Hyperparameter Tuning

Manually Selecting Hyperparameters

- Manually changing the hyperparameter values

Manually Selecting Hyperparameters

- Manually changing the hyperparameter values
- Comparing the results for all hyperparameter combinations

Manually Selecting Hyperparameters

- Manually changing the hyperparameter values
- Comparing the results for all hyperparameter combinations
- Selecting the value of k in kNN

Grid Search

Grid Search

- Takes in a list of values for each hyperparameter

Grid Search

- Takes in a list of values for each hyperparameter
- Build a model for each possible combination

Grid Search

- Takes in a list of values for each hyperparameter
- Build a model for each possible combination
- Returns the best set of hyperparameters

Grid Search

n_estimator : [10, 50, 100, 200]

max_depth : [5, 6, 7]

Grid Search

n_estimator : [**10**, 50, 100, 200]

max_depth : [**5**, 6, 7]

RandomForestClassifier(n_estimator=10, max_depth=5)

Grid Search

n_estimator : [**10**, 50, 100, 200]

max_depth : [5, **6**, 7]

RandomForestClassifier(n_estimator=10, max_depth=5)
RandomForestClassifier(n_estimator=10, max_depth=6)

Grid Search

n_estimator : [**10**, 50, 100, 200]

max_depth : [5, 6, **7**]

RandomForestClassifier(n_estimator=10, max_depth=5)
RandomForestClassifier(n_estimator=10, max_depth=6)
RandomForestClassifier(n_estimator=10, max_depth=7)

Grid Search

n_estimator : [10, **50**, 100, 200]

max_depth : [**5,** 6, 7]

RandomForestClassifier(n_estimator=10, max_depth=5)
RandomForestClassifier(n_estimator=10, max_depth=6)
RandomForestClassifier(n_estimator=10, max_depth=7)
RandomForestClassifier(n_estimator=50, max_depth=5)

Grid Search

n_estimator : [10, **50**, 100, 200]

max_depth : [5, **6**, 7]

RandomForestClassifier(n_estimator=10, max_depth=5)
RandomForestClassifier(n_estimator=10, max_depth=6)
RandomForestClassifier(n_estimator=10, max_depth=7)
RandomForestClassifier(n_estimator=50, max_depth=5)
RandomForestClassifier(n_estimator=50, max_depth=6)
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Grid Search

n_estimator : [10, 50, 100, 200]

max_depth : [5, 6, 7]

RandomForestClassifier(n_estimator=10, max_depth=5)
RandomForestClassifier(n_estimator=10, max_depth=6)
RandomForestClassifier(n_estimator=10, max_depth=7)
RandomForestClassifier(n_estimator=50, max_depth=5)
RandomForestClassifier(n_estimator=50, max_depth=6)
RandomForestClassifier(n_estimator=50, max_depth=7)
RandomForestClassifier(n_estimator=100, max_depth=5)
RandomForestClassifier(n_estimator=100, max_depth=6)
RandomForestClassifier(n_estimator=100

Grid Search

- Takes in a list of values for each hyperparameter
- Build a model for each possible combination
- Returns the best set of hyperparameters
- Also known as exhaustive search

Random Search

Random Search

- Takes in a list of values for each hyperparameter

Random Search

- Takes in a list of values for each hyperparameter
- Builds fixed number of models for random set of hyperparameter

Random Search

- Takes in a list of values for each hyperparameter
- Builds fixed number of models for random set of hyperparameter
- Returns the best set of hyperparameters

Random Search

n_estimator : [10, 20, 50, 80, 90, 100, 150, 200]

max_depth : [3, 4, 5, 6, 7, 8, 9]

Random Search

n_estimator : [10, 20, **50**, 80, 90, 100, 150, 200]

max_depth : [3, **4**, 5, 6, 7, 8, 9]

RandomForestClassifier(n_estimator=50, max_depth=4)
Accuracy : 0.72

Random Search

n_estimator : [10, 20, 50, 80, 90, **100**, 150, 200]

max_depth : [3, 4, **5**, 6, 7, 8, 9]

RandomForestClassifier(n_estimator=50, max_depth=4)
Accuracy : 0.72
RandomForestClassifier(n_estimator=100, max_depth=5)
Accuracy: 0.89

Random Search

n_estimator : [10, 20, 50, 80, **90**, 100, 150, 200]

max_depth : [3, 4, 5, 6, **7**, 8, 9]

RandomForestClassifier(n_estimator=50, max_depth=4)
Accuracy : 0.72
RandomForestClassifier(n_estimator=100, max_depth=5)
Accuracy: 0.89
RandomForestClassifier(n_estimator=90, max_depth=7)
Accuracy 0.81

Random Search

n_estimator : [10, 20, 50, 80, 90, 100, **150**, 200]

max_depth : [3, 4, 5, **6**, 7, 8, 9]

RandomForestClassifier(n_estimator=50, max_depth=4)
Accuracy : 0.72
RandomForestClassifier(n_estimator=100, max_depth=5)
Accuracy: 0.89
RandomForestClassifier(n_estimator=90, max_depth=7)
Accuracy 0.81
RandomForestClassifier(n_estimator=150, max_depth=6)
Accuracy 0.85
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