A PYTHON PROGRAM TO IMPLEMENT K-MEANS MODEL

Ex.No.: 9B

Date of Experiment: 25/10/2024

AIM:-

To implement a python program using a K-Means Algorithm in a model.

ALGORITHM:-

Step1: Import all the other necessary libraries(numpy as np, matplotlib.pyplot as plt and sklearn.tree,pandas as pd and seaborn as sns).

Step2: Select the number K to decide the number of clusters.

Step3: Select random K points or centroids. (It can be different from the input dataset). Step4:

Assign each data point to their closest centroid, which will form the predefined K clusters. Step5:

Calculate the variance and place a new centroid of each cluster.

Step6: Repeat the fourth steps, which means assign each datapoint to the new closest centroid of each cluster.

Step7: If any reassignment occurs, then go to step-5 else go to FINISH.

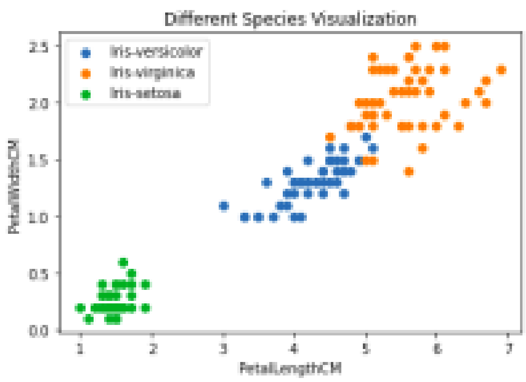
Step8: Train the model and plot the graph using scatterplot() function.

IMPLEMENTATION:-

data = pd.read_csv('../input/k-means-clustering/KNN (3).csv')

data.head(5)

Text(0.5, 1.0, 'Different Species Visualization')



req_data = data.iloc[:,1:]

req_data.head(5)

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa

shuffle_index = np.random.permutation(req_data.shape[0]) #shuffling the row index of our dataset

req_data = req_data.iloc[shuffle_index]

req_data.head(5)

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
45	4.8	3.0	1.4	0.3	Iris-setosa
50	7.0	3.2	4.7	1.4	Iris-versicolor
135	7.7	3.0	6.1	2.3	Iris-virginica
49	5.0	3.3	1.4	0.2	Iris-setosa
89	5.5	2.5	4.0	1.3	Iris-versicolor

```
train_size = int(req_data.shape[0]*0.7)

train_df = req_data.iloc[:train_size,:]
test_df = req_data.iloc[train_size:,:]
train = train_df.values
test = test_df.values
y_true = test[:,-1]
print('Train_Shape: ',train_df.shape)
print('Test_Shape: ',test_df.shape)
```

```
Train_Shape:  (105, 5)
Test_Shape:  (45, 5)
```

```
from math import sqrt
def euclidean_distance(x_test, x_train):
    distance = 0
    for i in range(len(x_test)-1):
        distance += (x_test[i]-x_train[i])**2
    return sqrt(distance)

def get_neighbors(x_test, x_train, num_neighbors):
    distances = []
```

```
    data = []
    for i in x_train:
        distances.append(euclidean_distance(x_test,i))
        data.append(i)
    distances = np.array(distances)
    data = np.array(data)
      sort_indexes = distances.argsort() #argsort() function returns indices by sorting distances
data in ascending order
    data = data[sort_indexes] #modifying our data based on sorted indices, so that we can get the
nearest neighbors
    return data[:num_neighbors]

def prediction(x_test, x_train, num_neighbors):
    classes = []
    neighbors = get_neighbors(x_test, x_train, num_neighbors)
    for i in neighbors:
        classes.append(i[-1])
    predicted = max(classes, key=classes.count) #taking the most repeated class return
    predicted

def predict_classifier(x_test):
    classes = []
    neighbors = get_neighbors(x_test, req_data.values, 5)
    for i in neighbors:
        classes.append(i[-1])
    predicted = max(classes, key=classes.count)
    print(predicted)
    return predicted

def accuracy(y_true, y_pred):
    num_correct = 0
```

```
    for i in range(len(y_true)):
        if y_true[i]==y_pred[i]:
            num_correct+=1
    accuracy = num_correct/len(y_true)
    return accuracy


y_pred = []
for i in test:
    y_pred.append(prediction(i, train, 5))
y_pred
```

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['Iris-virginica',
 'Iris-versicolor',
 'Iris-versicolor',
 'Iris-setosa',
 'Iris-virginica',
 'Iris-setosa',
 'Iris-setosa',
 'Iris-setosa',
 'Iris-virginica',
 'Iris-versicolor',
 'Iris-setosa',
 'Iris-versicolor',
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 'Iris-setosa',
 'Iris-virginica',
 'Iris-virginica',
 'Iris-setosa',
 'Iris-versicolor',
 'Iris-virginica',
 'Iris-versicolor']
```

accuracy = accuracy(y_true, y_pred)

accuracy

```
0.9555555555555556
```

test_df.sample(5)

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
113	5.7	2.5	5.0	2.0	Iris-virginica
125	7.2	3.2	6.0	1.8	Iris-virginica
149	5.9	3.0	5.1	1.8	Iris-virginica
94	5.6	2.7	4.2	1.3	Iris-versicolor
99	5.7	2.8	4.1	1.3	Iris-versicolor

RESULT:-

Thus the python program to implement the K-Means model has been successfully implemented and the results have been verified and analyzed.