EXPERIMENT -9 (a)

A python program using a K-Means Algorithm in a model

AIM:

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

ALGORITHM:

1. Import Necessary Libraries: Import required libraries like numpy, matplotlib.pyplot, and sklearn.cluster.

2. Load and Preprocess Data: Load the dataset. Preprocess the data if needed (e.g., scaling).

3. Initialize Cluster Centers: Choose the number of clusters (K). Initialize K cluster centers randomly.

4. Assign Data Points to Clusters: For each data point, calculate the distance to each cluster center. Assign the data point to the cluster with the nearest center.

5. Update Cluster Centers: Calculate the mean of the data points in each cluster. Update the cluster centers to the calculated means.

6. Repeat Steps 4 and 5: Repeat the assignment of data points to clusters and updating of cluster centers until convergence (i.e.,

when the cluster assignments do not change much between iterations).

7. Plot the Clusters: Plot the data points and the cluster centers to visualize the clustering result.

CODE

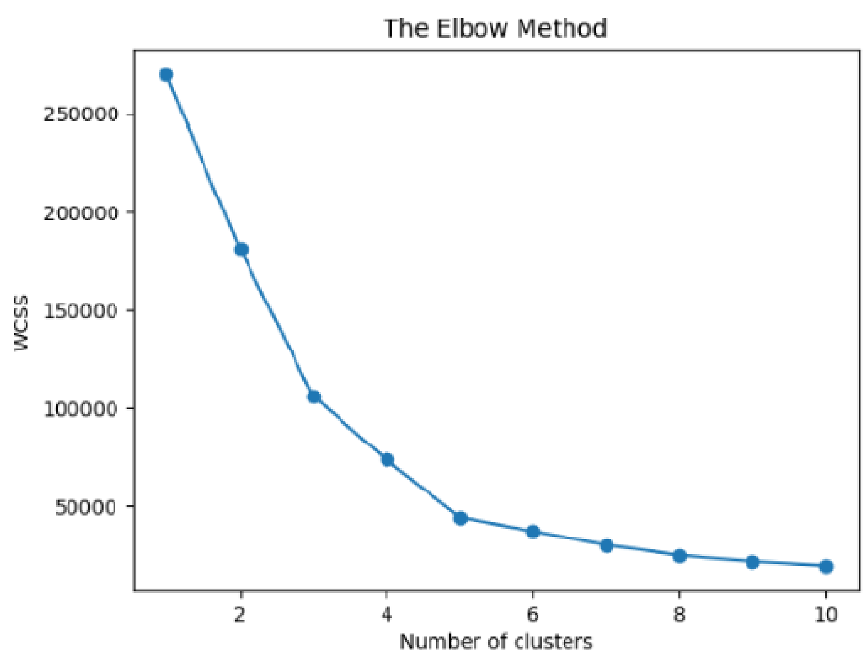
```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
dataset = pd.read_csv('/content/Mall_Customers.csv')
X = dataset.iloc[:,[3,4]].values
print(dataset)

from sklearn.cluster import KMeans
wcss =[]
for i in range (1,11):
    kmeans = KMeans(n_clusters = i, init = 'k-means++', max_iter =300,
n_init = 10, random_state = 0)
    kmeans.fit(X)
    wcss.append(kmeans.inertia_)
# Plot the graph to visualize the Elbow Method to find the optimal
number of cluster
plt.plot(range(1,11),wcss)
plt.title('The Elbow Method')
plt.xlabel('Number of clusters')
plt.ylabel('WCSS')
plt.show()


kmeans=KMeans(n_clusters= 5, init = 'k-means++', max_iter = 300,
n_init = 10, random_state = 0)
y_kmeans = kmeans.fit_predict(X)
y_kmeans
```

```
type(y_kmeans)

y_kmeans
plt.scatter(X[y_kmeans == 0, 0], X[y_kmeans == 0, 1], s = 100, c = 'red',
label = 'Cluster 1')
plt.scatter(X[y_kmeans == 1, 0], X[y_kmeans == 1, 1], s = 100, c =
'blue', label = 'Cluster 2')
plt.scatter(X[y_kmeans == 2, 0], X[y_kmeans == 2, 1], s = 100, c =
'green', label = 'Cluster
3')
plt.scatter(X[y_kmeans == 3, 0], X[y_kmeans == 3, 1], s = 100, c =
'cyan', label = 'Cluster 4')
plt.scatter(X[y_kmeans == 4, 0], X[y_kmeans == 4, 1], s = 100, c =
'magenta', label =
'Cluster 5')
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:, 1], s
= 300, c = 'yellow',
label = 'Centroids')


plt.title('Clusters of customers')
plt.xlabel('Annual Income (k$)')
plt.ylabel('Spending Score (1-100)')
plt.legend()
plt.show()

plt.scatter(X[y_kmeans == 0, 0], X[y_kmeans == 0, 1], s = 100, c = 'red',
label = 'Cluster 1')
plt.scatter(X[y_kmeans == 1, 0], X[y_kmeans == 1, 1], s = 100, c =
'blue', label = 'Cluster 2')
plt.scatter(X[y_kmeans == 2, 0], X[y_kmeans == 2, 1], s = 100, c =
'green', label = 'Cluster 3')
plt.scatter(X[y_kmeans == 3, 0], X[y_kmeans == 3, 1], s = 100, c =
'cyan', label = 'Cluster 4')
plt.scatter(X[y_kmeans == 4, 0], X[y_kmeans == 4, 1], s = 100, c =
'magenta', label =
'Cluster 5')
```

