

Model Evaluation and Tuning Summary: Model evaluation is the process of checking how well a machine learning model performs using metrics such as accuracy, precision, recall, F1-score, confusion matrix, and ROC-AUC. Overfitting happens when the model learns noise (high variance), while underfitting occurs when it is too simple (high bias). Cross-validation, especially k-fold CV, helps ensure stable performance by testing on multiple splits. Hyperparameter tuning (GridSearchCV or RandomizedSearchCV) is used to find the best model settings for improved accuracy and generalization. The bias-variance tradeoff highlights the balance between underfitting and overfitting. The general workflow includes splitting data into train/test, training the model, evaluating with proper metrics, applying cross-validation, tuning hyperparameters, and finally selecting the best model.