

```

!pip install tpot
import pandas as pd
from sklearn.model_selection import train_test_split
from tpot import TPOTClassifier
from sklearn.metrics import accuracy_score

data = pd.read_csv('wineq.csv')
X = data.drop('quality', axis=1)
y = data['quality']

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=0)

tpot = TPOTClassifier(
    generations=2,
    population_size=5,
    random_state=0,
    verbosity=3,
    config_dict={
        'sklearn.tree.DecisionTreeClassifier': {},
        'sklearn.ensemble.RandomForestClassifier': {},
        'sklearn.ensemble.GradientBoostingClassifier': {},
    },
)

tpot.fit(X_train, y_train)

y_pred = tpot.predict(X_test)

accuracy = accuracy_score(y_test, y_pred)
print(f"Accuracy: {accuracy}")

tpot.export('best_model_pipeline.py')

```

```

Requirement already satisfied: tpot in /usr/local/lib/python3.10/dist-packages (0.12.1)
Requirement already satisfied: numpy>=1.16.3 in /usr/local/lib/python3.10/dist-packages (from tpot) (1.23.5)
Requirement already satisfied: scipy>=1.3.1 in /usr/local/lib/python3.10/dist-packages (from tpot) (1.11.3)
Requirement already satisfied: scikit-learn>=0.22.0 in /usr/local/lib/python3.10/dist-packages (from tpot) (1.2.2)
Requirement already satisfied: deap>=1.2 in /usr/local/lib/python3.10/dist-packages (from tpot) (1.4.1)
Requirement already satisfied: update-checker>=0.16 in /usr/local/lib/python3.10/dist-packages (from tpot) (0.18.0)
Requirement already satisfied: tqdm>=4.36.1 in /usr/local/lib/python3.10/dist-packages (from tpot) (4.66.1)
Requirement already satisfied: stopit>=1.1.1 in /usr/local/lib/python3.10/dist-packages (from tpot) (1.1.2)
Requirement already satisfied: pandas>=0.24.2 in /usr/local/lib/python3.10/dist-packages (from tpot) (1.5.3)
Requirement already satisfied: joblib>=0.13.2 in /usr/local/lib/python3.10/dist-packages (from tpot) (1.3.2)

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Requirement already satisfied: xgboost>=1.1.0 in /usr/local/lib/python3.10/dist-packages (from tpot) (2.0.2)
Requirement already satisfied: python-dateutil>=2.8.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=0.24.2->tpot) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=0.24.2->tpot) (2023.3.post1)
Requirement already satisfied: threadpoolctl>=2.0.0 in /usr/local/lib/python3.10/dist-packages (from scikit-learn>=0.22.0->tpot) (3.2.0)
Requirement already satisfied: requests>=2.3.0 in /usr/local/lib/python3.10/dist-packages (from update-checker>=0.16->tpot) (2.31.0)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages (from python-dateutil>=2.8.1->pandas>=0.24.2->tpot) (1.16.0)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests>=2.3.0->update-checker>=0.16->tpot) (3.4.0)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests>=2.3.0->update-checker>=0.16->tpot) (3.4)
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests>=2.3.0->update-checker>=0.16->tpot) (2.0.7)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests>=2.3.0->update-checker>=0.16->tpot) (2023.7.25)
3 operators have been imported by TPOT.

Generation 1 - Current Pareto front scores:

-1 0.6559957107843137 RandomForestClassifier(input_matrix)

Pipeline encountered that has previously been evaluated during the optimization process. Using the score from the previous evaluation.

Generation 2 - Current Pareto front scores:

-1 0.6559957107843137 RandomForestClassifier(input_matrix)

Accuracy: 0.7125

```
!pip install optuna
from sklearn.impute import SimpleImputer
from sklearn.preprocessing import StandardScaler, OneHotEncoder
from sklearn.compose import ColumnTransformer
from sklearn.pipeline import Pipeline
from sklearn.ensemble import RandomForestClassifier
from sklearn.svm import SVC
import optuna
import optuna.visualization as optuna_viz

def objective(trial):
    classifier_name = trial.suggest_categorical('classifier', ['RandomForest', 'SVM'])
    if classifier_name == 'RandomForest':
        n_estimators = trial.suggest_int('n_estimators', 10, 200)
        max_depth = trial.suggest_int('max_depth', 2, 40, log=True)
        clf = RandomForestClassifier(n_estimators=n_estimators, max_depth=max_depth, random_state=42)
    else:
        C = trial.suggest_loguniform('C', 1e-5, 1e5)
        gamma = trial.suggest_loguniform('gamma', 1e-5, 1e5)
        clf = SVC(C=C, gamma=gamma, random_state=42)
```

```

numeric_features = X.select_dtypes(include=['int64', 'float64']).columns
categorical_features = X.select_dtypes(include=['object']).columns

numeric_transformer = Pipeline(steps=[
    ('imputer', SimpleImputer(strategy='mean')),
    ('scaler', StandardScaler())
])

categorical_transformer = Pipeline(steps=[
    ('imputer', SimpleImputer(strategy='most_frequent')),
    ('onehot', OneHotEncoder(handle_unknown='ignore'))
])

preprocessor = ColumnTransformer(
    transformers=[
        ('num', numeric_transformer, numeric_features),
        ('cat', categorical_transformer, categorical_features)
    ])

pipeline = Pipeline(steps=[('preprocessor', preprocessor),
    ('classifier', clf)])

pipeline.fit(X_train, y_train)

y_pred = pipeline.predict(X_test)
accuracy = accuracy_score(y_test, y_pred)

return accuracy

study = optuna.create_study(direction='maximize')
study.optimize(objective, n_trials=200)

trial = study.best_trial
print('Accuracy: {}'.format(trial.value))
print("Best hyperparameters: {}".format(trial.params))

optuna_viz.plot_optimization_history(study)

optuna_viz.plot_slice(study)

```

Requirement already satisfied: optuna in /usr/local/lib/python3.10/dist-packages (3.4.0)

Requirement already satisfied: alembic>=1.5.0 in /usr/local/lib/python3.10/dist-packages (from optuna) (1.12.1)

Requirement already satisfied: colorlog in /usr/local/lib/python3.10/dist-packages (from optuna) (6.7.0)

Requirement already satisfied: numpy in /usr/local/lib/python3.10/dist-packages (from optuna) (1.23.5)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.10/dist-packages (from optuna) (23.2)
Requirement already satisfied: sqlalchemy>=1.3.0 in /usr/local/lib/python3.10/dist-packages (from optuna) (2.0.23)
Requirement already satisfied: tqdm in /usr/local/lib/python3.10/dist-packages (from optuna) (4.66.1)
Requirement already satisfied: PyYAML in /usr/local/lib/python3.10/dist-packages (from optuna) (6.0.1)
Requirement already satisfied: Mako in /usr/local/lib/python3.10/dist-packages (from alembic>=1.5.0->optuna) (1.3.0)
Requirement already satisfied: typing-extensions>=4 in /usr/local/lib/python3.10/dist-packages (from alembic>=1.5.0->optuna) (4.5.0)
Requirement already satisfied: greenlet!=0.4.17 in /usr/local/lib/python3.10/dist-packages (from sqlalchemy>=1.3.0->optuna) (3.0.1)
Requirement already satisfied: MarkupSafe>=0.9.2 in /usr/local/lib/python3.10/dist-packages (from Mako->alembic>=1.5.0->optuna) (2.1.3)
[I 2023-11-28 04:05:20,061] A new study created in memory with name: no-name-cdaf1993-ed52-4a07-ab87-337226d8eba0
<ipython-input-6-8fb45d99070c>:20: FutureWarning:

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

<ipython-input-6-8fb45d99070c>:21: FutureWarning:

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

[I 2023-11-28 04:05:20,342] Trial 0 finished with value: 0.61875 and parameters: {'classifier': 'SVM', 'C': 65.11891891864353, 'gamma': 0.00289937312813}
<ipython-input-6-8fb45d99070c>:20: FutureWarning:

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[I 2023-11-28 04:05:20,806] Trial 1 finished with value: 0.421875 and parameters: {'classifier': 'SVM', 'C': 0.03286074257759569, 'gamma': 84428.7553052}
[I 2023-11-28 04:05:20,944] Trial 2 finished with value: 0.628125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 30, 'max_depth': 3}. Be
[I 2023-11-28 04:05:21,846] Trial 3 finished with value: 0.725 and parameters: {'classifier': 'RandomForest', 'n_estimators': 146, 'max_depth': 11}. Bes
[I 2023-11-28 04:05:23,017] Trial 4 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 180, 'max_depth': 30}. Be
<ipython-input-6-8fb45d99070c>:20: FutureWarning:

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

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suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

[I 2023-11-28 04:05:23,253] Trial 5 finished with value: 0.421875 and parameters: {'classifier': 'SVM', 'C': 8.27263753136252e-05, 'gamma': 0.0040266125}
<ipython-input-6-8fb45d99070c>:20: FutureWarning:

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

<ipython-input-6-8fb45d99070c>:21: FutureWarning:

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

[I 2023-11-28 04:05:23,464] Trial 6 finished with value: 0.421875 and parameters: {'classifier': 'SVM', 'C': 0.0005272858169544021, 'gamma': 0.012602570}.
<ipython-input-6-8fb45d99070c>:20: FutureWarning:

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

<ipython-input-6-8fb45d99070c>:21: FutureWarning:

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

[I 2023-11-28 04:05:23,951] Trial 7 finished with value: 0.565625 and parameters: {'classifier': 'SVM', 'C': 149.3497815474287, 'gamma': 6589.9176881776}.

[I 2023-11-28 04:05:24,555] Trial 8 finished with value: 0.703125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 120, 'max_depth': 9}. Best

<ipython-input-6-8fb45d99070c>:20: FutureWarning:

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

<ipython-input-6-8fb45d99070c>:21: FutureWarning:

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

[I 2023-11-28 04:05:30,317] Trial 9 finished with value: 0.609375 and parameters: {'classifier': 'SVM', 'C': 29900.715847205916, 'gamma': 0.004087806402}.

[I 2023-11-28 04:05:31,038] Trial 10 finished with value: 0.721875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 170, 'max_depth': 12}. Best

[I 2023-11-28 04:05:31,712] Trial 11 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 171, 'max_depth': 9}. Best

[I 2023-11-28 04:05:32,304] Trial 12 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 131, 'max_depth': 17}. Best

[I 2023-11-28 04:05:33,163] Trial 13 finished with value: 0.71875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 197, 'max_depth': 15}. Best

[I 2023-11-28 04:05:33,567] Trial 14 finished with value: 0.65625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 145, 'max_depth': 4}. Best

[I 2023-11-28 04:05:33,793] Trial 15 finished with value: 0.675 and parameters: {'classifier': 'RandomForest', 'n_estimators': 74, 'max_depth': 5}. Best

[I 2023-11-28 04:05:33,997] Trial 16 finished with value: 0.603125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 84, 'max_depth': 2}. Best

[I 2023-11-28 04:05:34,847] Trial 17 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 153, 'max_depth': 14}. Best

[I 2023-11-28 04:05:35,406] Trial 18 finished with value: 0.6875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 101, 'max_depth': 7}. Best

[I 2023-11-28 04:05:36,498] Trial 19 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 158, 'max_depth': 39}. Best

[I 2023-11-28 04:05:37,857] Trial 20 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 200, 'max_depth': 21}. Best

[I 2023-11-28 04:05:38,959] Trial 21 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 200, 'max_depth': 12}. Best

[I 2023-11-28 04:05:39,727] Trial 22 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 177, 'max_depth': 20}. Best

[I 2023-11-28 04:05:40,498] Trial 23 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 182, 'max_depth': 12}. Best

[I 2023-11-28 04:05:41,001] Trial 24 finished with value: 0.671875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 134, 'max_depth': 7}. Best

[I 2023-11-28 04:05:41,700] Trial 25 finished with value: 0.721875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 166, 'max_depth': 12}. Best

[I 2023-11-28 04:05:42,365] Trial 26 finished with value: 0.725 and parameters: {'classifier': 'RandomForest', 'n_estimators': 161, 'max_depth': 10}. Best

[I 2023-11-28 04:05:42,795] Trial 27 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 110, 'max_depth': 9}. Best

[I 2023-11-28 04:05:43,320] Trial 28 finished with value: 0.68125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 148, 'max_depth': 7}. Best

<ipython-input-6-8fb45d99070c>:20: FutureWarning:

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

<ipython-input-6-8fb45d99070c>:21: FutureWarning:

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

[I 2023-11-28 04:05:43,494] Trial 29 finished with value: 0.421875 and parameters: {'classifier': 'SVM', 'C': 1.0371018658842935e-05, 'gamma': 25.154201}.

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[I 2023-11-28 04:05:44,099] Trial 30 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 132, 'max_depth': 23}.
[I 2023-11-28 04:05:44,778] Trial 31 finished with value: 0.721875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 167, 'max_depth': 12}.
[I 2023-11-28 04:05:45,438] Trial 32 finished with value: 0.725 and parameters: {'classifier': 'RandomForest', 'n_estimators': 162, 'max_depth': 11}. Be
[I 2023-11-28 04:05:46,009] Trial 33 finished with value: 0.725 and parameters: {'classifier': 'RandomForest', 'n_estimators': 145, 'max_depth': 10}. Be
[I 2023-11-28 04:05:46,562] Trial 34 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 148, 'max_depth': 9}.
<ipython-input-6-8fb45d99070c>:20: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
<ipython-input-6-8fb45d99070c>:21: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
[I 2023-11-28 04:05:46,703] Trial 35 finished with value: 0.421875 and parameters: {'classifier': 'SVM', 'C': 0.09076638065100819, 'gamma': 1.7652563290
[I 2023-11-28 04:05:47,115] Trial 36 finished with value: 0.65625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 118, 'max_depth': 6}. B
<ipython-input-6-8fb45d99070c>:20: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
<ipython-input-6-8fb45d99070c>:21: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
[I 2023-11-28 04:05:47,432] Trial 37 finished with value: 0.578125 and parameters: {'classifier': 'SVM', 'C': 26556.0860560722, 'gamma': 22.044786413853
[I 2023-11-28 04:05:47,984] Trial 38 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 137, 'max_depth': 10}.
[I 2023-11-28 04:05:48,278] Trial 39 finished with value: 0.665625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 89, 'max_depth': 6}. B
<ipython-input-6-8fb45d99070c>:20: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
<ipython-input-6-8fb45d99070c>:21: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

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[I 2023-11-28 04:05:48,417] Trial 40 finished with value: 0.421875 and parameters: {'classifier': 'SVM', 'C': 0.001571559314746213, 'gamma': 1.500468893
[I 2023-11-28 04:05:48,543] Trial 41 finished with value: 0.659375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 21, 'max_depth': 15}.
[I 2023-11-28 04:05:48,852] Trial 42 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 51, 'max_depth': 11}.
[I 2023-11-28 04:05:49,861] Trial 43 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 183, 'max_depth': 8}. B
[I 2023-11-28 04:05:50,846] Trial 44 finished with value: 0.725 and parameters: {'classifier': 'RandomForest', 'n_estimators': 160, 'max_depth': 10}. Be
[I 2023-11-28 04:05:52,238] Trial 45 finished with value: 0.725 and parameters: {'classifier': 'RandomForest', 'n_estimators': 159, 'max_depth': 10}. Be
[I 2023-11-28 04:05:53,766] Trial 46 finished with value: 0.6875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 140, 'max_depth': 8}. Be
[I 2023-11-28 04:05:55,005] Trial 47 finished with value: 0.71875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 186, 'max_depth': 10}.
<ipython-input-6-8fb45d99070c>:20: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
<ipython-input-6-8fb45d99070c>:21: FutureWarning:
```


suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
[I 2023-11-28 04:05:55,289] Trial 48 finished with value: 0.565625 and parameters: {'classifier': 'SVM', 'C': 1.1216868839172398, 'gamma': 518.5399201720}
[I 2023-11-28 04:05:56,055] Trial 49 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 122, 'max_depth': 15}. Best
[I 2023-11-28 04:05:57,146] Trial 50 finished with value: 0.703125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 161, 'max_depth': 18}.
[I 2023-11-28 04:05:58,206] Trial 51 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 159, 'max_depth': 9}.
[I 2023-11-28 04:05:59,067] Trial 52 finished with value: 0.721875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 174, 'max_depth': 10}.
[I 2023-11-28 04:05:59,706] Trial 53 finished with value: 0.721875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 152, 'max_depth': 13}.
[I 2023-11-28 04:06:00,222] Trial 54 finished with value: 0.73125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 124, 'max_depth': 11}.
[I 2023-11-28 04:06:00,825] Trial 55 finished with value: 0.690625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 128, 'max_depth': 14}.
[I 2023-11-28 04:06:01,870] Trial 56 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 145, 'max_depth': 16}.
[I 2023-11-28 04:06:02,697] Trial 57 finished with value: 0.7375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 110, 'max_depth': 11}. Best
[I 2023-11-28 04:06:03,473] Trial 58 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 120, 'max_depth': 13}. Best
[I 2023-11-28 04:06:04,218] Trial 59 finished with value: 0.721875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 103, 'max_depth': 17}.
[I 2023-11-28 04:06:05,565] Trial 60 finished with value: 0.728125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 112, 'max_depth': 11}.
[I 2023-11-28 04:06:07,025] Trial 61 finished with value: 0.740625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 95, 'max_depth': 11}.
[I 2023-11-28 04:06:08,620] Trial 62 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 94, 'max_depth': 13}. Best
[I 2023-11-28 04:06:08,959] Trial 63 finished with value: 0.71875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 77, 'max_depth': 11}. Best
[I 2023-11-28 04:06:09,396] Trial 64 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 99, 'max_depth': 14}. Best
[I 2023-11-28 04:06:09,868] Trial 65 finished with value: 0.7375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 111, 'max_depth': 11}. Best
[I 2023-11-28 04:06:10,261] Trial 66 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 109, 'max_depth': 8}. Best
<ipython-input-6-8fb45d99070c>:20: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
<ipython-input-6-8fb45d99070c>:21: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
[I 2023-11-28 04:06:10,433] Trial 67 finished with value: 0.671875 and parameters: {'classifier': 'SVM', 'C': 2.472168589842215, 'gamma': 0.254676156745}
[I 2023-11-28 04:06:10,777] Trial 68 finished with value: 0.71875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 80, 'max_depth': 12}. Best
[I 2023-11-28 04:06:11,095] Trial 69 finished with value: 0.703125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 70, 'max_depth': 9}. Best
[I 2023-11-28 04:06:11,621] Trial 70 finished with value: 0.703125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 114, 'max_depth': 15}.
[I 2023-11-28 04:06:12,129] Trial 71 finished with value: 0.73125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 124, 'max_depth': 11}.
[I 2023-11-28 04:06:12,656] Trial 72 finished with value: 0.73125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 125, 'max_depth': 11}.
[I 2023-11-28 04:06:13,195] Trial 73 finished with value: 0.728125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 129, 'max_depth': 11}.
[I 2023-11-28 04:06:13,738] Trial 74 finished with value: 0.728125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 127, 'max_depth': 11}.
[I 2023-11-28 04:06:14,260] Trial 75 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 114, 'max_depth': 12}. Best
[I 2023-11-28 04:06:14,723] Trial 76 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 108, 'max_depth': 13}. Best
[I 2023-11-28 04:06:15,189] Trial 77 finished with value: 0.696875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 125, 'max_depth': 8}.
[I 2023-11-28 04:06:15,577] Trial 78 finished with value: 0.703125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 95, 'max_depth': 9}. Best
[I 2023-11-28 04:06:16,110] Trial 79 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 116, 'max_depth': 18}. Best
<ipython-input-6-8fb45d99070c>:20: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
<ipython-input-6-8fb45d99070c>:21: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
[I 2023-11-28 04:06:16,290] Trial 80 finished with value: 0.421875 and parameters: {'classifier': 'SVM', 'C': 0.004622503343464401, 'gamma': 2.336140381}
[I 2023-11-28 04:06:16,815] Trial 81 finished with value: 0.728125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 127, 'max_depth': 11}.