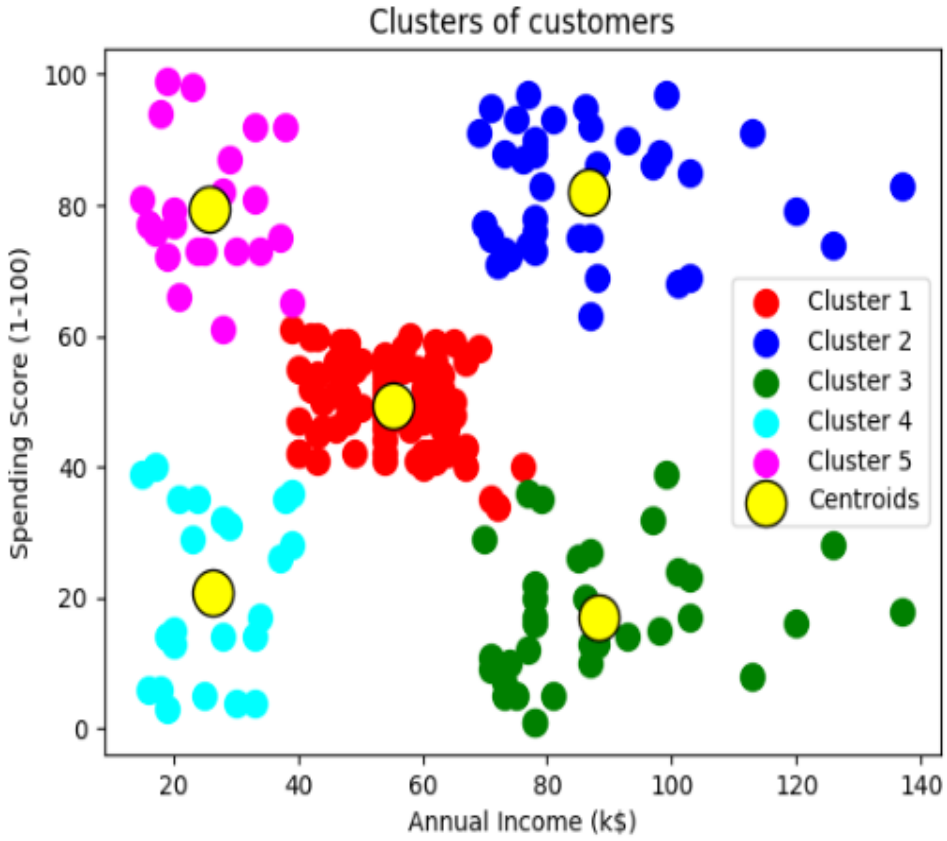
```
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:, 1], s
= 300, c = 'yellow',
label = 'Centroids')
plt.title('Clusters of customers')
plt.xlabel('Annual Income (k$)')
plt.ylabel('Spending Score (1-100)')
plt.legend()
plt.show()
```

OUTPUT

```
   CustomerID   Genre  Age  Annual Income (k$)  Spending Score (1-100)
0           1    Male   19                  15                      39
1           2    Male   21                  15                      81
2           3  Female   20                  16                       6
3           4  Female   23                  16                      77
4           5  Female   31                  17                      40
```




```
Cluster labels: [3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3
 4 3 4 3 4 3 0 3 4 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 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 2 1 0 1 2 1 2 1 0 1 2 1 2 1 2 1 2 1 0 1 2 1 2 1
 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2
 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1]
Type of labels: <class 'numpy.ndarray'>
```



RESULT:

Thus a python program using a K-Means Algorithm in a model is written and the output is verified