```
#inBuilt Function
import numpy as np
from collections import Counter
#Euclidian Distance
def euclidean_distance(x1, x2):
  return np.sqrt(np.sum((x1 - x2)**2))

class k_nearest_neighbors:
  def __init__(self, k):
    self.k = k

  def knn_fit(self, X_train, y_train):
    self.X_train = X_train
    self.y_train = y_train

  def knn_predict(self, X):
    predicted_lables = [self._predict(x) for x in X]
    #predicted_labels=[]
    #for x in X:
     #   pred=self._predict(x)
      #  predicted_labels.append(pred)
    return np.array(predicted_lables)

  #helper method
  def _predict(self, x):
    #compute distances
    distances = [euclidean_distance(x, x_train) for x_train in self.X_train]
    #get k nearest samples, labels
    k_indices = np.argsort(distances)[:self.k]
    k_nearest_labels = [self.y_train[i] for i in k_indices]
    #majority vote, most common class label
    majority_vote = Counter(k_nearest_labels).most_common(1)
    print("majority vote is",majority_vote)
    return majority_vote[0][0]

#Test KNN on Iris dataset and visualize the results
from sklearn import datasets
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import train_test_split
from sklearn.metrics import classification_report,confusion_matrix
import numpy as np
import matplotlib.pyplot as plt

#User defined module import
#from KNN import k_nearest_neighbors


#Loading dataset
iris_data = datasets.load_iris()
```

```
target = iris_data.target
print(data)
print(target)
# Train/Test splits
X_train, X_test, y_train, y_test = train_test_split(data, target, test_size=0.2)
print("traning instances: ",len(X_train))
print("Test instances: ",len(X_test))

#Train KNN model
my_model = k_nearest_neighbors(k = 3)
model=my_model.knn_fit(X_train, y_train)

#predictions = my_model.knn_predict(X_test)

predictions = my_model.knn_predict(X_test)
#Evaluation report
#print("confusion Matrix:")
#print(confusion_matrix(y_test,predictions))
#print("Classification report:", classification_report(y_test, predictions))

#Visulize the predictions
for class_value in range(3):
    row_ix = np.where(predictions== class_value)
    row_px = np.where(y_test== class_value)
  # create scatter of these samples
    if(class_value==0):
        m='*'
        c='red'
    elif(class_value==1):
        m="o"
        c='green'
    elif(class_value==2):
        m='x'
        c='yellow'

    plot1 = plt.figure(1)
    plt.plot(X_test[row_ix, 1], X_test[row_ix, 0],marker=m,color=c)

   # create scatter of these samples
    if(class_value==0):
        m='*'
        c='violet'
    elif(class_value==1):
        m="o"
        c='black'
    elif(class_value==2):
        m='x'
        c='cyan'

    #plt.subplot(1, 2, 2)
    #plt.subplot(1, 2, 2)
    plot2= plt.figure(2)
    plt.plot(X_test[row_px, 1], X_test[row_px, 0],marker=m,color=c)

plt.show()
```

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[[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]
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traning instances:  120
Test instances:  30
majority vote is [(2, 3)]
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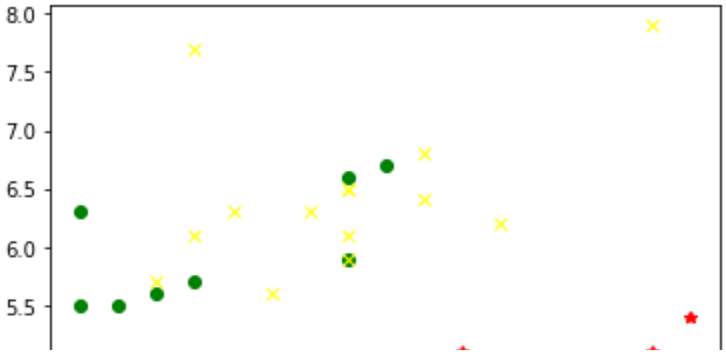
majority vote is [(2, 3)]
majority vote is [(0, 3)]
majority vote is [(1, 3)]
```



```
#Using Library Functions
from sklearn import datasets
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import train_test_split
from sklearn.metrics import classification_report,confusion_matrix
import numpy as np
import matplotlib.pyplot as plt

#Loading dataset
iris_data = datasets.load_iris()
data = iris_data.data
target = iris_data.target

# Train/Test splits
```

```
X_train, X_test, y_train, y_test = train_test_split(data, target, test_size=0.2)
print("traning instances: ",len(X_train))
print("Test instances: ",len(X_test))

#Train KNN model
knn = KNeighborsClassifier(n_neighbors=3)
knn.fit(X_train, y_train)
predictions = knn.predict(X_test)
#Evaluation report
print("confusion Matrix:")
print(confusion_matrix(y_test,predictions))
print("Classification report:", classification_report(y_test, predictions))

