CS353 ML Lab 5

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Q: Write a program in python to implement KNN classifier for a sample data set. Compute the accuracy of the classifier.

Dataset Used: Iris_Dataset

Importing Libraries and Dataset

```
from sklearn.neighbors import KNeighborsClassifier
from sklearn.datasets import load_iris

from sklearn.metrics import confusion_matrix,explained_variance_scor
from sklearn.metrics import mean_squared_error,r2_score
from sklearn.metrics import accuracy_score, classification_report

import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
```

Data Preprocessing

```
dataset = load_iris()
x = dataset.data
y = dataset.target

data = pd.DataFrame(dataset.data, columns=[dataset.feature_names])
data['Target'] = pd.Series(data=dataset.target, index=data.index)
data.sample(10)
```

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	Target
57	4.9	2.4	3.3	1.0	1
85	6.0	3.4	4.5	1.6	1
26	5.0	3.4	1.6	0.4	0
90	5.5	2.6	4.4	1.2	1
25	5.0	3.0	1.6	0.2	0
24	4.8	3.4	1.9	0.2	0
140	6.7	3.1	5.6	2.4	2

Training the model

```
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size

print('Training dataset size:\nx_train -', len(x_train), '\ny_train
print('Testing dataset size:\nx_test -', len(x_test), '\ny_test -',
```

```
Training dataset size:
x_train - 105
y_train - 105

Testing dataset size:
x_test - 45
y_test - 45
```

```
KNN = []
for i in range(1, 8):
  KNNModel = KNeighborsClassifier(n_neighbors=i, metric = 'euclidean
  KNN.append(KNNModel)
```

```
for i in range(7):
  KNN[i].fit(x_train, y_train)
```

Finding Accuracies for all models using the test dataset

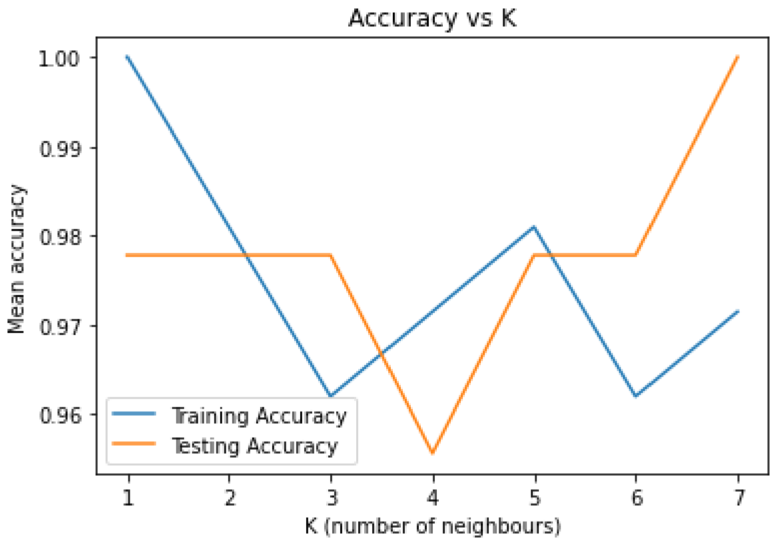
```
train_accuracyKNN = []
test_accuracyKNN = []

for i in range(7):
  print('K = {}'.format(i + 1))
  train_accuracyKNN.append(KNN[i].score(x_train, y_train))
  test_accuracyKNN.append(KNN[i].score(x_test, y_test))
```

```
    test_accuracyKNN.append(KNN[i].score(x_test, y_test))
    y_pred = KNN[i].predict(x_test)
    print("Confusion Matrix:\n",confusion_matrix(y_test, y_pred))
    print(classification_report(y_test,y_pred))
    print("\nAccuracy: %.2f" %(accuracy_score(y_test, y_pred)*100))
    print("Mean Squared Error: %.2f" %(mean_squared_error(y_test, y_pr
    print("Explained Variance: %.2f" %(explained_variance_score(y_test
    print("R2 Score: %.2f" %(r2_score(y_test, y_pred)*100))
    print("\n\n")
```

```
    accuracy                           0.98        45
   macro avg       0.97      0.98      0.98        45
weighted avg       0.98      0.98      0.98        45


Accuracy: 97.78
Mean Squared Error: 2.22
Explained Variance: 97.12
R2 Score: 97.05



K = 6
Confusion Matrix:
 [[16  0  0]
 [ 0 11  0]
 [ 0  1 17]]
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        16
           1       0.92      1.00      0.96        11
           2       1.00      0.94      0.97        18

    accuracy                           0.98        45
   macro avg       0.97      0.98      0.98        45
weighted avg       0.98      0.98      0.98        45


Accuracy: 97.78
Mean Squared Error: 2.22
Explained Variance: 97.12
R2 Score: 97.05



K = 7
Confusion Matrix:
 [[16  0  0]
 [ 0 11  0]
 [ 0  0 18]]
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        16
           1       1.00      1.00      1.00        11
           2       1.00      1.00      1.00        18

    accuracy                           1.00        45
   macro avg       1.00      1.00      1.00        45
weighted avg       1.00      1.00      1.00        45
```

```
    Accuracy: 100.00
    Mean Squared Error: 0.00
    Explained Variance: 100.00
    R2 Score: 100.00
```

```
fig = plt.figure()
ax = plt.axes()
plt.plot([1,2,3,4,5,6,7], train_accuracyKNN, label = 'Training Accur
plt.plot([1,2,3,4,5,6,7], test_accuracyKNN, label = 'Testing Accurac
plt.xlabel('K (number of neighbours)')
plt.ylabel('Mean accuracy')
plt.title('Accuracy vs K')
plt.legend()
plt.savefig('Graph.png')
plt.show()
```


Accuracy vs K
Mean accuracy
Training Accuracy
Testing Accuracy
K (number of neighbours)