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### **Hyperparameters Used for Readmission Prediction**

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#### **Binary Classifiers**

1. **DecisionTreeClassifier**:
   * random\_state: 42
   * No specific hyperparameters were mentioned in the code, custom class weights were applied.
2. **LogisticRegression**:
   * random\_state: 42
   * max\_iter: 1000
   * class\_weight: 'balanced'
3. **RandomForestClassifier**:
   * random\_state: 42
   * class\_weight: 'balanced'
   * n\_jobs: -1 (in custom weighting)
4. **GradientBoostingClassifier**:
   * n\_estimators: 100
   * learning\_rate: 0.1 (in custom weighting)
   * random\_state: 42
   * sample\_weight: computed using custom weighting
5. **XGBClassifier**:
   * random\_state: 42
   * ratio of negative to positive class (in custom weighting): scale\_pos\_weight=float(counts[0] / counts[1],random\_state=42
6. **MLPClassifier**:
   * random\_state: 42
   * max\_iter: 1000
   * learning\_rate: 'adaptive' (in version 2 and custom weighting)

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#### **B. Multi-Label Classifiers**

1. **DecisionTreeClassifier**:
   * random\_state: 42
   * class\_weight: 'balanced'
2. **LogisticRegression**:
   * random\_state: 42
   * max\_iter: 1000
   * class\_weight: 'balanced'
3. **RandomForestClassifier**:
   * random\_state: 42
   * class\_weight: 'balanced'
   * n\_jobs: -1 (in custom weighting)
4. **GradientBoostingClassifier**:
   * n\_estimators: 100
   * learning\_rate: 0.1
   * random\_state: 42
   * sample\_weight: computed using compute\_sample\_weight(class\_weight='balanced', y=y\_train) in version 2
5. **XGBClassifier**:
   * random\_state: 42
   * sample\_weight: computed using compute\_sample\_weight(class\_weight='balanced', y=y\_train) in version 2
   * scale\_pos\_weight: ratio of negative to positive class (in custom weighting)
6. **MLPClassifier**:
   * random\_state: 42
   * max\_iter: 1000
   * learning\_rate: 'adaptive'