

Supplementary Table S2. Hyper-parameter optimized. The foundation of our framework consists of four basic models, each of which is hyper-parameter optimized by a parallel grid search with cross-validation.

Model	Parameter	Description	Values
RandomForest	n_estimators	The number of trees in the forest	50, 100, 200
	max_depth	The maximum depth of the tree	None (unlimited), 10, 20, 30
	min_samples_split	The minimum number of samples required to split an internal node	2, 5, 10
	min_samples_leaf	The minimum number of samples required to be at a leaf node	1, 2, 4
Gradient Boosting Trees	n_estimators	The number of boosting stages to perform	50, 100, 200
	max_depth	Maximum depth of the individual regression estimators	3, 5, 7
	learning_rate	Shrinks the contribution of each tree	0.01, 0.1, 1
XGBoost	n_estimators	Number of gradient boosted trees	100, 200, 300
	max_depth	Maximum tree depth for base learners	3, 5, 7
	learning_rate	Boosting learning rate	0.01, 0.1, 0.3
	subsample	Subsample ratio of the training instance	0.8, 1.0
	colsample_bytree	Subsample ratio of columns when constructing each tree	0.8, 1.0
Support Vector Machine	C	Regularization parameter	0.1, 1, 10, 100
	gamma	Kernel coefficient	'scale', 'auto', 0.1, 1
	kernel	The kernel type to be used in the algorithm	'rbf', 'poly'