Assignment 2 – K-Means (Optimal)

Problem Statement:

You work in XYZ Company as a Python Developer. The company officials want you to write code for a clustering problem. Dataset: customers.csv

Tasks To Be Performed:

1. K-Means Clustering:

- Load customer data
- Check the number of cells in each column with null values
- Create a scatter plot with Age as X and Spending Score as Y
- Find out the best number for clusters between 1 and 10 (inclusive) using the elbow method
- Draw a scatter plot displaying data points colored on the basis of clusters

In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
from sklearn.cluster import KMeans
import warnings
warnings.filterwarnings('ignore')
```

In [2]:
```
df = pd.read_csv(r'csv files/customers-1.csv')
df
```

Out[2]:

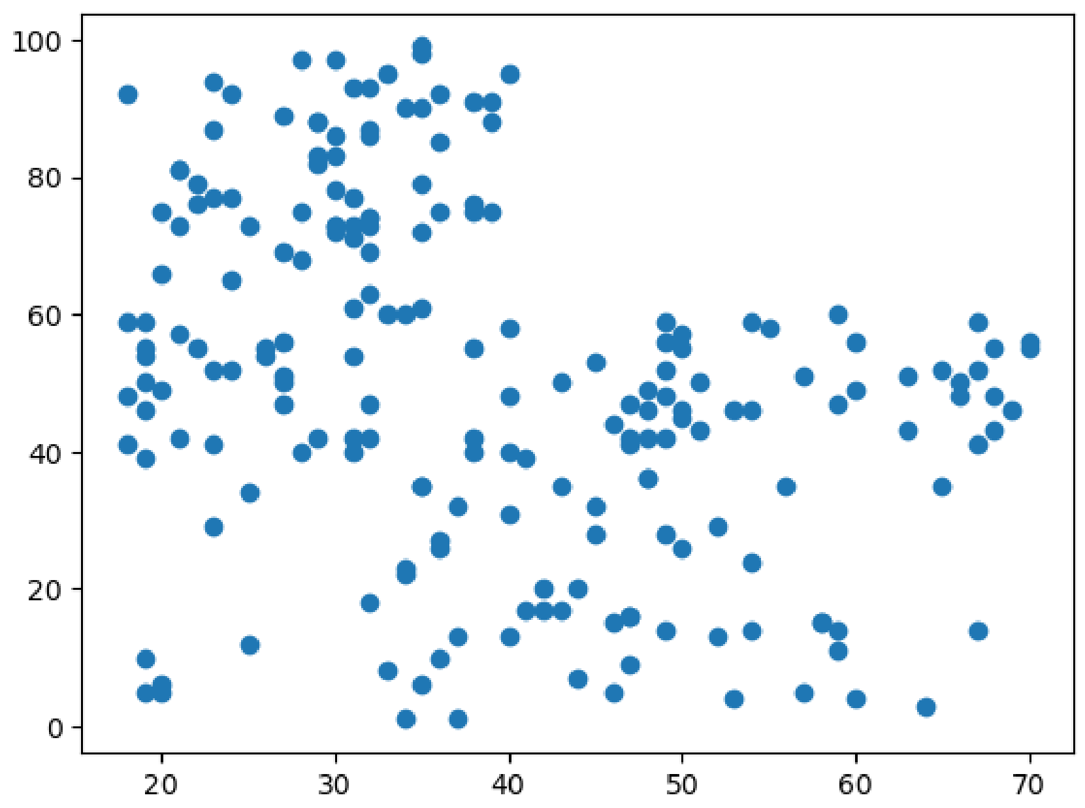
	CustomerID	Gender	Age	Annual Income (k$)	Spending Score (1-100)
