

Algorithm	Speed of Algorithm	Independence Assumption	Normality Assumption	Quality under High Dimensionality	Types of Hyperparameters	Improvement with Cross Validation
Naive Bayes	Fast	Yes	Often, for Gaussian NB	Good with feature selection	Prior probabilities, Smoothing	Often improves performance
Logistic Regression	Moderate	No	No	Requires regularization	Regularization strength, Type	Helps in tuning regularization
SVM	Slow for large datasets	No	No	Good with appropriate kernel	C (Regularization), Kernel, Gamma	Helps in tuning C and kernel
Decision Tree	Fast	No	No	Can become over-complex	Depth, Split criterion, Min samples	Helps prevent overfitting
Bagging	Varies	No	No	Depends on base estimator	Base estimator, n_estimators, Max samples	Often improves generalization
Random Forest	Moderate	No	No	Good, but can overfit	n_estimators, Max depth, Min samples	Often improves generalization
Extra Trees	Moderate	No	No	Good	n_estimators, Max depth, Min samples	Often improves generalization
Ada Boosting	Varies	No	No	Can be sensitive	n_estimators, Learning rate, Base estimator	Helps in tuning learning rate
Gradient Boosting	Moderate to slow	No	No	Can overfit if not tuned	n_estimators, Learning rate, Max depth	Reduces overfitting risk
KNN	Slow in prediction	No	No	Degrades with dimension	Number of neighbors, Distance metric	Helps in tuning neighbors number
Neural Networks	Varies	No	No	Requires design/architecture	Learning rate, Activation, Number of layers, Batch size	Helps in model tuning & validation