9.Problem : Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

In [6]:

```
# Author : Dr.Thyagaraju G S , Context Innovations Lab , DEpt of CSE , SDMIT - Ujire
# Date : July 11 2018
# Python program to demonstrate
# KNN classification algorithm
# on IRIS dataset

from sklearn.datasets import load_iris
from sklearn.neighbors import KNeighborsClassifier
import numpy as np
from sklearn.model_selection import train_test_split
iris_dataset=load_iris()

print("\n IRIS FEATURES \ TARGET NAMES: \n ", iris_dataset.target_names)
for i in range(len(iris_dataset.target_names)):
    print("\n[{0}]:[{1}]".format(i,iris_dataset.target_names[i]))

print("\n IRIS DATA :\n",iris_dataset["data"])

X_train, X_test, y_train, y_test = train_test_split(iris_dataset["data"], iris_dataset["target"], r
andom_state=0)

print("\n Target :\n",iris_dataset["target"])
print("\n X TRAINING DATA SET \n", X_train)
print("\n Y TRAINING DATA SET \n", y_train)
print("\n X TESTING DATA  SET \n", X_test)
print("\n Y TESTING DATA  SET \n", y_test)

kn = KNeighborsClassifier(n_neighbors=1)
kn.fit(X_train, y_train)

print("Prediction Test / Validation \n ")
for i in range(len(X_test)):
    x = X_test[i]
    x_new = np.array([x])
    prediction = kn.predict(x_new)
    print("\n Actual : {0} {1}, Predicted :{2}{3}".format(y_test[i],iris_dataset["target_names"][y_
test[i]],prediction,iris_dataset["target_names"][prediction]))

print("\n TEST SCORE[ACCURACY]: {:.2f}\n".format(kn.score(X_test, y_test)))
```

```
 IRIS FEATURES \ TARGET NAMES:
  ['setosa' 'versicolor' 'virginica']

[0]:[setosa]

[1]:[versicolor]

[2]:[virginica]

 IRIS DATA :
 [[ 5.1  3.5  1.4  0.2]
 [ 4.9  3.   1.4  0.2]
 [ 4.7  3.2  1.3  0.2]
 [ 4.6  3.1  1.5  0.2]
 [ 5.   3.6  1.4  0.2]
 [ 5.4  3.9  1.7  0.4]
 [ 4.6  3.4  1.4  0.3]
 [ 5.   3.4  1.5  0.2]
 [ 4.4  2.9  1.4  0.2]
 [ 4.9  3.1  1.5  0.1]
 [ 5.4  3.7  1.5  0.2]
 [ 4.8  3.4  1.6  0.2]
 [ 4.8  3.   1.4  0.1]
```

```
[ 4.3  3.   1.1  0.1]
[ 5.8  4.   1.2  0.2]
[ 5.7  4.4  1.5  0.4]
[ 5.4  3.9  1.3  0.4]
[ 5.1  3.5  1.4  0.3]
[ 5.7  3.8  1.7  0.3]
[ 5.1  3.8  1.5  0.3]
[ 5.4  3.4  1.7  0.2]
[ 5.1  3.7  1.5  0.4]
[ 4.6  3.6  1.   0.2]
[ 5.1  3.3  1.7  0.5]
[ 4.8  3.4  1.9  0.2]
[ 5.   3.   1.6  0.2]
[ 5.   3.4  1.6  0.4]
[ 5.2  3.5  1.5  0.2]
[ 5.2  3.4  1.4  0.2]
[ 4.7  3.2  1.6  0.2]
[ 4.8  3.1  1.6  0.2]
[ 5.4  3.4  1.5  0.4]
[ 5.2  4.1  1.5  0.1]
[ 5.5  4.2  1.4  0.2]
[ 4.9  3.1  1.5  0.1]
[ 5.   3.2  1.2  0.2]
[ 5.5  3.5  1.3  0.2]
[ 4.9  3.1  1.5  0.1]
[ 4.4  3.   1.3  0.2]
[ 5.1  3.4  1.5  0.2]
[ 5.   3.5  1.3  0.3]
[ 4.5  2.3  1.3  0.3]
[ 4.4  3.2  1.3  0.2]
[ 5.   3.5  1.6  0.6]
[ 5.1  3.8  1.9  0.4]
[ 4.8  3.   1.4  0.3]
[ 5.1  3.8  1.6  0.2]
[ 4.6  3.2  1.4  0.2]
[ 5.3  3.7  1.5  0.2]
[ 5.   3.3  1.4  0.2]
[ 7.   3.2  4.7  1.4]
[ 6.4  3.2  4.5  1.5]
[ 6.9  3.1  4.9  1.5]
[ 5.5  2.3  4.   1.3]
[ 6.5  2.8  4.6  1.5]
[ 5.7  2.8  4.5  1.3]
[ 6.3  3.3  4.7  1.6]
[ 4.9  2.4  3.3  1. ]
[ 6.6  2.9  4.6  1.3]
[ 5.2  2.7  3.9  1.4]
[ 5.   2.   3.5  1. ]
[ 5.9  3.   4.2  1.5]
[ 6.   2.2  4.   1. ]
[ 6.1  2.9  4.7  1.4]
[ 5.6  2.9  3.6  1.3]
[ 6.7  3.1  4.4  1.4]
[ 5.6  3.   4.5  1.5]
[ 5.8  2.7  4.1  1. ]
[ 6.2  2.2  4.5  1.5]
[ 5.6  2.5  3.9  1.1]
[ 5.9  3.2  4.8  1.8]
[ 6.1  2.8  4.   1.3]
[ 6.3  2.5  4.9  1.5]
[ 6.1  2.8  4.7  1.2]
[ 6.4  2.9  4.3  1.3]
[ 6.6  3.   4.4  1.4]
[ 6.8  2.8  4.8  1.4]
[ 6.7  3.   5.   1.7]
[ 6.   2.9  4.5  1.5]
[ 5.7  2.6  3.5  1. ]
[ 5.5  2.4  3.8  1.1]
[ 5.5  2.4  3.7  1. ]
[ 5.8  2.7  3.9  1.2]
[ 6.   2.7  5.1  1.6]
[ 5.4  3.   4.5  1.5]
[ 6.   3.4  4.5  1.6]
[ 6.7  3.1  4.7  1.5]
[ 6.3  2.3  4.4  1.3]
[ 5.6  3.   4.1  1.3]
[ 5.5  2.5  4.   1.3]
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```
[ 5.5  2.6  4.4  1.2]
[ 6.1  3.   4.6  1.4]
[ 5.8  2.6  4.   1.2]
[ 5.   2.3  3.3  1. ]
[ 5.6  2.7  4.2  1.3]
[ 5.7  3.   4.2  1.2]
[ 5.7  2.9  4.2  1.3]
[ 6.2  2.9  4.3  1.3]
[ 5.1  2.5  3.   1.1]
[ 5.7  2.8  4.1  1.3]
[ 6.3  3.3  6.   2.5]
[ 5.8  2.7  5.1  1.9]
[ 7.1  3.   5.9  2.1]
[ 6.3  2.9  5.6  1.8]
[ 6.5  3.   5.8  2.2]
[ 7.6  3.   6.6  2.1]
[ 4.9  2.5  4.5  1.7]
[ 7.3  2.9  6.3  1.8]
[ 6.7  2.5  5.8  1.8]
[ 7.2  3.6  6.1  2.5]
[ 6.5  3.2  5.1  2. ]
[ 6.4  2.7  5.3  1.9]
[ 6.8  3.   5.5  2.1]
[ 5.7  2.5  5.   2. ]
[ 5.8  2.8  5.1  2.4]
[ 6.4  3.2  5.3  2.3]
[ 6.5  3.   5.5  1.8]
[ 7.7  3.8  6.7  2.2]
[ 7.7  2.6  6.9  2.3]
[ 6.   2.2  5.   1.5]
[ 6.9  3.2  5.7  2.3]
[ 5.6  2.8  4.9  2. ]
[ 7.7  2.8  6.7  2. ]
[ 6.3  2.7  4.9  1.8]
[ 6.7  3.3  5.7  2.1]
[ 7.2  3.2  6.   1.8]
[ 6.2  2.8  4.8  1.8]
[ 6.1  3.   4.9  1.8]
[ 6.4  2.8  5.6  2.1]
[ 7.2  3.   5.8  1.6]
[ 7.4  2.8  6.1  1.9]
[ 7.9  3.8  6.4  2. ]
[ 6.4  2.8  5.6  2.2]
[ 6.3  2.8  5.1  1.5]
[ 6.1  2.6  5.6  1.4]
[ 7.7  3.   6.1  2.3]
[ 6.3  3.4  5.6  2.4]
[ 6.4  3.1  5.5  1.8]
[ 6.   3.   4.8  1.8]
[ 6.9  3.1  5.4  2.1]
[ 6.7  3.1  5.6  2.4]
[ 6.9  3.1  5.1  2.3]
[ 5.8  2.7  5.1  1.9]
[ 6.8  3.2  5.9  2.3]
[ 6.7  3.3  5.7  2.5]
[ 6.7  3.   5.2  2.3]
[ 6.3  2.5  5.   1.9]
[ 6.5  3.   5.2  2. ]
[ 6.2  3.4  5.4  2.3]
[ 5.9  3.   5.1  1.8]]

Target :
[0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2]

X TRAINING DATA SET
[[ 5.9  3.   4.2  1.5]
[ 5.8  2.6  4.   1.2]
[ 6.8  3.   5.5  2.1]
[ 4.7  3.2  1.3  0.2]
[ 6.9  3.1  5.1  2.3]
[ 5.   3.5  1.6  0.6]
[ 5.4  3.7  1.5  0.2]
[ 5.   2.   3.5  1. ]
```

