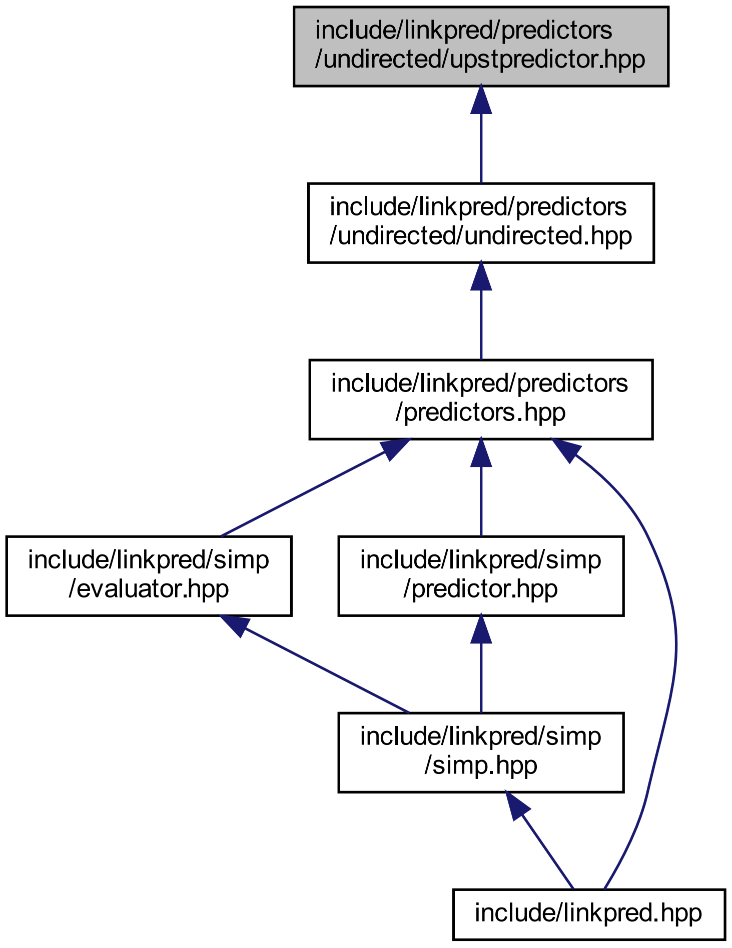
Contains the implementation of a link predictor that prestores the scores of edges.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```

Include dependency graph for upstpredictor.hpp:


include/linkpred/predictors /undirected/upstpredictor.hpp
linkpred/predictors /undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/unetwork /unetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors /undirected/upstpredictor.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::UPSTPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  A link predictor that prestores edge scores. This allows to seemingly integrate results from external link prediction algorithms to LinkPred (for example, users may implement their own link prediction algorithm and then use this link predictor to use compare their results to algorithms available in LinkPred).

Namespaces

- LinkPred

  Main namespace.

10.92.1 Detailed Description

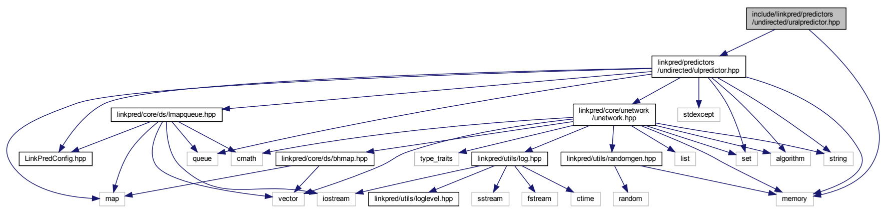
Contains the implementation of a link predictor that prestores the scores of edges.

10.93 include/linkpred/predictors/undirected/uralpredictor.hpp File Reference

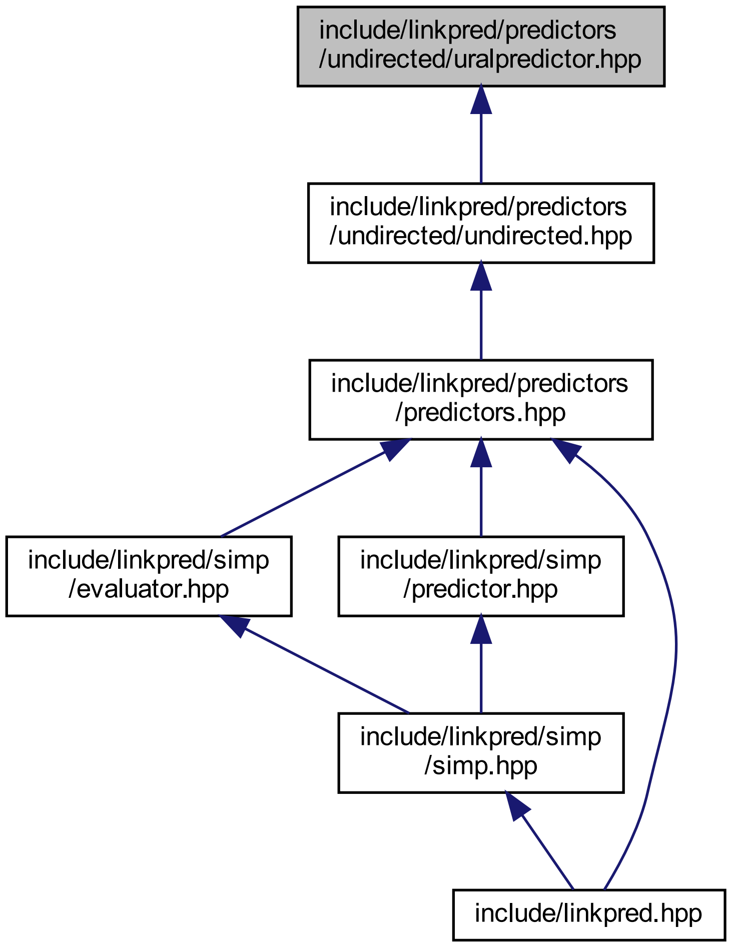
Contains the implementation of a resource allocation link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```

Include dependency graph for uralpredictor.hpp:


include/linkpred/predictors
/undirected/uralpredictor.hpp
linkpred/predictors
/undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/unetwork
/unetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/uralpredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::URALPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  A resource allocation link predictor.

Namespaces

- LinkPred

  Main namespace.