[I 2023-11-28 04:06:17,406] Trial 82 finished with value: 0.728125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 136, 'max_depth': 11}.
[I 2023-11-28 04:06:17,843] Trial 83 finished with value: 0.740625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 104, 'max_depth': 11}.
[I 2023-11-28 04:06:18,447] Trial 84 finished with value: 0.71875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 105, 'max_depth': 13}.
[I 2023-11-28 04:06:19,419] Trial 85 finished with value: 0.703125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 88, 'max_depth': 9}.
[I 2023-11-28 04:06:20,566] Trial 86 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 100, 'max_depth': 12}.
[I 2023-11-28 04:06:23,293] Trial 87 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 110, 'max_depth': 14}. Best
[I 2023-11-28 04:06:24,460] Trial 88 finished with value: 0.725 and parameters: {'classifier': 'RandomForest', 'n_estimators': 67, 'max_depth': 11}. Bes
[I 2023-11-28 04:06:25,603] Trial 89 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 120, 'max_depth': 10}.
[I 2023-11-28 04:06:26,200] Trial 90 finished with value: 0.6875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 95, 'max_depth': 7}. Bes
[I 2023-11-28 04:06:27,152] Trial 91 finished with value: 0.728125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 129, 'max_depth': 11}.
[I 2023-11-28 04:06:27,698] Trial 92 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 123, 'max_depth': 12}.
[I 2023-11-28 04:06:28,253] Trial 93 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 133, 'max_depth': 10}.
[I 2023-11-28 04:06:28,849] Trial 94 finished with value: 0.728125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 141, 'max_depth': 11}.
[I 2023-11-28 04:06:29,298] Trial 95 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 112, 'max_depth': 9}.
[I 2023-11-28 04:06:29,813] Trial 96 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 117, 'max_depth': 13}.
[I 2023-11-28 04:06:30,737] Trial 97 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 105, 'max_depth': 14}. Best
<ipython-input-6-8fb45d99070c>:20: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
<ipython-input-6-8fb45d99070c>:21: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
[I 2023-11-28 04:06:31,020] Trial 98 finished with value: 0.421875 and parameters: {'classifier': 'SVM', 'C': 1.4738451208429686e-05, 'gamma': 82361.720}
[I 2023-11-28 04:06:31,870] Trial 99 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 124, 'max_depth': 10}.
[I 2023-11-28 04:06:33,020] Trial 100 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 139, 'max_depth': 12}.
[I 2023-11-28 04:06:34,539] Trial 101 finished with value: 0.728125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 128, 'max_depth': 11}.
[I 2023-11-28 04:06:35,405] Trial 102 finished with value: 0.73125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 132, 'max_depth': 11}.
[I 2023-11-28 04:06:36,130] Trial 103 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 119, 'max_depth': 9}.
[I 2023-11-28 04:06:36,939] Trial 104 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 131, 'max_depth': 10}.
[I 2023-11-28 04:06:37,565] Trial 105 finished with value: 0.728125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 90, 'max_depth': 16}.
[I 2023-11-28 04:06:38,022] Trial 106 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 100, 'max_depth': 12}.
[I 2023-11-28 04:06:38,560] Trial 107 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 135, 'max_depth': 10}.
[I 2023-11-28 04:06:39,051] Trial 108 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 109, 'max_depth': 14}. Bes
[I 2023-11-28 04:06:39,545] Trial 109 finished with value: 0.73125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 116, 'max_depth': 11}.
[I 2023-11-28 04:06:40,054] Trial 110 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 117, 'max_depth': 13}.
[I 2023-11-28 04:06:40,572] Trial 111 finished with value: 0.73125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 122, 'max_depth': 11}.
[I 2023-11-28 04:06:41,092] Trial 112 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 123, 'max_depth': 12}.
[I 2023-11-28 04:06:41,565] Trial 113 finished with value: 0.73125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 114, 'max_depth': 11}.
[I 2023-11-28 04:06:41,997] Trial 114 finished with value: 0.703125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 113, 'max_depth': 9}.
[I 2023-11-28 04:06:42,418] Trial 115 finished with value: 0.696875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 106, 'max_depth': 8}.
[I 2023-11-28 04:06:42,854] Trial 116 finished with value: 0.721875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 103, 'max_depth': 10}.
<ipython-input-6-8fb45d99070c>:20: FutureWarning:
```


suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

<ipython-input-6-8fb45d99070c>:21: FutureWarning:

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