0	1	Male	19	15	39
1	2	Male	21	15	81
2	3	Female	20	16	6
3	4	Female	23	16	77
4	5	Female	31	17	40
...	...	...	...	...	...
195	196	Female	35	120	79
196	197	Female	45	126	28
197	198	Male	32	126	74
198	199	Male	32	137	18
199	200	Male	30	137	83

200 rows × 5 columns

In [3]:
```
df.isna().sum()
```

Out[3]:
```
CustomerID                0
Gender                    0
Age                       0
Annual Income (k$)        0
Spending Score (1-100)    0
dtype: int64
```

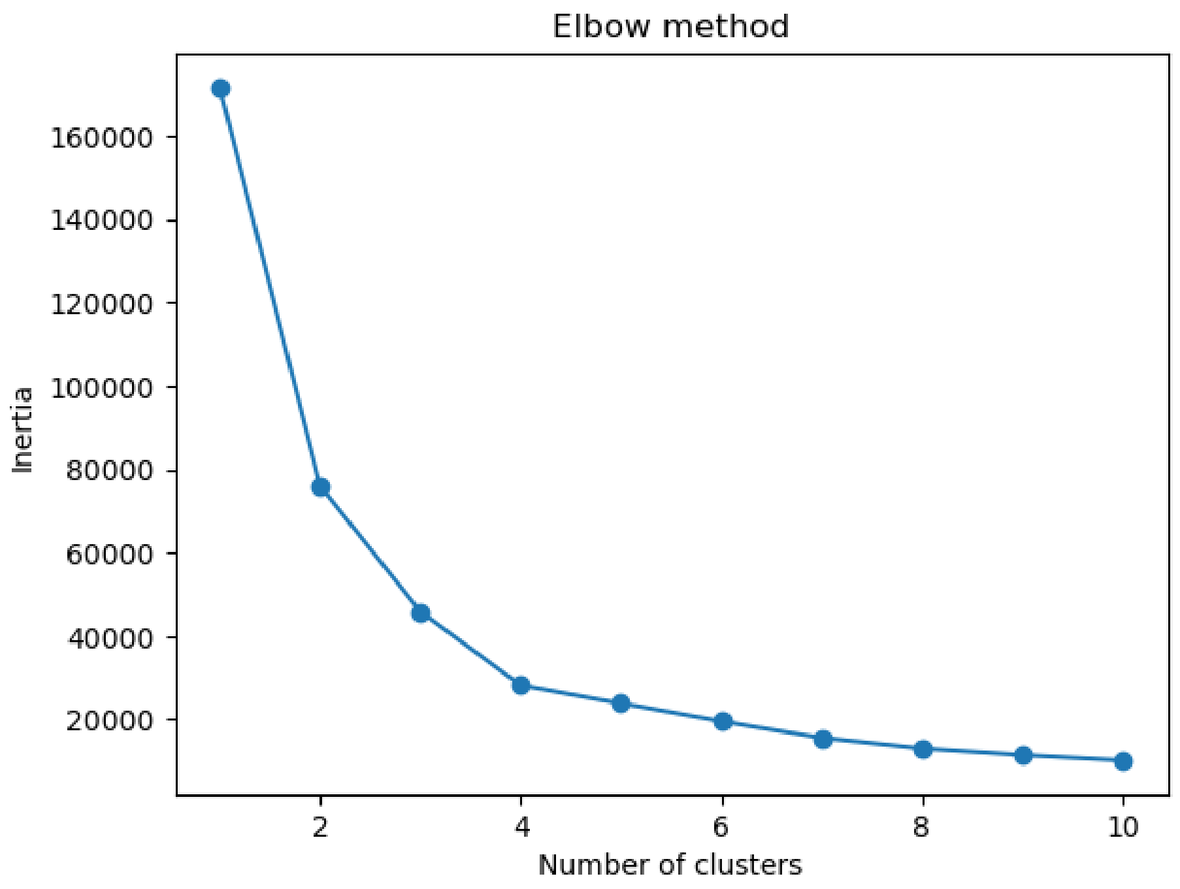
In [4]:
```
plt.scatter(df['Age'], df['Spending Score (1-100)'])
plt.show()
```



In [5]:
```
f1 = df['Age'].values
f2 = df['Spending Score (1-100)'].values
X = np.array(list(zip(f1, f2)))
```

In [6]:
```
inertias = []
for i in range(1,11):
    kmeans = KMeans(n_clusters=i)
    kmeans.fit(X)
    inertias.append(kmeans.inertia_)