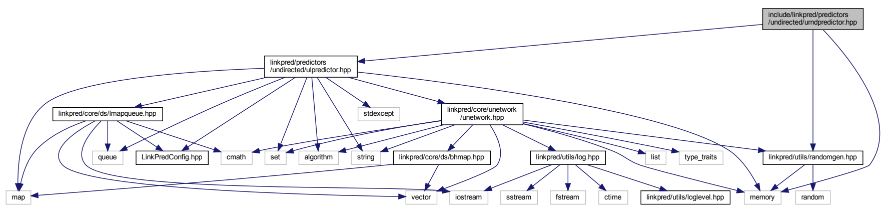
10.93.1 Detailed Description

Contains the implementation of a resource allocation link predictor.

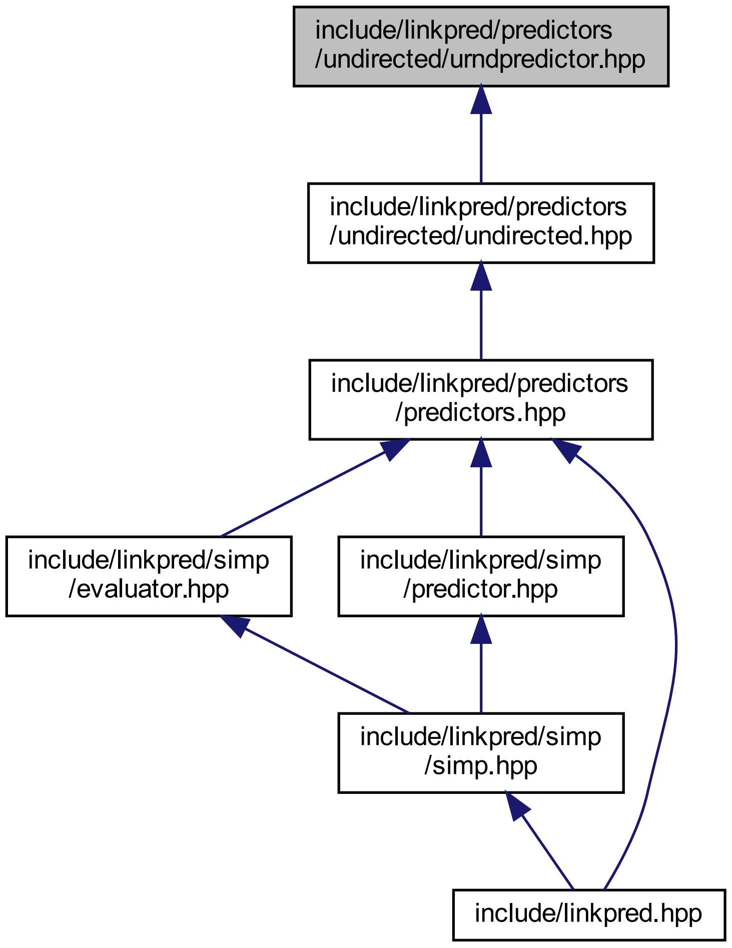
10.94 include/linkpred/predictors/undirected/urndpredictor.hpp File Reference

