PROGRAM NO : 13

AIM : Program to implement K-Means Clustering technique using any standard dataset available in the public domain

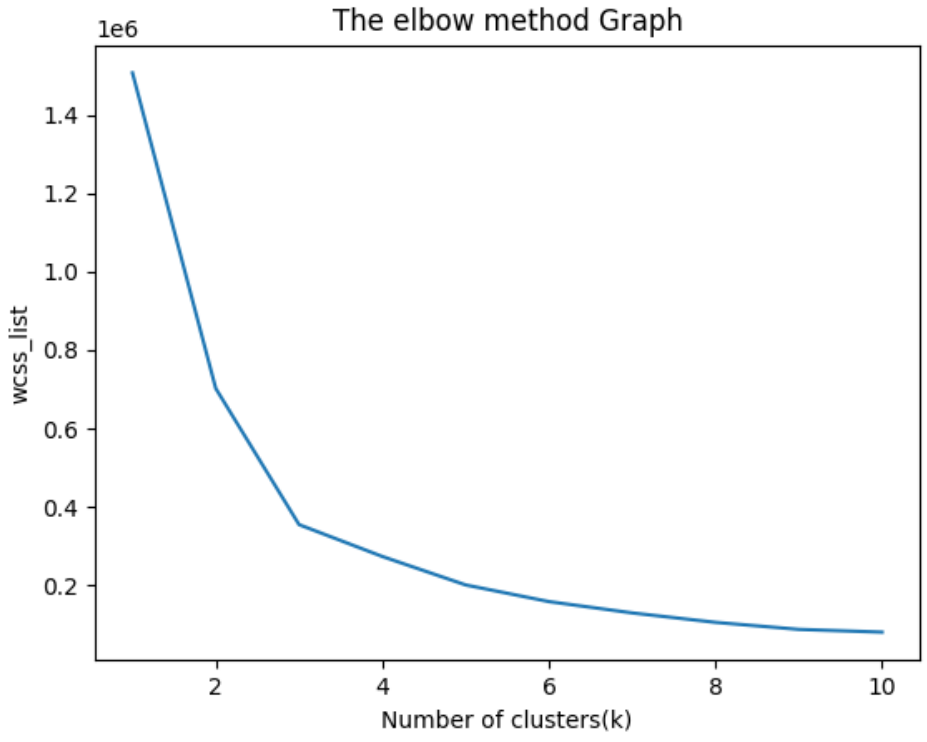
PROGRAM

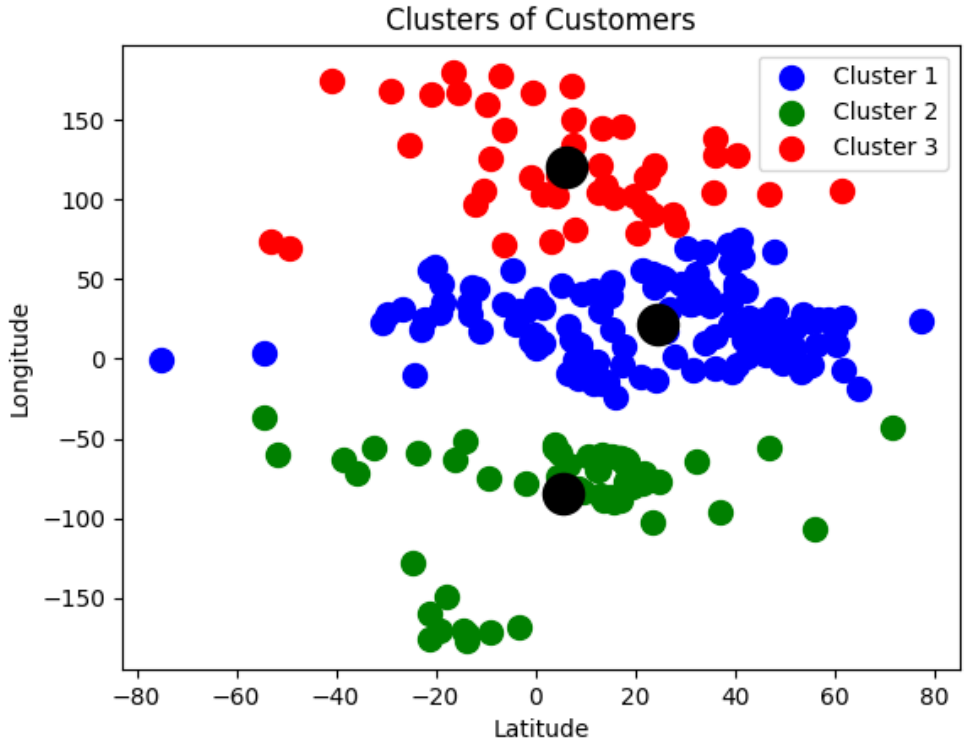
```
import matplotlib.pyplot as mtp
import pandas as pd

dataset=pd.read_csv('world_country_and_usa_states_latitude_and_longitude_values.csv')
x=dataset.iloc[:,[1,2]].values
print(x)

from  sklearn.cluster import KMeans

wcss_list=[]

for i in range(1,11):
   kmeans=KMeans(n_clusters=i,init='k-means++',random_state=42)
   kmeans.fit(x)
   wcss_list.append(kmeans.inertia_)

mtp.plot(range(1,11),wcss_list)
mtp.title("The elbow method Graph")
mtp.xlabel("Number of clusters(k)")
mtp.ylabel("wcss_list")
mtp.show()

kmeans=KMeans(n_clusters=3,init='k-means++',random_state=42)
y_predict=kmeans.fit_predict(x)
print(y_predict)

#Visualizing the Clusters
mtp.scatter(x[y_predict == 0,0],x[y_predict == 0,1],s=100,c='blue',label='Cluster 1')
mtp.scatter(x[y_predict == 1,0],x[y_predict == 1,1],s=100,c='green',label='Cluster 2')
mtp.scatter(x[y_predict == 2,0],x[y_predict == 2,1],s=100,c='red',label='Cluster 3')

mtp.scatter(kmeans.cluster_centers_[:,0],kmeans.cluster_centers_[:,1],s=300,c='black')

mtp.title("Clusters of Customers")
mtp.xlabel("Latitude")
mtp.ylabel("Longitude")
mtp.legend()
mtp.show()
```

OUTPUT

```
k-means -lat long
C:\Users\ajcemca\PycharmProjects\pythonProject\venv\Scripts\python.exe "C:/Users/ajcemca/PycharmProjects/pythonProject/05-01-2022/k-means -lat long.py"
[[ 4.25462450e+01  1.60155400e+00]
 [ 2.34240760e+01  5.38478180e+01]
 [ 3.39391100e+01  6.77099530e+01]
 [ 1.70608160e+01 -6.17964280e+01]
 [ 1.82205540e+01 -6.30686150e+01]
 [ 4.11533320e+01  2.01683310e+01]
 [ 4.00690990e+01  4.50381890e+01]
 [ 1.22260790e+01 -6.90600870e+01]
 [-1.12026920e+01  1.78738870e+01]
 [-7.52509730e+01 -7.13890000e-02]
 [-3.84160970e+01 -6.36166720e+01]
 [-1.42709720e+01 -1.70132217e+02]
 [ 4.75162310e+01  1.45500720e+01]
TODO  Problems  Terminal  Python Packages  Python Console  Eve
```

```
k-means -lat long
 [-1.28275000e+01  4.51662440e+01]
 [-3.05594820e+01  2.29375060e+01]
 [-1.31338970e+01  2.78493320e+01]
 [-1.90154380e+01  2.91548570e+01]]
[0 0 0 1 1 0 0 1 0 0 1 1 0 2 1 0 0 1 2 0 0 0 0 0 0 1 2 1 1 1 2 0 0 0 1 1 2
 0 0 0 0 0 1 1 0 2 1 1 1 0 2 0 0 0 0 0 1 1 0 1 0 0 0 0 0 0 0 0 2 1 2 0 0 0 0
 1 0 1 0 0 0 1 0 0 1 0 0 1 1 2 0 1 0 2 2 1 0 1 0 2 0 0 0 2 2 0 0 0 0 0 1 0
 2 0 0 2 1 0 1 2 2 0 1 0 2 0 1 0 2 0 0 0 0 0 0 0 0 0 0 0 2 0 0 2 2 2 2 1 0
 1 0 0 2 0 1 2 0 0 2 0 2 0 1 0 0 2 2 1 2 0 1 1 1 2 2 0 0 1 1 1 0 0 2 1 0 0
 0 0 2 0 0 2 0 0 0 2 0 0 0 0 0 0 0 0 1 0 1 0 0 1 0 2 0 2 0 1 2 0 0 1 0 1 2
 2 0 0 0 1 1 0 0 1 1 1 1 2 2 1 1 0 0 0 0 0 0]

Process finished with exit code 0
```




Clusters of Customers
Cluster 1
Cluster 2
Cluster 3
Longitude
Latitude
150
100
50
0
−50
−100
−150
−80
−60
−40
−20
0
20
40
60
80