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[ 6.5  3.   5.5  1.8]
[ 6.7  3.3  5.7  2.5]
[ 6.   2.2  5.   1.5]
[ 6.7  2.5  5.8  1.8]
[ 5.6  2.5  3.9  1.1]
[ 7.7  3.   6.1  2.3]
[ 6.3  3.3  4.7  1.6]
[ 5.5  2.4  3.8  1.1]
[ 6.3  2.7  4.9  1.8]
[ 6.3  2.8  5.1  1.5]
[ 4.9  2.5  4.5  1.7]
[ 6.3  2.5  5.   1.9]
[ 7.   3.2  4.7  1.4]
[ 6.5  3.   5.2  2. ]
[ 6.   3.4  4.5  1.6]
[ 4.8  3.1  1.6  0.2]
[ 5.8  2.7  5.1  1.9]
[ 5.6  2.7  4.2  1.3]
[ 5.6  2.9  3.6  1.3]
[ 5.5  2.5  4.   1.3]
[ 6.1  3.   4.6  1.4]
[ 7.2  3.2  6.   1.8]
[ 5.3  3.7  1.5  0.2]
[ 4.3  3.   1.1  0.1]
[ 6.4  2.7  5.3  1.9]
[ 5.7  3.   4.2  1.2]
[ 5.4  3.4  1.7  0.2]
[ 5.7  4.4  1.5  0.4]
[ 6.9  3.1  4.9  1.5]
[ 4.6  3.1  1.5  0.2]
[ 5.9  3.   5.1  1.8]
[ 5.1  2.5  3.   1.1]
[ 4.6  3.4  1.4  0.3]
[ 6.2  2.2  4.5  1.5]
[ 7.2  3.6  6.1  2.5]
[ 5.7  2.9  4.2  1.3]
[ 4.8  3.   1.4  0.1]
[ 7.1  3.   5.9  2.1]
[ 6.9  3.2  5.7  2.3]
[ 6.5  3.   5.8  2.2]
[ 6.4  2.8  5.6  2.1]
[ 5.1  3.8  1.6  0.2]
[ 4.8  3.4  1.6  0.2]
[ 6.5  3.2  5.1  2. ]
[ 6.7  3.3  5.7  2.1]
[ 4.5  2.3  1.3  0.3]
[ 6.2  3.4  5.4  2.3]
[ 4.9  3.   1.4  0.2]
[ 5.7  2.5  5.   2. ]
[ 6.9  3.1  5.4  2.1]
[ 4.4  3.2  1.3  0.2]
[ 5.   3.6  1.4  0.2]
[ 7.2  3.   5.8  1.6]
[ 5.1  3.5  1.4  0.3]
[ 4.4  3.   1.3  0.2]
[ 5.4  3.9  1.7  0.4]
[ 5.5  2.3  4.   1.3]
[ 6.8  3.2  5.9  2.3]
[ 7.6  3.   6.6  2.1]
[ 5.1  3.5  1.4  0.2]
[ 4.9  3.1  1.5  0.1]
[ 5.2  3.4  1.4  0.2]
[ 5.7  2.8  4.5  1.3]
[ 6.6  3.   4.4  1.4]
[ 5.   3.2  1.2  0.2]
[ 5.1  3.3  1.7  0.5]
[ 6.4  2.9  4.3  1.3]
[ 5.4  3.4  1.5  0.4]
[ 7.7  2.6  6.9  2.3]
[ 4.9  2.4  3.3  1. ]
[ 7.9  3.8  6.4  2. ]
[ 6.7  3.1  4.4  1.4]
[ 5.2  4.1  1.5  0.1]
[ 6.   3.   4.8  1.8]
[ 5.8  4.   1.2  0.2]
[ 7.7  2.8  6.7  2. ]
[ 5.1  3.8  1.5  0.3]
```

