

Program No:12

Aim:Program to implement k-means clustering technique using any standard dataset available in the public domain

Program

```
import numpy as np
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++')
    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)
mtp.scatter(x[y_predict == 0,0], x[y_predict ==0,1], s=100, c='blue', label='Cluster0')
mtp.scatter(x[y_predict == 1,0], x[y_predict ==1,1], s=100, c='green', label= 'Cluster1')
mtp.scatter(x[y_predict == 2,0], x[y_predict ==2,1], s=100, c='red', label= 'Cluster2')
mtp.scatter(kmeans.cluster_centers_[0],kmeans.cluster_centers_[1], s = 300,)
mtp.title('clusters of customers')
mtp.xlabel('latitude')
mtp.ylabel('longitude')
mtp.legend()
mtp.show()
```

OUTPUT

C:\Users\ajcemca\AppData\Local\Programs\Python\Python39\python.exe C:/Users/ajci

```
[[ 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]
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 [ 4.27338830e+01  2.54858300e+01]
 [ 2.59304140e+01  5.06377720e+01]
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 [ 9.30769000e+00  2.31583400e+00]
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 [ 4.53527700e+00  1.14727669e+02]
 [-1.62901540e+01 -6.35886530e+01]
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```

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[6.61111100e+00	2.09394440e+01]
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[4.68181880e+01	8.22751200e+00]
[7.53998900e+00	-5.54708000e+00]
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[ 9.94558700e+00 -9.69664500e+00]
[ 1.69959710e+01 -6.20676410e+01]
[ 1.65080100e+00  1.02678950e+01]
[ 3.90742080e+01  2.18243120e+01]
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[ 1.57834710e+01 -9.02307590e+01]
[ 1.34443040e+01  1.44793731e+02]
[ 1.18037490e+01 -1.51804130e+01]
[ 4.86041600e+00 -5.89301800e+01]
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[ 1.51999990e+01 -8.62419050e+01]
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[ 4.71624940e+01  1.95033040e+01]
[-7.89275000e-01  1.13921327e+02]
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[ 3.10460510e+01  3.48516120e+01]
[ 5.42361070e+01 -4.54805600e+00]
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[ 3.24279080e+01  5.36880460e+01]
[ 6.49630510e+01 -1.90208350e+01]
[ 4.18719400e+01  1.25673800e+01]
[ 4.92144390e+01 -2.13125000e+00]
[ 1.81095810e+01 -7.72975080e+01]
[ 3.05851640e+01  3.62384140e+01]
```

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[ 2.36978100e+01  1.20960515e+02]
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[ 4.83794330e+01  3.11655800e+01]
[ 1.37333300e+00  3.22902750e+01]
[ 1.45787000e+00  2.42540000e+00]
[ 3.70902400e+01 -9.57128910e+01]
[-3.25227790e+01 -5.57658350e+01]
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[ 4.19029160e+01  1.24533890e+01]
[ 1.29843050e+01 -6.12872280e+01]
[ 6.42375000e+00 -6.65897300e+01]
[ 1.84206950e+01 -6.46399680e+01]
[ 1.83357650e+01 -6.48963350e+01]
[ 1.40583240e+01  1.08277199e+02]
[-1.53767060e+01  1.66959158e+02]
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[ 1.55527270e+01  4.85163880e+01]
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```

Figure 1

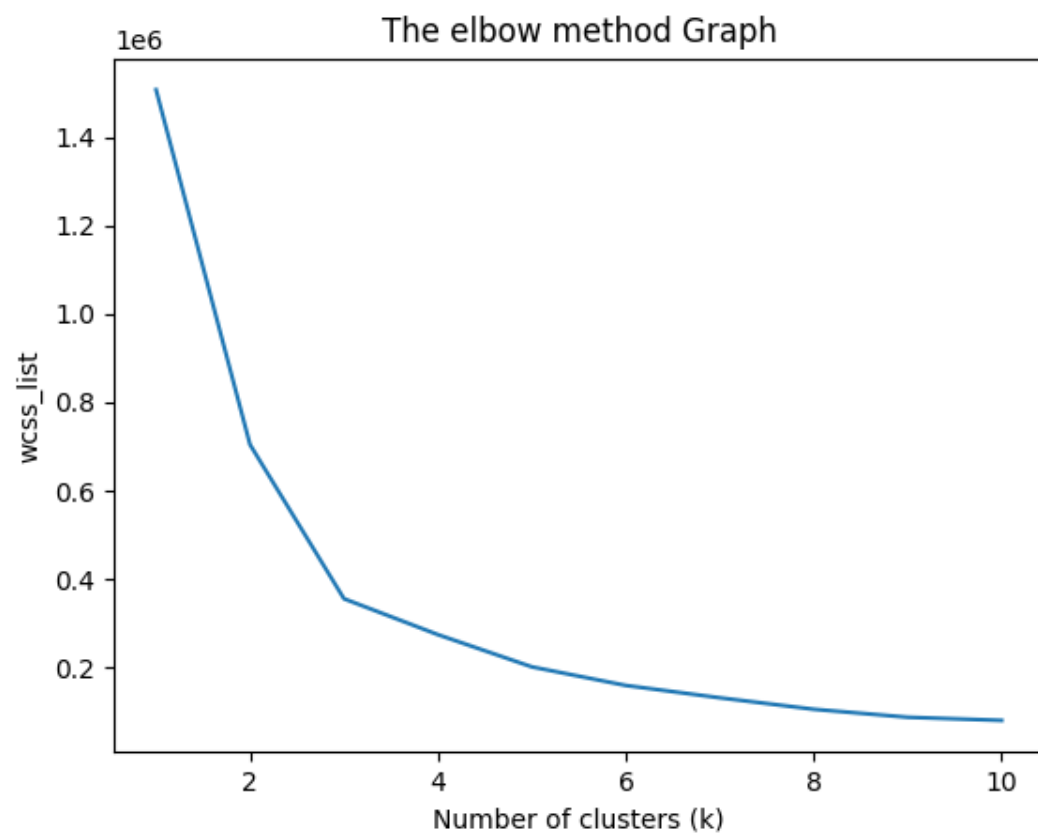


Figure 1