[I 2023-11-28 04:06:43,160] Trial 117 finished with value: 0.565625 and parameters: {'classifier': 'SVM', 'C': 1004.8852890972845, 'gamma': 614.53001219}.
[I 2023-11-28 04:06:43,906] Trial 118 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 113, 'max_depth': 13}.
[I 2023-11-28 04:06:44,447] Trial 119 finished with value: 0.746875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 97, 'max_depth': 11}.
[I 2023-11-28 04:06:45,217] Trial 120 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 93, 'max_depth': 15}.
[I 2023-11-28 04:06:45,882] Trial 121 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 97, 'max_depth': 12}.
[I 2023-11-28 04:06:46,663] Trial 122 finished with value: 0.73125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 120, 'max_depth': 11}.
[I 2023-11-28 04:06:47,157] Trial 123 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 121, 'max_depth': 10}.
[I 2023-11-28 04:06:47,696] Trial 124 finished with value: 0.7375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 118, 'max_depth': 11}.
[I 2023-11-28 04:06:48,244] Trial 125 finished with value: 0.71875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 83, 'max_depth': 12}.
[I 2023-11-28 04:06:49,239] Trial 126 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 107, 'max_depth': 9}.
[I 2023-11-28 04:06:50,929] Trial 127 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 115, 'max_depth': 13}.
[I 2023-11-28 04:06:52,535] Trial 128 finished with value: 0.746875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 102, 'max_depth': 11}.
[I 2023-11-28 04:06:53,196] Trial 129 finished with value: 0.703125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 103, 'max_depth': 12}.
[I 2023-11-28 04:06:53,589] Trial 130 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 91, 'max_depth': 10}.
[I 2023-11-28 04:06:54,148] Trial 131 finished with value: 0.725 and parameters: {'classifier': 'RandomForest', 'n_estimators': 86, 'max_depth': 11}.
[I 2023-11-28 04:06:54,978] Trial 132 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 98, 'max_depth': 14}.
[I 2023-11-28 04:06:55,981] Trial 133 finished with value: 0.7375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 110, 'max_depth': 11}.
[I 2023-11-28 04:06:56,815] Trial 134 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 125, 'max_depth': 9}.
[I 2023-11-28 04:06:57,287] Trial 135 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 102, 'max_depth': 13}.
[I 2023-11-28 04:06:57,770] Trial 136 finished with value: 0.740625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 109, 'max_depth': 11}.
[I 2023-11-28 04:06:58,231] Trial 137 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 110, 'max_depth': 10}.
<ipython-input-6-8fb45d99070c>:20: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

<ipython-input-6-8fb45d99070c>:21: FutureWarning:

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
[I 2023-11-28 04:06:58,423] Trial 138 finished with value: 0.675 and parameters: {'classifier': 'SVM', 'C': 9.188979905061636, 'gamma': 0.21023699056579}.
[I 2023-11-28 04:06:58,795] Trial 139 finished with value: 0.696875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 98, 'max_depth': 8}.
[I 2023-11-28 04:06:59,257] Trial 140 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 106, 'max_depth': 12}.
[I 2023-11-28 04:06:59,751] Trial 141 finished with value: 0.7375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 118, 'max_depth': 11}.
[I 2023-11-28 04:07:00,211] Trial 142 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 117, 'max_depth': 10}.
[I 2023-11-28 04:07:00,764] Trial 143 finished with value: 0.73125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 132, 'max_depth': 11}.
[I 2023-11-28 04:07:01,251] Trial 144 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 111, 'max_depth': 12}.
[I 2023-11-28 04:07:01,757] Trial 145 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 108, 'max_depth': 13}.
[I 2023-11-28 04:07:02,234] Trial 146 finished with value: 0.696875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 102, 'max_depth': 14}.
[I 2023-11-28 04:07:02,946] Trial 147 finished with value: 0.73125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 126, 'max_depth': 11}.
[I 2023-11-28 04:07:03,978] Trial 148 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 117, 'max_depth': 9}.
[I 2023-11-28 04:07:05,423] Trial 149 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 94, 'max_depth': 10}.
```

```
[I 2023-11-28 04:07:06,716] Trial 150 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 111, 'max_depth': 12}. Best
[I 2023-11-28 04:07:07,728] Trial 151 finished with value: 0.73125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 120, 'max_depth': 11}.
[I 2023-11-28 04:07:08,243] Trial 152 finished with value: 0.73125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 121, 'max_depth': 11}.
[I 2023-11-28 04:07:08,790] Trial 153 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 126, 'max_depth': 12}. Best