```
[ 4.7  3.2  1.6  0.2]
[ 7.4  2.8  6.1  1.9]
[ 5.   3.3  1.4  0.2]
[ 6.3  3.4  5.6  2.4]
[ 5.7  2.8  4.1  1.3]
[ 5.8  2.7  3.9  1.2]
[ 5.7  2.6  3.5  1. ]
[ 6.4  3.2  5.3  2.3]
[ 6.7  3.   5.2  2.3]
[ 6.3  2.5  4.9  1.5]
[ 6.7  3.   5.   1.7]
[ 5.   3.   1.6  0.2]
[ 5.5  2.4  3.7  1. ]
[ 6.7  3.1  5.6  2.4]
[ 5.8  2.7  5.1  1.9]
[ 5.1  3.4  1.5  0.2]
[ 6.6  2.9  4.6  1.3]
[ 5.6  3.   4.1  1.3]
[ 5.9  3.2  4.8  1.8]
[ 6.3  2.3  4.4  1.3]
[ 5.5  3.5  1.3  0.2]
[ 5.1  3.7  1.5  0.4]
[ 4.9  3.1  1.5  0.1]
[ 6.3  2.9  5.6  1.8]
[ 5.8  2.7  4.1  1. ]
[ 7.7  3.8  6.7  2.2]
[ 4.6  3.2  1.4  0.2]]

Y TRAINING DATA SET
[1 1 2 0 2 0 0 1 2 2 2 2 1 2 1 1 2 2 2 2 1 2 1 0 2 1 1 1 1 2 0 0 2 1 0 0 1
0 2 1 0 1 2 1 0 2 2 2 2 2 0 0 2 2 0 2 0 2 2 2 0 0 2 0 0 0 1 2 2 0 0 0 1 1 0 0
1 0 2 1 2 1 0 2 0 2 0 0 2 0 2 1 1 1 2 2 1 1 0 1 2 2 0 1 1 1 1 0 0 0 2 1 2
0]

