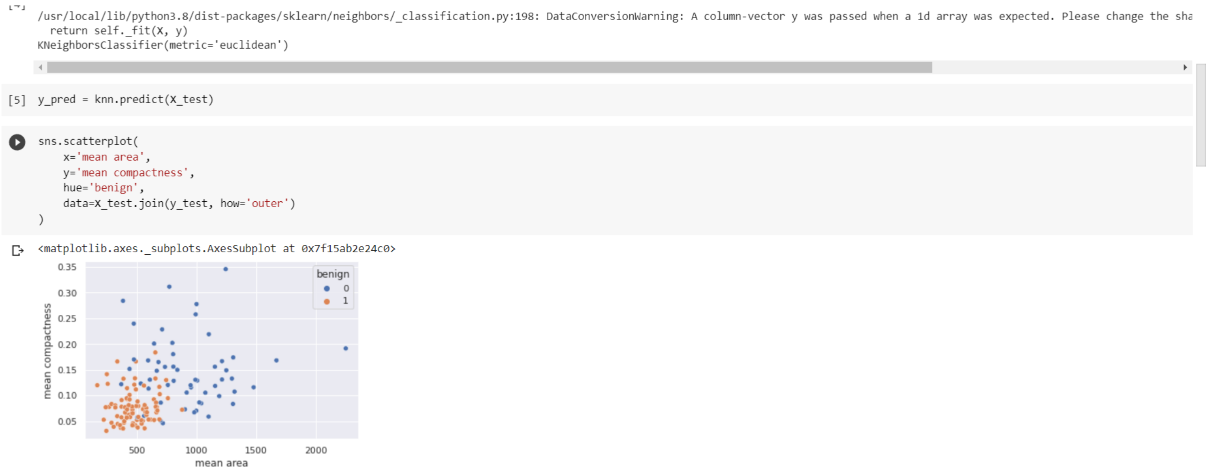
Practical 5

Aim: K-NN Algorithm

Code:

```
import numpy as np
import pandas as pd
from matplotlib import pyplot as plt
from sklearn.datasets import load_breast_cancer
from sklearn.metrics import confusion_matrix
from sklearn.metrics import accuracy_score
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import train_test_split
import seaborn as sns
sns.set()

breast_cancer = load_breast_cancer()
X = pd.DataFrame(breast_cancer.data, columns=breast_cancer.feature_names)
X = X[['mean area', 'mean compactness']]
y = pd.Categorical.from_codes(breast_cancer.target, breast_cancer.target_names)
y = pd.get_dummies(y, drop_first=True)

X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=1)

knn = KNeighborsClassifier(n_neighbors=5, metric='euclidean')
knn.fit(X_train, y_train)

y_pred = knn.predict(X_test)

sns.scatterplot(
    x='mean area',
    y='mean compactness',
    hue='benign',
    data=X_test.join(y_test, how='outer')
)

plt.scatter(
    X_test['mean area'],
    X_test['mean compactness'],
    c=y_pred,
    cmap='coolwarm',
    alpha=0.7
)

confusion_matrix(y_test, y_pred)

accuracy_score(y_test, y_pred)
```

Output:

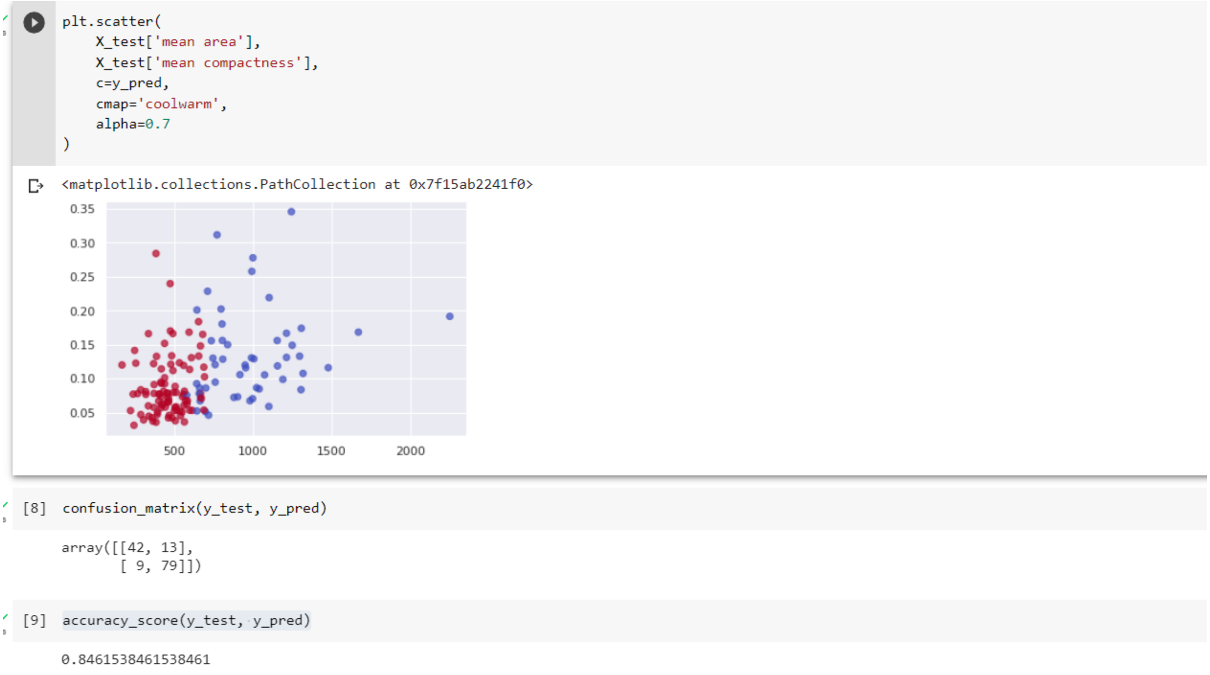


```
/usr/local/lib/python3.8/dist-packages/sklearn/neighbors/_classification.py:198: DataConversionWarning: A column-vector y was passed when a 1d array was expected. Please change the sha
  return self._fit(X, y)
KNeighborsClassifier(metric='euclidean')
```

```
[5] y_pred = knn.predict(X_test)
```

```
sns.scatterplot(
    x='mean area',
    y='mean compactness',
    hue='benign',
    data=X_test.join(y_test, how='outer')
)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f15ab2e24c0>
```



```
plt.scatter(
    X_test['mean area'],
    X_test['mean compactness'],
    c=y_pred,
    cmap='coolwarm',
    alpha=0.7
)
```

```
<matplotlib.collections.PathCollection at 0x7f15ab2241f0>
```

```
[8] confusion_matrix(y_test, y_pred)
```

```
array([[42, 13],
       [ 9, 79]])
```

```
[9] accuracy_score(y_test, y_pred)
```

```
0.8461538461538461
```