[I 2023-11-28 04:07:09,339] Trial 154 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 130, 'max_depth': 10}
[I 2023-11-28 04:07:09,931] Trial 155 finished with value: 0.728125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 142, 'max_depth': 11}
[I 2023-11-28 04:07:10,155] Trial 156 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 43, 'max_depth': 13}.
[I 2023-11-28 04:07:10,636] Trial 157 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 115, 'max_depth': 10}.
[I 2023-11-28 04:07:11,069] Trial 158 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 105, 'max_depth': 9}. Best
[I 2023-11-28 04:07:11,664] Trial 159 finished with value: 0.721875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 135, 'max_depth': 11}
<ipython-input-6-8fb45d99070c>:20: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
<ipython-input-6-8fb45d99070c>:21: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
[I 2023-11-28 04:07:12,041] Trial 160 finished with value: 0.421875 and parameters: {'classifier': 'SVM', 'C': 0.24495375545864415, 'gamma': 0.0001054301
[I 2023-11-28 04:07:12,719] Trial 161 finished with value: 0.73125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 114, 'max_depth': 11}.
[I 2023-11-28 04:07:13,586] Trial 162 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 123, 'max_depth': 12}.
[I 2023-11-28 04:07:14,325] Trial 163 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 118, 'max_depth': 10}
[I 2023-11-28 04:07:14,773] Trial 164 finished with value: 0.734375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 108, 'max_depth': 11}
[I 2023-11-28 04:07:15,061] Trial 165 finished with value: 0.640625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 109, 'max_depth': 3}.
[I 2023-11-28 04:07:15,515] Trial 166 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 100, 'max_depth': 13}
[I 2023-11-28 04:07:15,972] Trial 167 finished with value: 0.703125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 107, 'max_depth': 12}
[I 2023-11-28 04:07:16,398] Trial 168 finished with value: 0.74375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 96, 'max_depth': 11}.
[I 2023-11-28 04:07:16,769] Trial 169 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 88, 'max_depth': 10}.
[I 2023-11-28 04:07:17,412] Trial 170 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 95, 'max_depth': 14}.
[I 2023-11-28 04:07:18,600] Trial 171 finished with value: 0.746875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 102, 'max_depth': 11}
[I 2023-11-28 04:07:20,138] Trial 172 finished with value: 0.74375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 101, 'max_depth': 11}.
[I 2023-11-28 04:07:21,882] Trial 173 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 98, 'max_depth': 12}.
[I 2023-11-28 04:07:22,616] Trial 174 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 102, 'max_depth': 10}
[I 2023-11-28 04:07:23,264] Trial 175 finished with value: 0.725 and parameters: {'classifier': 'RandomForest', 'n_estimators': 82, 'max_depth': 11}. Best
[I 2023-11-28 04:07:23,954] Trial 176 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 90, 'max_depth': 9}. Best
[I 2023-11-28 04:07:24,670] Trial 177 finished with value: 0.715625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 97, 'max_depth': 13}.
[I 2023-11-28 04:07:25,160] Trial 178 finished with value: 0.746875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 103, 'max_depth': 11}
[I 2023-11-28 04:07:25,619] Trial 179 finished with value: 0.703125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 103, 'max_depth': 12}
[I 2023-11-28 04:07:26,041] Trial 180 finished with value: 0.703125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 92, 'max_depth': 15}.
[I 2023-11-28 04:07:26,489] Trial 181 finished with value: 0.7125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 106, 'max_depth': 10}.
[I 2023-11-28 04:07:26,920] Trial 182 finished with value: 0.74375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 100, 'max_depth': 11}.
[I 2023-11-28 04:07:27,358] Trial 183 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 101, 'max_depth': 12}.
[I 2023-11-28 04:07:27,842] Trial 184 finished with value: 0.7375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 110, 'max_depth': 11}.
[I 2023-11-28 04:07:28,319] Trial 185 finished with value: 0.740625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 109, 'max_depth': 11}
[I 2023-11-28 04:07:28,772] Trial 186 finished with value: 0.71875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 105, 'max_depth': 10}.
[I 2023-11-28 04:07:29,254] Trial 187 finished with value: 0.7375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 110, 'max_depth': 11}.
[I 2023-11-28 04:07:29,819] Trial 188 finished with value: 0.7 and parameters: {'classifier': 'RandomForest', 'n_estimators': 111, 'max_depth': 12}. Best
[I 2023-11-28 04:07:30,264] Trial 189 finished with value: 0.703125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 97, 'max_depth': 9}.