X TESTING DATA  SET
[[ 5.8  2.8  5.1  2.4]
[ 6.   2.2  4.   1. ]
[ 5.5  4.2  1.4  0.2]
[ 7.3  2.9  6.3  1.8]
[ 5.   3.4  1.5  0.2]
[ 6.3  3.3  6.   2.5]
[ 5.   3.5  1.3  0.3]
[ 6.7  3.1  4.7  1.5]
[ 6.8  2.8  4.8  1.4]
[ 6.1  2.8  4.   1.3]
[ 6.1  2.6  5.6  1.4]
[ 6.4  3.2  4.5  1.5]
[ 6.1  2.8  4.7  1.2]
[ 6.5  2.8  4.6  1.5]
[ 6.1  2.9  4.7  1.4]
[ 4.9  3.1  1.5  0.1]
[ 6.   2.9  4.5  1.5]
[ 5.5  2.6  4.4  1.2]
[ 4.8  3.   1.4  0.3]
[ 5.4  3.9  1.3  0.4]
[ 5.6  2.8  4.9  2. ]
[ 5.6  3.   4.5  1.5]
[ 4.8  3.4  1.9  0.2]
[ 4.4  2.9  1.4  0.2]
[ 6.2  2.8  4.8  1.8]
[ 4.6  3.6  1.   0.2]
[ 5.1  3.8  1.9  0.4]
[ 6.2  2.9  4.3  1.3]
[ 5.   2.3  3.3  1. ]
[ 5.   3.4  1.6  0.4]
[ 6.4  3.1  5.5  1.8]
[ 5.4  3.   4.5  1.5]
[ 5.2  3.5  1.5  0.2]
[ 6.1  3.   4.9  1.8]
[ 6.4  2.8  5.6  2.2]
[ 5.2  2.7  3.9  1.4]
[ 5.7  3.8  1.7  0.3]
[ 6.   2.7  5.1  1.6]]

Y TESTING DATA  SET
[2 1 0 2 0 2 0 1 1 1 2 1 1 1 1 0 1 1 0 0 2 1 0 0 2 0 0 1 1 0 2 1 0 2 2 1 0
1]
```

```
Prediction Test / Validation

 Actual : 2 virginica, Predicted :[2]['virginica']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 0 setosa, Predicted :[0]['setosa']

 Actual : 2 virginica, Predicted :[2]['virginica']

 Actual : 0 setosa, Predicted :[0]['setosa']

 Actual : 2 virginica, Predicted :[2]['virginica']

 Actual : 0 setosa, Predicted :[0]['setosa']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 2 virginica, Predicted :[2]['virginica']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 0 setosa, Predicted :[0]['setosa']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 0 setosa, Predicted :[0]['setosa']

 Actual : 0 setosa, Predicted :[0]['setosa']

 Actual : 2 virginica, Predicted :[2]['virginica']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 0 setosa, Predicted :[0]['setosa']

 Actual : 0 setosa, Predicted :[0]['setosa']

 Actual : 2 virginica, Predicted :[2]['virginica']

 Actual : 0 setosa, Predicted :[0]['setosa']

 Actual : 0 setosa, Predicted :[0]['setosa']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 0 setosa, Predicted :[0]['setosa']

 Actual : 2 virginica, Predicted :[2]['virginica']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 0 setosa, Predicted :[0]['setosa']

 Actual : 2 virginica, Predicted :[2]['virginica']

 Actual : 2 virginica, Predicted :[2]['virginica']

 Actual : 1 versicolor, Predicted :[1]['versicolor']

 Actual : 0 setosa, Predicted :[0]['setosa']
```

```
Actual : 1 versicolor, Predicted :[2]['virginica']

TEST SCORE[ACCURACY]: 0.97
```