Contains the implementation of a random link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include "linkpred/utils/randomgen.hpp"
#include <memory>
```
Include dependency graph for urndpredictor.hpp:


include/linkpred/predictors/undirected/urndpredictor.hpp
linkpred/predictors/undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
stdexcept
linkpred/core/unetwork/unetwork.hpp
queue
LinkPredConfig.hpp
cmath
set
algorithm
string
linkpred/core/ds/bhmap.hpp
linkpred/utils/log.hpp
list
type_traits
linkpred/utils/randomgen.hpp
map
vector
iostream
sstream
fstream
ctime
linkpred/utils/loglevel.hpp
memory
random

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/urndpredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::URNDPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

    A random link predictor.

Namespaces

- LinkPred

    Main namespace.

10.94.1 Detailed Description

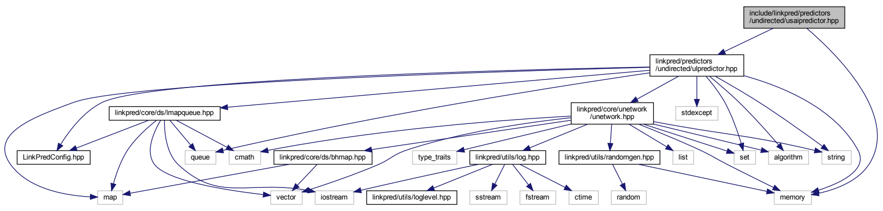
Contains the implementation of a random link predictor.

10.95 include/linkpred/predictors/undirected/usaipredictor.hpp File Reference

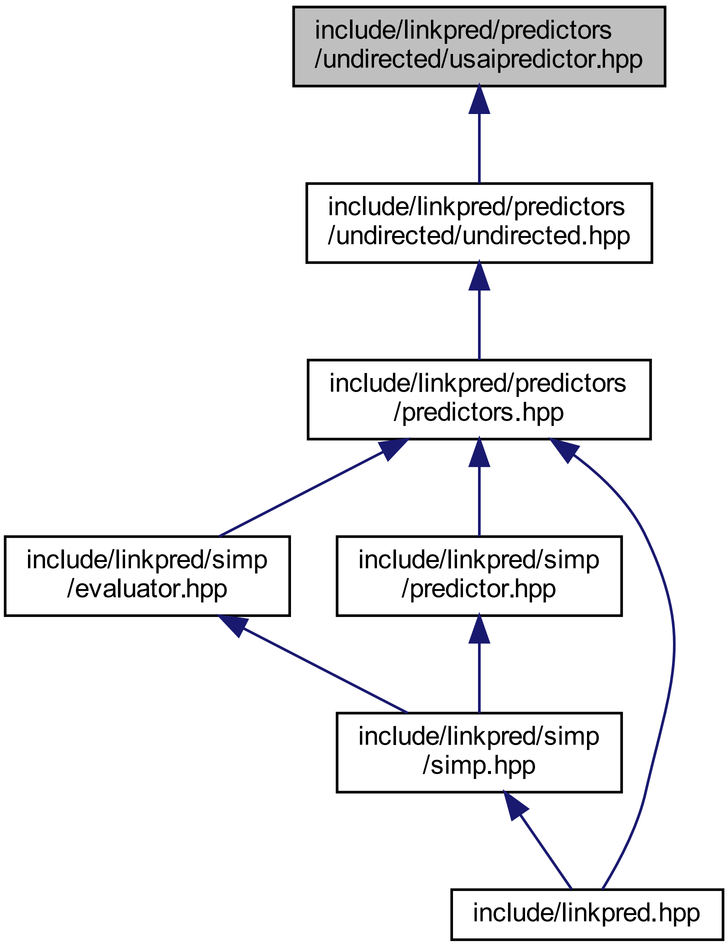
Contains the implementation of a Salton index link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```

Include dependency graph for usaipredictor.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/predictors/undirected/usaipredictor.hpp
include/linkpred/predictors/undirected/undirected.hpp
include/linkpred/predictors/predictors.hpp
include/linkpred/simp/evaluator.hpp
include/linkpred/simp/predictor.hpp
include/linkpred/simp/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::USAIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  A Salton index link predictor.

Namespaces

- LinkPred

  Main namespace.

10.95.1 Detailed Description

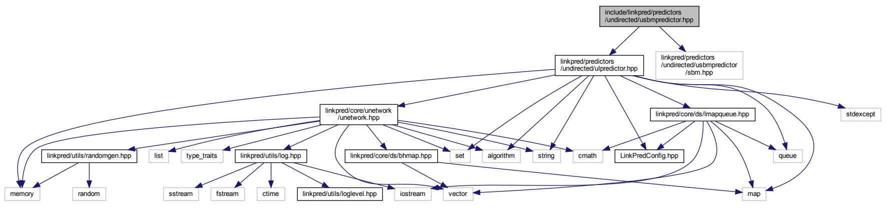
Contains the implementation of a Salton index link predictor.

10.96 include/linkpred/predictors/undirected/usbmpredictor.hpp File Reference

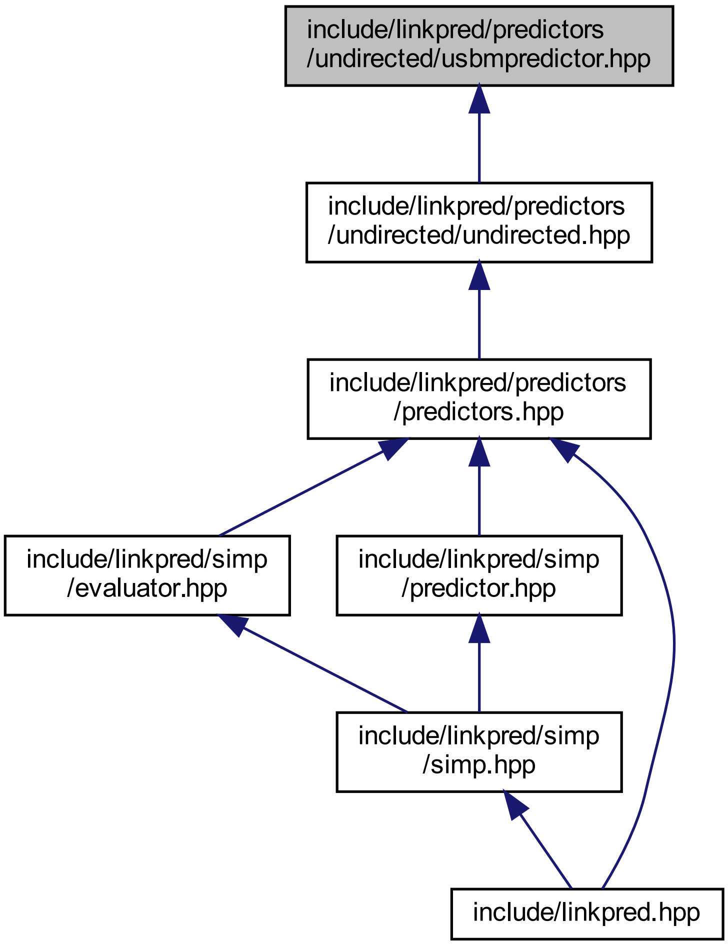
Contains the implementation of the stochastic block model link predictor.

`#include <linkpred/predictors/undirected/ulpredictor.hpp>`
`#include <linkpred/predictors/undirected/usbmpredictor/sbm.hpp>`

Include dependency graph for usbmpredictor.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/usbmpredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::USBMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  The stochastic block model link predictor.

Namespaces

- LinkPred

  Main namespace.

10.96.1 Detailed Description

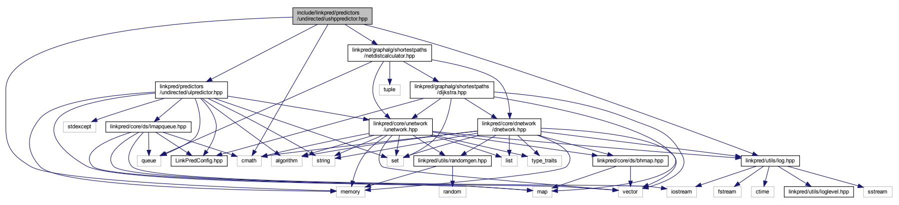
Contains the implementation of the stochastic block model link predictor.

10.97 include/linkpred/predictors/undirected/ushppredictor.hpp File Reference

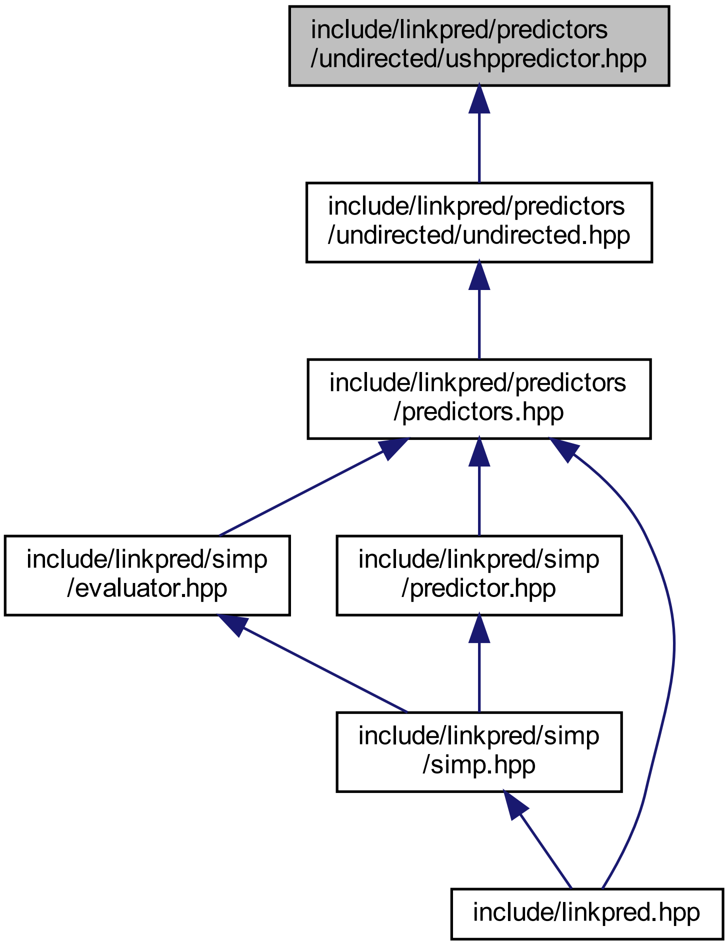
Contains the implementation of a shortest path link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include "linkpred/graphalg/shortestpaths/netdistcalculator.hpp"
#include "linkpred/utils/log.hpp"
#include <memory>
#include <cmath>
```