```

```
[I 2023-11-28 04:07:30,730] Trial 190 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 109, 'max_depth': 13}
[I 2023-11-28 04:07:31,154] Trial 191 finished with value: 0.74375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 100, 'max_depth': 11}.
[I 2023-11-28 04:07:31,580] Trial 192 finished with value: 0.74375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 100, 'max_depth': 11}.
[I 2023-11-28 04:07:32,013] Trial 193 finished with value: 0.74375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 101, 'max_depth': 11}.
[I 2023-11-28 04:07:32,613] Trial 194 finished with value: 0.709375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 94, 'max_depth': 10}.
[I 2023-11-28 04:07:33,281] Trial 195 finished with value: 0.74375 and parameters: {'classifier': 'RandomForest', 'n_estimators': 100, 'max_depth': 11}.
[I 2023-11-28 04:07:33,956] Trial 196 finished with value: 0.71875 and parameters: {'classifier': 'RandomForest', 'n_estimators': 100, 'max_depth': 23}.
[I 2023-11-28 04:07:34,660] Trial 197 finished with value: 0.703125 and parameters: {'classifier': 'RandomForest', 'n_estimators': 103, 'max_depth': 12}
<ipython-input-6-8fb45d99070c>:20: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
<ipython-input-6-8fb45d99070c>:21: FutureWarning:
```

suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use

```
[I 2023-11-28 04:07:34,906] Trial 198 finished with value: 0.421875 and parameters: {'classifier': 'SVM', 'C': 0.01268202428223455, 'gamma': 0.000592318}
[I 2023-11-28 04:07:35,517] Trial 199 finished with value: 0.70625 and parameters: {'classifier': 'RandomForest', 'n_estimators': 96, 'max_depth': 10}.
Accuracy: 0.746875
Best hyperparameters: {'classifier': 'RandomForest', 'n_estimators': 97, 'max_depth': 11}
```

Slice Plot



