NAVNEEL MONDAL

DATE: 05-10-2023

AI ML ASSIGNMENT-5

Reg No: 21BCE2654

1. Download the dataset: mailcustomersegmentaion.csv is downloaded.

2. Load The dataset:

```
# import required libraries

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

3. Understanding the Data

```
8
9    df = pd.read_csv('/content/Mall_Customers.csv')
10    df.head()
11
```

	CustomerID	Gender	Δαρ	Annual Income (k\$)	Spending Score (1-100)
	Customenb	Centuer	Age	Aimaai income (k¢)	opending ocore (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

```
11
12 df.shape
```

```
(200, 5)
```

```
14 df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 5 columns):
   Column
                            Non-Null Count Dtype
    CustomerID
                                            int64
0
                            200 non-null
    Gender
                                            object
1
                            200 non-null
 2
    Age
                            200 non-null
                                            int64
3
    Annual Income (k$)
                            200 non-null
                                            int64
     Spending Score (1-100) 200 non-null
                                            int64
dtypes: int64(4), object(1)
memory usage: 7.9+ KB
```

```
15
16 df.isnull().sum()
17
```

CustomerID	0
Gender	0
Age	0
Annual Income (k\$)	0
Spending Score (1-100)	0
dtype: int64	

```
17
18 df.describe()
```

	CustomerID	Age	Annual Income (k\$)	Spending Score (1-100)
count	200.000000	200.000000	200.000000	200.000000
mean	100.500000	38.850000	60.560000	50.200000
std	57.879185	13.969007	26.264721	25.823522
min	1.000000	18.000000	15.000000	1.000000
25%	50.750000	28.750000	41.500000	34.750000
50%	100.500000	36.000000	61.500000	50.000000
75%	150.250000	49.000000	78.000000	73.000000
max	200.000000	70.000000	137.000000	99.000000

4. Data preprocessing:

```
19
20 from sklearn import cluster
21
22 ew_df = df.iloc[:,-2:]
23 new_df.head()
24
```

	Annual Income (k\$)	Spending Score (1-100)
0	15	39
1	15	81
2	16	6
3	16	77
4	17	40

```
25 error=[]
26 for i in range(1,11):
27 kmeans = cluster.KMeans(n_clusters=i,init = 'k-means++',random_state=4)
28 kmeans.fit(new_df)
29 error.append(kmeans.inertia_)
30
```

/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will chang e from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning warnings.warn(

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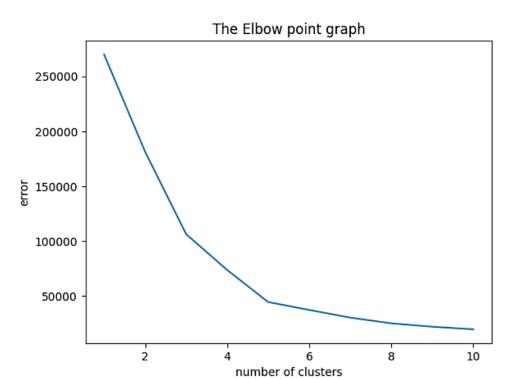
```
plt.plot(range(1,11),error)

plt.title('The Elbow point graph')

plt.xlabel('number of clusters')

plt.ylabel('error')

plt.show()
```



5. Machine Learning approach with K-Means Clustering Algorithm:

```
36
37     km_model = cluster.KMeans(n_clusters=5,init = 'k-means++',random_state=0)
38     km_model.fit(new_df)
39
```

KMeans(n clusters=5, random state=0)

/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will chang e from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning warnings.warn(

```
39
40     pred = km_model.predict(new_df)
41     pred
42

array([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, 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, 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, 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, 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, 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, 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, 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, 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, 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, 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, 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, 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, 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, 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, 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,
```

```
# Testing the model with random observation

44

45 km_model.predict([[60,50]])
```

array([1], dtype=int32)

/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439: UserWarn ing: X does not have valid feature names, but KMeans was fitted with feature names

warnings.warn(

```
46
47 km_model.predict([[15,1]])
48
```

array([4], dtype=int32)

/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439: UserWarn ing: X does not have valid feature names, but KMeans was fitted with feature names

warnings.warn(

```
48
49 km_model.predict([[41,34]])
50
```

array([4], dtype=int32

/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439: UserWarn ing: X does not have valid feature names, but KMeans was fitted with feature names

array([2], dtype=int32

/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439: UserWarn ing: X does not have valid feature names, but KMeans was fitted with feature names

warnings.warn(

```
52
53 km_model.predict([[78,73]])
54
55
```

array([2], dtype=int32

```
/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439: UserWarn ing: X does not have valid feature names, but KMeans was fitted with feature names warnings.warn(
```