Include dependency graph for ushppredictor.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/predictors
/undirected/ushppredictor.hpp
include/linkpred/predictors
/undirected/undirected.hpp
include/linkpred/predictors
/predictors.hpp
include/linkpred/simp
/evaluator.hpp
include/linkpred/simp
/predictor.hpp
include/linkpred/simp
/simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::USHPPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  A shortest path link predictor link predictor.

Namespaces

- LinkPred

  Main namespace.

10.97.1 Detailed Description

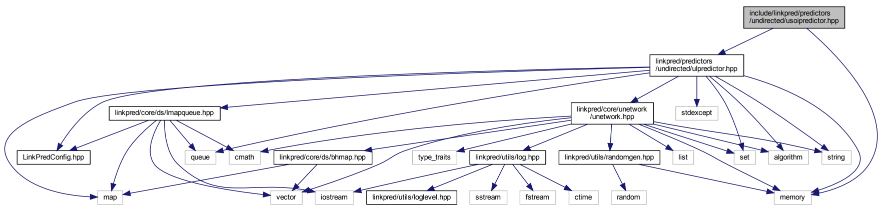
Contains the implementation of a shortest path link predictor.

10.98 include/linkpred/predictors/undirected/usoipredictor.hpp File Reference

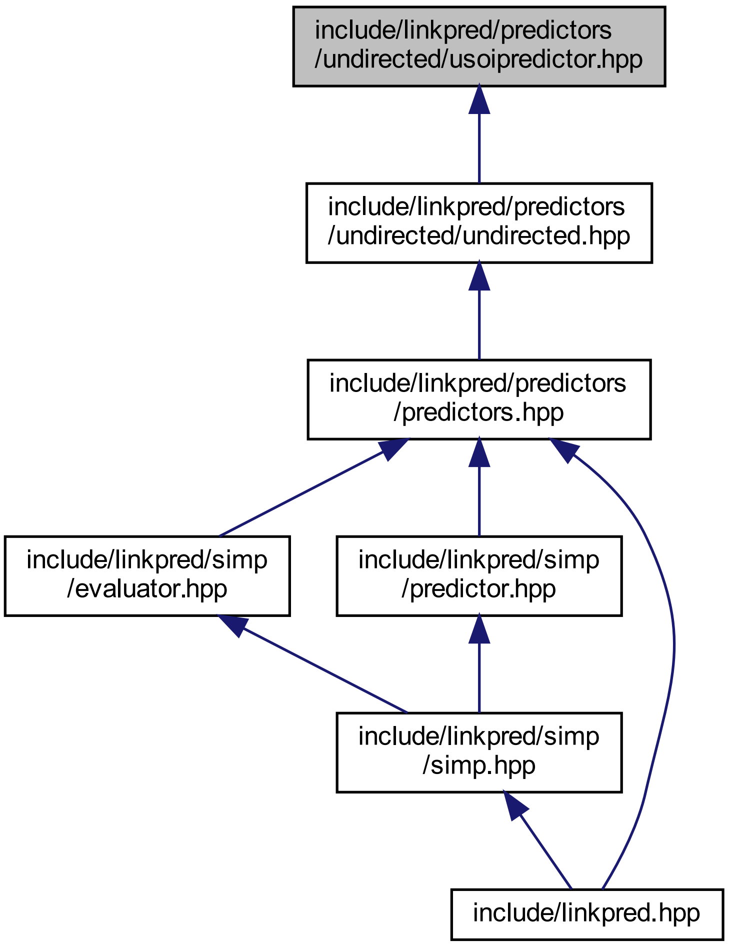
Contains the implementation of a Sorensen index link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```

Include dependency graph for usoipredictor.hpp:


include/linkpred/predictors /undirected/usoipredictor.hpp
linkpred/predictors /undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/unetwork /unetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors /undirected/usoipredictor.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::USOIPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  A Sorensen index link predictor.

Namespaces

- LinkPred

  Main namespace.

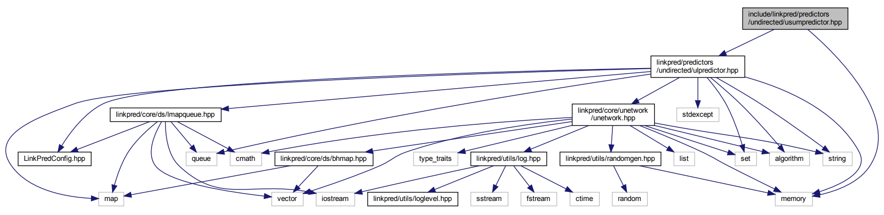
10.98.1 Detailed Description

Contains the implementation of a Sorensen index link predictor.