plt.plot(range(1,11), inertias, marker='o')
plt.title('Elbow method')
plt.xlabel('Number of clusters')
plt.ylabel('Inertia')
plt.show()
```



In [7]:
```
#Model
k = 4 #No. of cluster
kmeans = KMeans(n_clusters=k)
kmeans.fit(X)
```

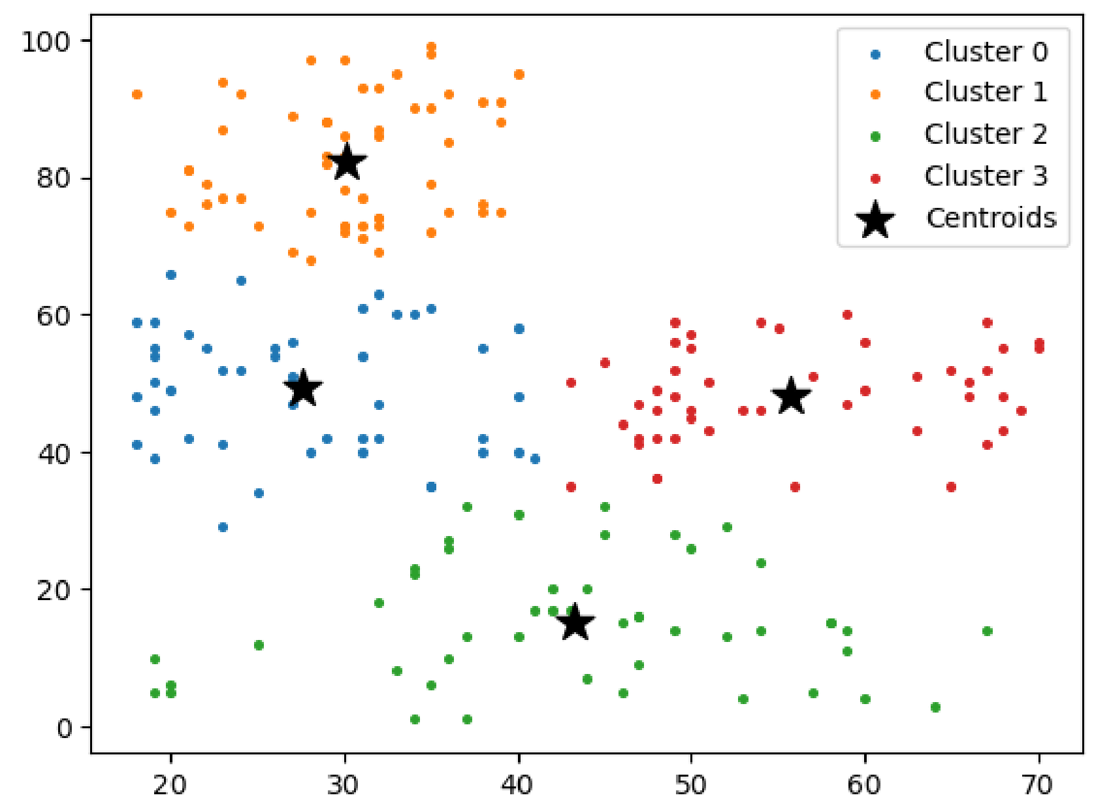
Out[7]:
```
▾ KMeans
KMeans(n_clusters=4)
```

In [8]:
```
labels = kmeans.predict(X)
centroids = kmeans.cluster_centers_
print(centroids)
```

```
[[27.61702128 49.14893617]
 [30.1754386  82.35087719]
 [43.29166667 15.02083333]
 [55.70833333 48.22916667]]
```

In [9]:
```
#Scatter plot
for i in range(k):
    plt.scatter(f1[labels == i], f2[labels == i], s=7, label=f'Cluster {i}') # Scatter plot for each cluster

plt.scatter(centroids[:, 0], centroids[:, 1], marker='*', c='black', s=200, label='Centroids') # Centroids
plt.legend()
plt.show()
```


100
80
60
40
20
0
20
30
40
50
60
70
Cluster 0
Cluster 1
Cluster 2
Cluster 3
Centroids

In [ ]: