GaussianNB

Top 5 parameter combinations:

Rank: 1

Score: 0.7640211224262862

Parameters: {'classifier__var_smoothing': 0.03694601205199302}

Rank: 2

Score: 0.7638773409740935

Parameters: {'classifier__var_smoothing': 0.0361874981241128}

Rank: 3

Score: 0.7638772375341999

Parameters: {'classifier__var_smoothing': 0.039318287557057685}

Rank: 4

Score: 0.7638772375341999

Parameters: {'classifier__var_smoothing': 0.04014242490499322}

Rank: 5

Score: 0.7637336629617945

Parameters: {'classifier__var_smoothing': 0.012563166024741208}

MultinomialNB

Top 5 parameter combinations:

Rank: 1

Score: 0.6193565004215176

Parameters: {'classifier__alpha': 0.001, 'classifier__fit_prior': True}

Rank: 2

Score: 0.6193565004215176

Parameters: {'classifier__alpha': 6.579332246575683e-05, 'classifier__fit_prior': True}

Rank: 3

Score: 0.6193565004215176

Parameters: {'classifier__alpha': 1.232846739442066e-07, 'classifier__fit_prior': True}

Rank: 4

Score: 0.6193565004215176

Parameters: {'classifier__alpha': 8.111308307896872e-05, 'classifier__fit_prior': True}

Rank: 5

Score: 0.6193565004215176

Parameters: {'classifier__alpha': 0.0001, 'classifier__fit_prior': True}

DecisionTree

Top 5 parameter combinations:

Rank: 1

Score: 0.7738004334131545

Parameters: {'classifier__criterion': 'gini', 'classifier__max_depth': 10, 'classifier__max_features': None, 'classifier__min_samples_leaf': 1, 'classifier__min_samples_split': 20}

Rank: 2

Score: 0.7727916875701453

Parameters: {'classifier__criterion': 'entropy', 'classifier__max_depth': 10, 'classifier__max_features': None, 'classifier__min_samples_leaf': 6, 'classifier__min_samples_split': 20}

Rank: 3

Score: 0.7725058831439522

Parameters: {'classifier__criterion': 'gini', 'classifier__max_depth': 10, 'classifier__max_features': None, 'classifier__min_samples_leaf': 2, 'classifier__min_samples_split': 20}

Rank: 4

Score: 0.7722187339991414

Parameters: {'classifier__criterion': 'gini', 'classifier__max_depth': 10, 'classifier__max_features': None, 'classifier__min_samples_leaf': 4, 'classifier__min_samples_split': 20}

Rank: 5

Score: 0.7707806091575338

Parameters: {'classifier__criterion': 'entropy', 'classifier__max_depth': 10, 'classifier__max_features': None, 'classifier__min_samples_leaf': 2, 'classifier__min_samples_split': 20}

Random Forest

Top 5 parameter combinations:

Rank: 1

Score: 0.7917759078143668

Parameters: {'classifier__n_estimators': 300, 'classifier__min_samples_split': 2, 'classifier__min_samples_leaf': 1, 'classifier__max_features': 'sqrt', 'classifier__max_depth': 10}

Rank: 2

Score: 0.7917759078143668

Parameters: {'classifier__n_estimators': 300, 'classifier__min_samples_split': 2, 'classifier__min_samples_leaf': 1, 'classifier__max_features': 'log2', 'classifier__max_depth': 10}

Rank: 3

Score: 0.7916317126025993

Parameters: {'classifier__n_estimators': 100, 'classifier__min_samples_split': 10, 'classifier__min_samples_leaf': 2, 'classifier__max_features': 'log2', 'classifier__max_depth': 10}

Rank: 4

Score: 0.7912001613662341

Parameters: {'classifier__n_estimators': 200, 'classifier__min_samples_split': 10, 'classifier__min_samples_leaf': 4, 'classifier__max_features': 'sqrt', 'classifier__max_depth': 10}

Rank: 5

Score: 0.7901937946407791

Parameters: {'classifier__n_estimators': 200, 'classifier__min_samples_split': 5, 'classifier__min_samples_leaf': 4, 'classifier__max_features': 'log2', 'classifier__max_depth': 10}

Logistic Regression

Top 5 parameter combinations:

Rank: 1

Score: 0.7842973069423684

Parameters: {'classifier__C': 100, 'classifier__max_iter': 300, 'classifier__solver': 'liblinear'}

Rank: 2

Score: 0.7842973069423684

Parameters: {'classifier__C': 100, 'classifier__max_iter': 300, 'classifier__solver': 'newton-cg'}

Rank: 3

Score: 0.7842973069423684

Parameters: {'classifier__C': 100, 'classifier__max_iter': 200, 'classifier__solver': 'liblinear'}

Rank: 4

Score: 0.7842973069423684

Parameters: {'classifier__C': 100, 'classifier__max_iter': 200, 'classifier__solver': 'lbfgs'}

Rank: 5

Score: 0.7842973069423684

Parameters: {'classifier__C': 100, 'classifier__max_iter': 200, 'classifier__solver': 'newton-cg'}

NeuralNetwork

Top 5 parameter combinations:

Rank: 1

Hyperparameters: {'hidden_layer_sizes': (100,), 'max_iter': 300, 'alpha': 0.0001}

Average Accuracy: 0.8012652767792956

Rank: 2

Hyperparameters: {'hidden_layer_sizes': (50, 50), 'max_iter': 500, 'alpha': 0.001}

Average Accuracy: 0.7962320467134559

Rank: 3

Hyperparameters: {'hidden_layer_sizes': (100, 100), 'max_iter': 300, 'alpha': 1e-05}

Average Accuracy: 0.7894253051907862

Rank: 4

Hyperparameters: {'hidden_layer_sizes': (50,), 'max_iter': 400, 'alpha': 0.0005}

Average Accuracy: 0.7890418672969605

Rank: 5

Hyperparameters: {'hidden_layer_sizes': (100, 50, 25), 'max_iter': 200, 'alpha': 0.01}

Average Accuracy: 0.7863096007737304

Top 3 Models

Rank 1:

('mlp', MLPClassifier(hidden_layer_sizes=(100,), max_iter=300, alpha=0.0001, random_state=3270))])

Actual Accuracy: 0.8113858539390454

Rank 2:

('random_forest', RandomForestClassifier(n_estimators=300, min_samples_split=2, min_samples_leaf=1, max_features='sqrt', max_depth=10, random_state=3270))])

Actual Accuracy: 0.8027602070155262

Rank 3:

('logistic', LogisticRegression(C=100, max_iter=300, solver='liblinear', random_state=3270))])

Actual Accuracy: 0.7929844738355377

Rank 0

Ensemble prediciton using all 3 top models

Actual Accuracy: 0.8108108108108109

Trial 1

Accuracy: 0.74538

Place: 2104

Trial 2

Accuracy: 0.78746

Place: 1645

Trial 3

Accuracy: 0.80126

Place: 767

Trial 4

Accuracy: 0.80383

Place: 561

Trial 5

Accuracy: 0.80570

Place: 442

Trial 6

Accuracy: 0.80710

Place: 335