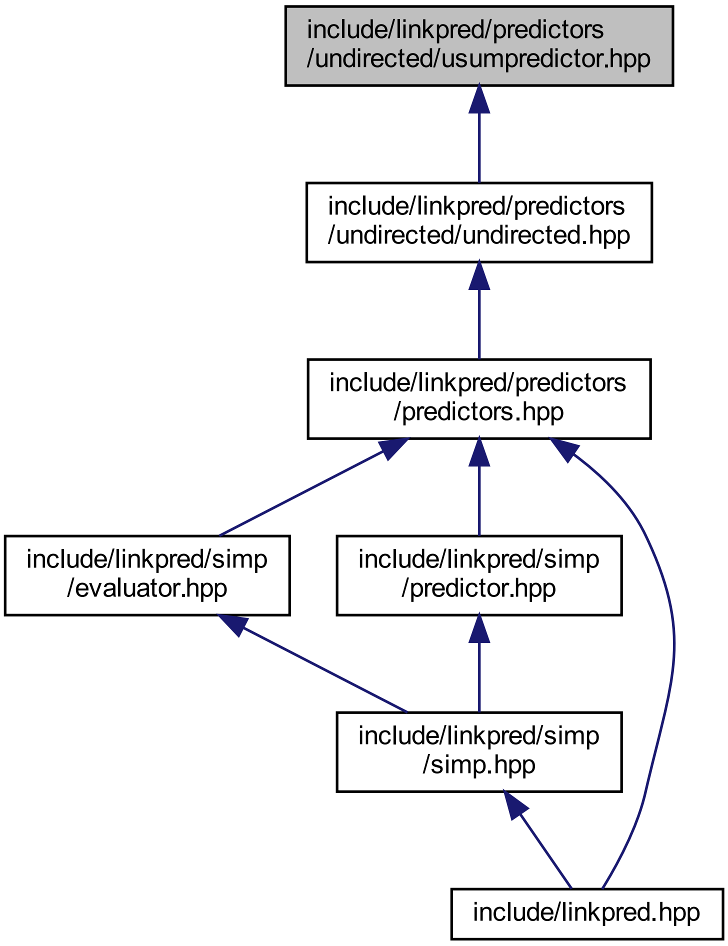
10.99 include/linkpred/predictors/undirected/usumpredictor.hpp File Reference

Contains the implementation of a sum-of-degrees link predictor.

```
#include <linkpred/predictors/undirected/ulpredictor.hpp>
#include <memory>
```
Include dependency graph for usumpredictor.hpp:


include/linkpred/predictors/undirected/usumpredictor.hpp
linkpred/predictors/undirected/ulpredictor.hpp
linkpred/core/ds/lmapqueue.hpp
linkpred/core/unetwork/unetwork.hpp
stdexcept
LinkPredConfig.hpp
queue
cmath
linkpred/core/ds/bhmap.hpp
type_traits
linkpred/utils/log.hpp
linkpred/utils/randomgen.hpp
list
set
algorithm
string
map
vector
iostream
linkpred/utils/loglevel.hpp
sstream
fstream
ctime
random
memory

This graph shows which files directly or indirectly include this file:


include/linkpred/predictors /undirected/usumpredictor.hpp
include/linkpred/predictors /undirected/undirected.hpp
include/linkpred/predictors /predictors.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /predictor.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- class LinkPred::USUMPredictor< Network, EdgeRndIt, ScoreRndIt, EdgeRndOutIt >

  A sum-of-degrees link predictor.

Namespaces

- LinkPred

  Main namespace.

10.99.1 Detailed Description

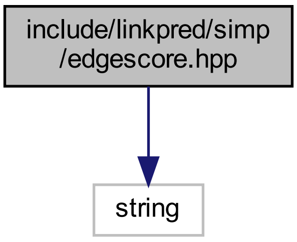
Contains the implementation of a sum-of-degrees link predictor.

10.100 include/linkpred/simp/edgescore.hpp File Reference

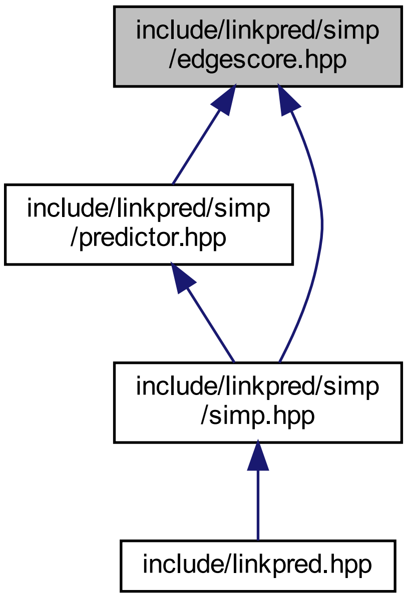
Contains the definition of a structure to store the score of an edge.

```
#include <string>
```

Include dependency graph for edgescore.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- struct LinkPred::Simp::EdgeScore

  A structure to store the score of an edge.
- struct LinkPred::Simp::EdgeScoreByID

  A structure to store the score of an edge. The node IDs are used instead of labels.

Namespaces

- LinkPred

  Main namespace.
- LinkPred::Simp

  Simplified interface. Contains a simplified interface for LinkPred that includes the essential functionalities.

10.100.1 Detailed Description

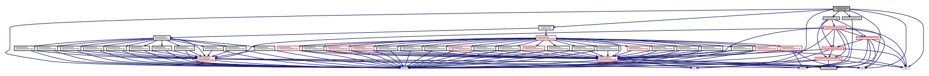
Contains the definition of a structure to store the score of an edge.

10.101 include/linkpred/simp/evaluator.hpp File Reference

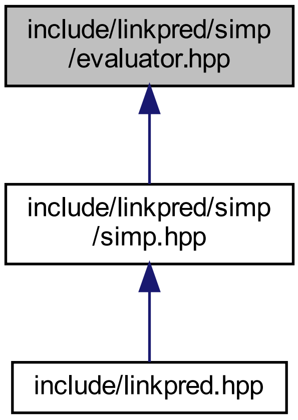
Contains the definition of a class that simplifies the evaluation of link prediction algorithms.

```
#include "LinkPredConfig.hpp"
#include "linkpred/simp/perfres.hpp"
#include "linkpred/predictors/predictors.hpp"
#include "linkpred/perf/perf.hpp"
#include <memory>
#include <vector>
#include <map>
#include <set>
```

Include dependency graph for evaluator.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::Simp::Evaluator

    A class that simplifies the evaluation of link prediction algorithms.
- struct LinkPred::Simp::Evaluator::Factory::ECLParams

    Parameters of ECL.
- struct LinkPred::Simp::Evaluator::Factory::ESMParams

    Parameters of ESM.
- struct LinkPred::Simp::Evaluator::Factory::FBMParams

    Parameters of FBM.
- struct LinkPred::Simp::Evaluator::Factory::HRGParams

    Parameters of HRG.
- struct LinkPred::Simp::Evaluator::Factory::HYPParams

    Parameters of HYP.
- struct LinkPred::Simp::Evaluator::Factory::KABParams

    Parameters of KAB.
- struct LinkPred::Simp::Evaluator::Factory::LCPParams

    Parameters of LCP.
- struct LinkPred::Simp::Evaluator::Factory::PSTParams

    Parameters of PST.
- struct LinkPred::Simp::Evaluator::Factory::RNDParams

    Parameters of RND.
- struct LinkPred::Simp::Evaluator::Factory::SBMParams

    Parameters of SBM.
- struct LinkPred::Simp::Evaluator::Factory::SHPParams

    Parameters of SHP.