#Visulize the predictions
for class_value in range(3):
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    elif(class_value==2):
        m='x'
        c='yellow'

    plot1 = plt.figure(1)
    plt.plot(X_test[row_ix, 1], X_test[row_ix, 0],marker=m,color=c)

   # create scatter of these samples
    if(class_value==0):
        m='*'
        c='violet'
    elif(class_value==1):
        m="o"
        c='black'
    elif(class_value==2):
        m='x'
        c='cyan'

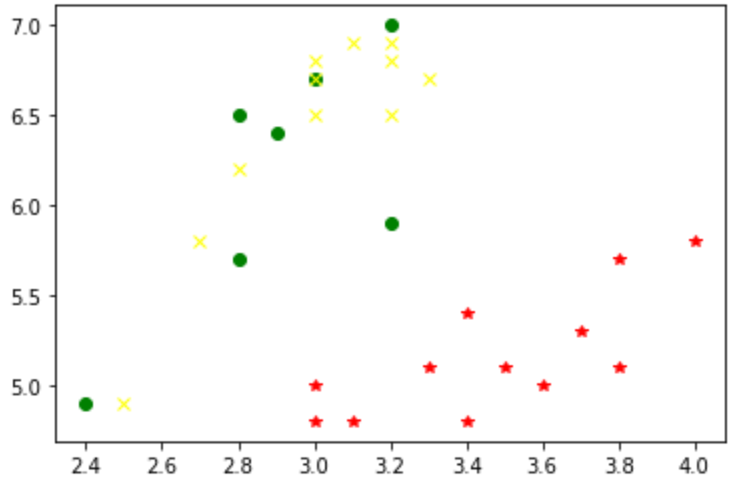
    #plt.subplot(1, 2, 2)
    plot2= plt.figure(2)
    plt.plot(X_test[row_px, 1], X_test[row_px, 0],marker=m,color=c)

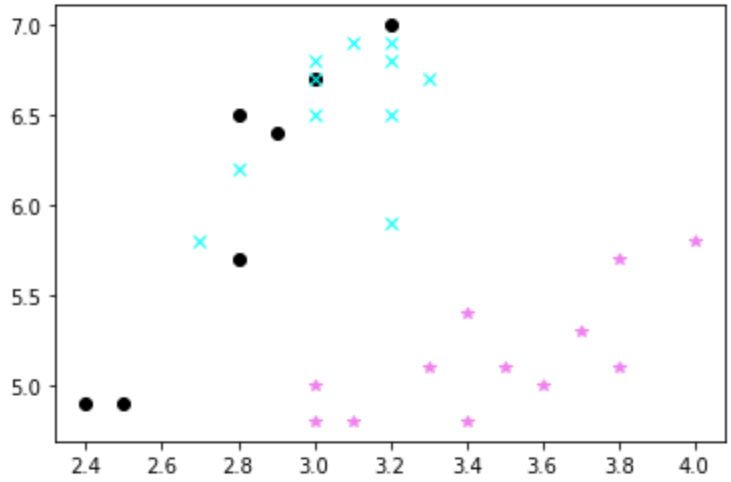
plt.show()
print(knn.score(X_test, y_test))
print("xaxis predicted",X_test[row_px, 1])
print("yaxis predicted",X_test[row_px, 0])
print("xaxis inputted ",X_test[row_ix, 1])
print("yaxis inputted",X_test[row_ix, 0])
```

```
traning instances:  120
Test instances:  30
confusion Matrix:
[[12  0  0]
 [ 0  6  1]
 [ 0  1 10]]
Classification report:               precision    recall  f1-score   support

           0       1.00      1.00      1.00        12
           1       0.86      0.86      0.86         7
           2       0.91      0.91      0.91        11

    accuracy                           0.93        30
   macro avg       0.92      0.92      0.92        30
weighted avg       0.93      0.93      0.93        30
```





```
0.9333333333333333
xaxis predicted [[3.1 3.  3.2 2.8 3.  3.2 3.2 2.7 3.2 3.3 3. ]]
yaxis predicted [[6.9 6.5 5.9 6.2 6.8 6.5 6.8 5.8 6.9 6.7 6.7]]
xaxis inputted  [[3.1 3.  2.8 2.5 3.  3.2 3.2 2.7 3.2 3.3 3. ]]
```

```
from sklearn import datasets
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import train_test_split
from sklearn.metrics import classification_report, confusion_matrix
from sklearn.metrics import classification_report,confusion_matrix
import numpy as np
import matplotlib.pyplot as plt

#User defined module import
#from KNN import k_nearest_neighbors



#Loading dataset
iris_data = datasets.load_iris()
data = iris_data.data
target = iris_data.target
print(data)
print(target)
```

```
[[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]
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