Namespaces

- LinkPred

    Main namespace.
- LinkPred::Simp

    Simplified interface. Contains a simplified interface for LinkPred that includes the essential functionalities.

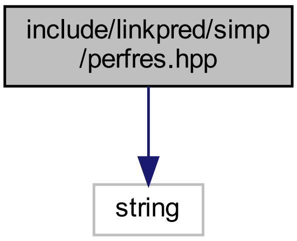
10.101.1 Detailed Description

Contains the definition of a class that simplifies the evaluation of link prediction algorithms.

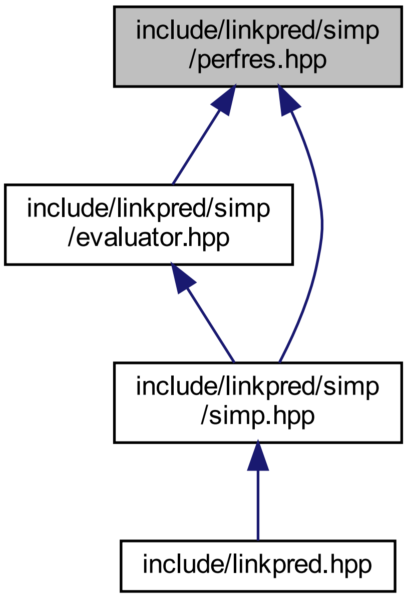
10.102 include/linkpred/simp/perfres.hpp File Reference

Contains the definition of a structure to store performance results.

```
#include <string>
```
Include dependency graph for perfres.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- struct LinkPred::Simp::PerfRes

    A structure to store performance results.

Namespaces

- LinkPred

    Main namespace.
- LinkPred::Simp

    Simplified interface. Contains a simplified interface for LinkPred that includes the essential functionalities.

10.102.1 Detailed Description

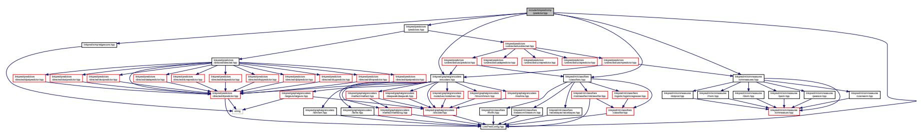
Contains the definition of a structure to store performance results.

10.103 include/linkpred/simp/predictor.hpp File Reference

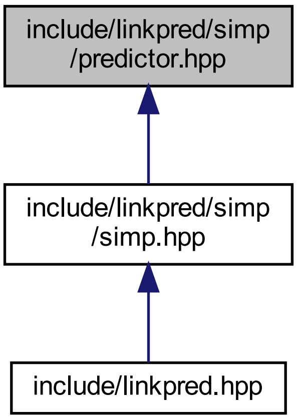
Contains the definition of a class that simplifies the use of link prediction algorithms.

```
#include "LinkPredConfig.hpp"
#include "linkpred/simp/edgescore.hpp"
#include "linkpred/predictors/predictors.hpp"
#include "linkpred/graphalg/encoders/encoders.hpp"
#include "linkpred/ml/classifiers/classifiers.hpp"
#include "linkpred/ml/simmeasures/simmeasures.hpp"
```

Include dependency graph for predictor.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::Simp::Predictor

  A class that simplifies the use of link prediction algorithms.

Namespaces

- LinkPred

  Main namespace.
- LinkPred::Simp

  Simplified interface. Contains a simplified interface for LinkPred that includes the essential functionalities.

10.103.1 Detailed Description

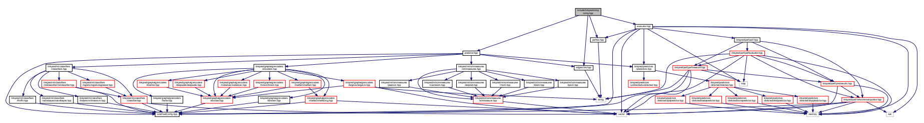
Contains the definition of a class that simplifies the use of link prediction algorithms.

10.104 include/linkpred/simp/simp.hpp File Reference

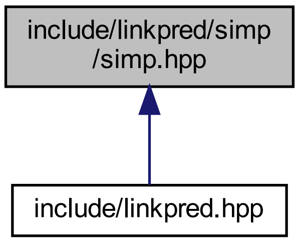
Includes all headers of the essential interface.

```
#include "edgescore.hpp"
#include "predictor.hpp"
#include "perfres.hpp"
#include "evaluator.hpp"
```

Include dependency graph for simp.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- LinkPred

  Main namespace.
- LinkPred::Simp

  Simplified interface. Contains a simplified interface for LinkPred that includes the essential functionalities.

10.104.1 Detailed Description

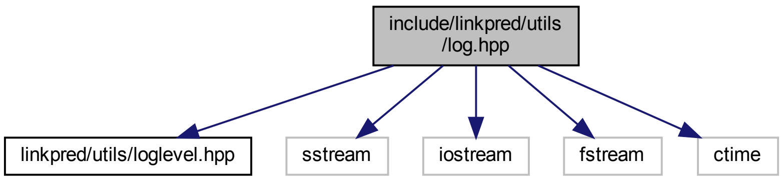
Includes all headers of the essential interface.

10.105 include/linkpred/utils/log.hpp File Reference

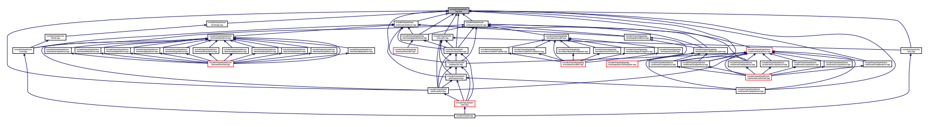
Contains the implementation of a log class.

```
#include "linkpred/utils/loglevel.hpp"
#include <sstream>
#include <iostream>
#include <fstream>
#include <ctime>
```

Include dependency graph for log.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::Log

  A log class.

Namespaces

- LinkPred

  Main namespace.

Macros

- #define logger(level, message)

10.105.1 Detailed Description

Contains the implementation of a log class.

10.105.2 Macro Definition Documentation

10.105.2.1 logger

```
#define logger(
               level,
               message )
```

Value:

```
if (level > Log::logLevel) ; \
else Log(level) « std::string(__FILE__)« " in "« std::string(__FUNCTION__) « ":" « __LINE__ « " : " «
       message;
```

Macro for writing to log.

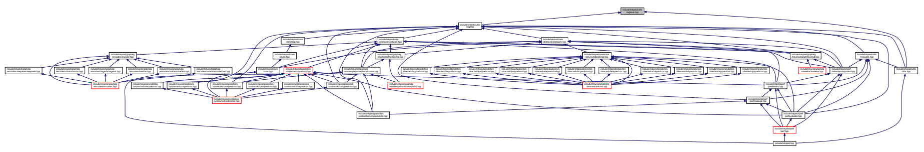
Parameters

level	The message log level.
message	The text that is added to the log.

10.106 include/linkpred/utils/loglevel.hpp File Reference

Contains the definition of log levels.

This graph shows which files directly or indirectly include this file:



Namespaces

- LinkPred

  Main namespace.

Enumerations

- enum LinkPred::LogLevel {
  LinkPred::logError, LinkPred::logWarning, LinkPred::logInfo, LinkPred::logDebug,
  LinkPred::logDebug1, LinkPred::logDebug2, LinkPred::logDebug3 }

  Enumeration of log levels.

10.106.1 Detailed Description

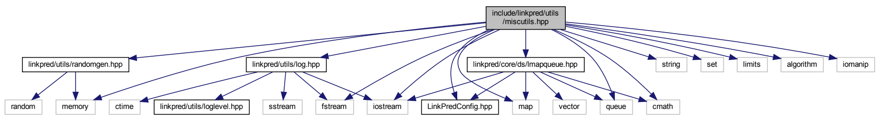
Contains the definition of log levels.

10.107 include/linkpred/utils/miscutils.hpp File Reference

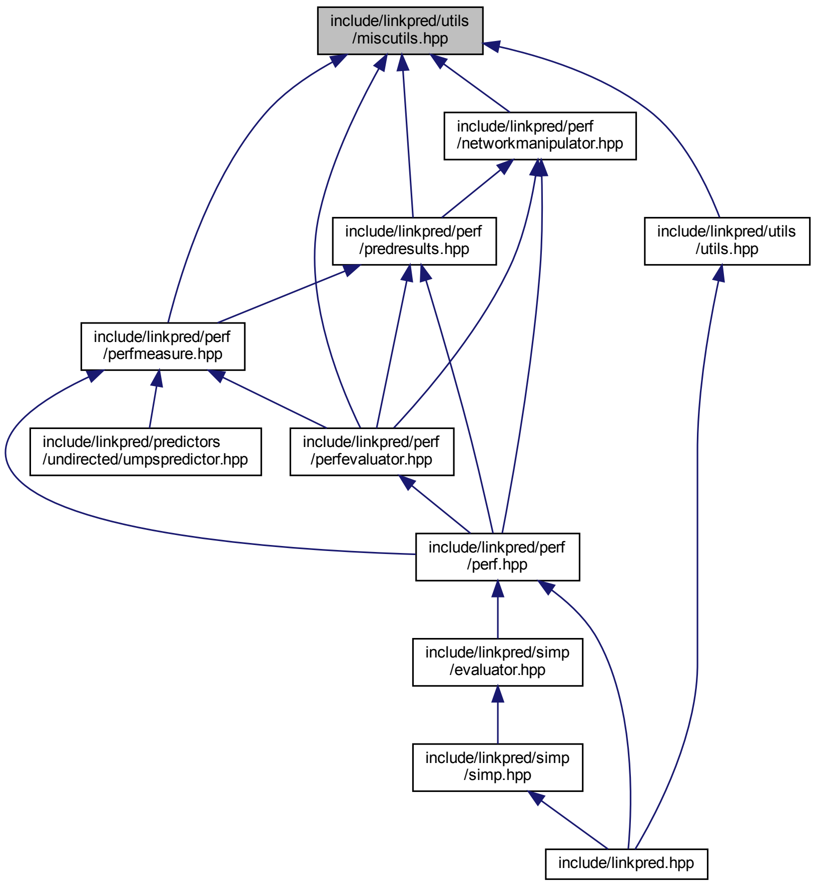
Contains the implementation of miscellaneous useful methods.

```
#include "LinkPredConfig.hpp"
#include "linkpred/utils/randomgen.hpp"
#include "linkpred/utils/log.hpp"
#include "linkpred/core/ds/lmapqueue.hpp"
#include <string>
#include <cmath>
#include <map>
#include <memory>
#include <set>
#include <queue>
#include <fstream>
#include <iostream>
#include <limits>
#include <algorithm>
#include <iomanip>
```

Include dependency graph for miscutils.hpp:



This graph shows which files directly or indirectly include this file:


include/linkpred/utils /miscutils.hpp
include/linkpred/perf /networkmanipulator.hpp
include/linkpred/perf /predresults.hpp
include/linkpred/utils /utils.hpp
include/linkpred/perf /perfmeasure.hpp
include/linkpred/predictors /undirected/umpspredictor.hpp
include/linkpred/perf /perfevaluator.hpp
include/linkpred/perf /perf.hpp
include/linkpred/simp /evaluator.hpp
include/linkpred/simp /simp.hpp
include/linkpred.hpp

Classes

- struct LinkPred::Utils::PairCompRight< FirstT, SecondT, CompareT >

  Class for comparing pairs based on second elements only.
- struct LinkPred::Utils::EdgeScore< Label >

  A structure to store the score of an edge.

Namespaces

- LinkPred

  Main namespace.
- LinkPred::Utils

  Some utility functions.

Enumerations

- enum LinkPred::SortOrder { LinkPred::None, LinkPred::Inc, LinkPred::Dec }

  Enumeration of different sorting orders.

Functions

- std::string & LinkPred::Utils::ltrim (std::string &str, const char ∗spaces=" \t\n\r\f\v")
- std::string & LinkPred::Utils::rtrim (std::string &str, const char ∗spaces=" \t\n\r\f\v")
- std::string & LinkPred::Utils::trim (std::string &str, const char ∗spaces=" \t\n\r\f\v")
- template<typename T >
  void LinkPred::Utils::clear (std::queue< T > &q)
- template<typename IteratorT >
  void LinkPred::Utils::sort (IteratorT begin, IteratorT end, SortOrder sortOrder)
- std::vector< std::size_t > LinkPred::Utils::getRndPerm (std::size_t n)
- std::vector< std::size_t > LinkPred::Utils::getRndPerm (std::size_t n, long int seed)
- std::pair< double, double > LinkPred::Utils::plFit (std::vector< std::size_t > const &data)
- std::pair< double, double > LinkPred::Utils::plFit (std::vector< double > const &data)
- template<typename T >
  void LinkPred::Utils::print (std::vector< T > const &v, std::string name)
- template<typename U , typename V >
  std::pair< V, U > LinkPred::Utils::flip (const std::pair< U, V > &p)
- template<typename U , typename V >
  std::multimap< V, U > LinkPred::Utils::flipMap (const std::map< U, V > &map)
- template<typename RandomIterator >
  std::set< typename std::iterator_traits< RandomIterator >::value_type > LinkPred::Utils::selectRandom (RandomIterator begin, RandomIterator end, std::size_t k, long int seed)
- template<typename RandomIterator >
  void LinkPred::Utils::selectRandomInPlace (RandomIterator begin, RandomIterator end, std::size_t k, long int seed)
- template<typename T , typename InputIterator , typename InserterIt , typename Compare >
  void LinkPred::Utils::selectTopK (InputIterator begin, InputIterator end, InserterIt inserter, std::size_t k)
- template<typename RandomIterator >
  RandomIterator LinkPred::Utils::getRandom (RandomIterator begin, RandomIterator end, long int seed)
- template<typename T , typename InputIterator , typename InserterIt >
  void LinkPred::Utils::filter (InputIterator begin, InputIterator end, std::set< T > const &excepts, Inserter←
  It inserter)
- template<typename InputIterator >
  void LinkPred::Utils::print (InputIterator begin, InputIterator end, std::string const &title, std::ostream &out)
- template<typename InputIterator >
  void LinkPred::Utils::print (InputIterator begin, InputIterator end, std::string const &title)
- template<typename InputIterator , typename Network >
  void LinkPred::Utils::printEdges (InputIterator begin, InputIterator end, Network const &net, std::string const &title, std::ostream &out)
- template<typename InputIterator , typename Network >
  void LinkPred::Utils::printEdges (InputIterator begin, InputIterator end, Network const &net, std::string const &title)
- template<typename InputIterator >
  double LinkPred::Utils::norm (InputIterator begin, InputIterator end)
- int LinkPred::Utils::int_cast (std::size_t source)
- template<typename InputIterator >
  void LinkPred::Utils::assertNoNaN (InputIterator begin, InputIterator end)
- std::pair< std::size_t, std::size_t > LinkPred::Utils::localRange (std::size_t n, int nbProcs, int procID)
- template<typename RandomIterator >
  void LinkPred::Utils::shuffle (RandomIterator begin, RandomIterator end, long int seed)
- template<typename Label = std::string>
  std::vector< std::pair< Label, Label > > LinkPred::Utils::readEdges (std::string fileName, bool ignore←
  Loops=true)
- template<typename Label = std::string>
  std::vector< EdgeScore< Label > > LinkPred::Utils::readEdgeScores (std::string fileName)
- template<typename Label = std::string>
  void LinkPred::Utils::writeEdgeScores (std::string fileName, std::vector< EdgeScore< Label >> const &esv)

10.107.1 Detailed Description

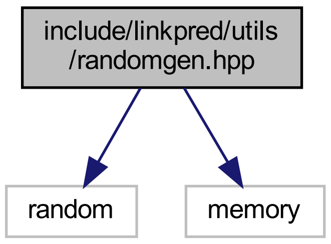
Contains the implementation of miscellaneous useful methods.

10.108 include/linkpred/utils/randomgen.hpp File Reference

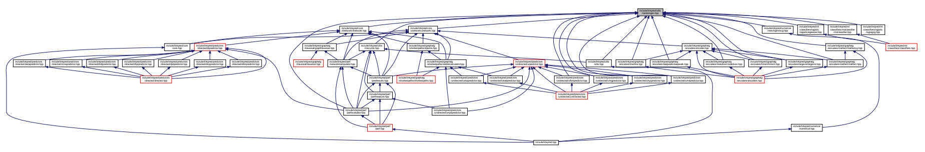
Contains the implementation of a random number generator.

```
#include <random>
#include <memory>
```

Include dependency graph for randomgen.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class LinkPred::RandomGen

  A random number generator.

Namespaces

- LinkPred

  Main namespace.

10.108.1 Detailed Description

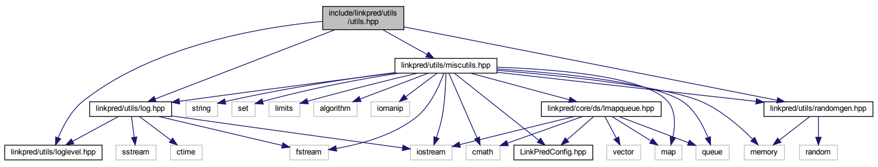
Contains the implementation of a random number generator.

10.109 include/linkpred/utils/utils.hpp File Reference

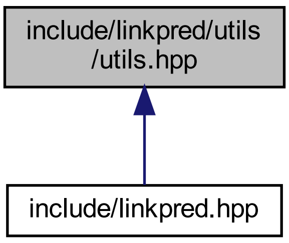
Includes the headers related to utility classes.

```
#include <linkpred/utils/miscutils.hpp>
#include "linkpred/utils/log.hpp"
#include "linkpred/utils/loglevel.hpp"
#include "linkpred/utils/randomgen.hpp"
```

Include dependency graph for utils.hpp:



This graph shows which files directly or indirectly include this file:



10.109.1 Detailed Description

Includes the headers related to utility classes.

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