Course: Laboratory Practice III

Course Code: 410246

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Class: BE - A

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Title: Implement K-Means clustering/ hierarchical clustering on sales_data_sample.csv dataset. Determine the number of clusters using the elbow method. Dataset link : https://www.kaggle.com/datasets/kyanyoga/sample-sales-data

```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import sklearn
```

```
dataset = pd.read_csv('/content/sales_data_sample.csv',sep=",", encoding='Latin-1')
```

```
dataset.head()
```

	ORDERNUMBER	QUANTITYORDERED	PRICEEACH	ORDERLINENUMBER	SALES	ORDERDATE	STA
0	10107	30	95.70	2	2871.00	2/24/2003 0:00	Ship
1	10121	34	81.35	5	2765.90	5/7/2003 0:00	Ship
2	10134	41	94.74	2	3884.34	7/1/2003 0:00	Ship
3	10145	45	83.26	6	3746.70	8/25/2003 0:00	Ship
4	10159	49	100.00	14	5205.27	10/10/2003 0:00	Ship

5 rows × 25 columns

```
dataset.tail()
```

	ORDERNUMBER	QUANTITYORDERED	PRICEEACH	ORDERLINENUMBER	SALES	ORDERDATE
2818	10350	20	100.00	15	2244.40	12/2/2004 0:00
2819	10373	29	100.00	1	3978.51	1/31/2005 0:00
2820	10386	43	100.00	4	5417.57	3/1/2005 0:00
2821	10397	34	62.24	1	2116.16	3/28/2005 0:00
2822	10414	47	65.52	9	3079.44	5/6/2005 0:00

5 rows × 25 columns

```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2823 entries, 0 to 2822
Data columns (total 25 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   ORDERNUMBER       2823 non-null   int64  
 1   QUANTITYORDERED   2823 non-null   int64  
 2   PRICEEACH         2823 non-null   float64
 3   ORDERLINENUMBER   2823 non-null   int64  
 4   SALES             2823 non-null   float64
 5   ORDERDATE         2823 non-null   object 
 6   STATUS            2823 non-null   object 
 7   QTR_ID            2823 non-null   int64  
 8   MONTH_ID          2823 non-null   int64  
 9   YEAR_ID           2823 non-null   int64  
 10  PRODUCTLINE       2823 non-null   object 
 11  MSRP              2823 non-null   int64  
 12  PRODUCTCODE       2823 non-null   object 
 13  CUSTOMERNAME      2823 non-null   object 
 14  PHONE             2823 non-null   object 
 15  ADDRESSLINE1      2823 non-null   object 
 16  ADDRESSLINE2      302 non-null    object 
 17  CITY              2823 non-null   object 
 18  STATE             1337 non-null   object 
 19  POSTALCODE        2747 non-null   object 
 20  COUNTRY           2823 non-null   object 
 21  TERRITORY         1749 non-null   object 
 22  CONTACTLASTNAME   2823 non-null   object 
 23  CONTACTFIRSTNAME  2823 non-null   object 
 24  DEALSIZE          2823 non-null   object 
dtypes: float64(2), int64(7), object(16)
memory usage: 551.5+ KB
```

```
dataset.shape
```

```
(2823, 25)
```

```
dataset.isnull().sum()
```

```
ORDERNUMBER           0
QUANTITYORDERED       0
PRICEEACH             0
ORDERLINENUMBER       0
SALES                 0
ORDERDATE             0
STATUS                0
QTR_ID                0
MONTH_ID              0
YEAR_ID               0
PRODUCTLINE           0
MSRP                  0
PRODUCTCODE           0
CUSTOMERNAME          0
PHONE                 0
ADDRESSLINE1          0
ADDRESSLINE2       2521
CITY                  0
STATE              1486
POSTALCODE           76
COUNTRY               0
TERRITORY          1074
CONTACTLASTNAME       0
CONTACTFIRSTNAME      0
DEALSIZE              0
dtype: int64
```

```
X = dataset.iloc[:, [1, 2]].values
```

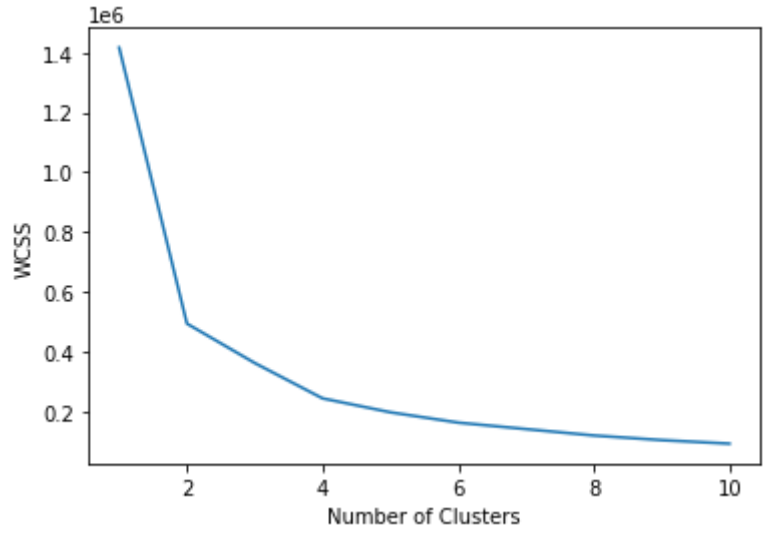
```
X
```

```
array([[ 30.  ,  95.7 ],
       [ 34.  ,  81.35],
       [ 41.  ,  94.74],
       ...,
       [ 43.  , 100.  ],
       [ 34.  ,  62.24],
       [ 47.  ,  65.52]])
```

```
from sklearn.cluster import KMeans
```

```
wcss = []
for i in range(1, 11):
    kmeans = KMeans(n_clusters = i, init = 'k-means++', random_state = 42)
    kmeans.fit(X)
    wcss.append(kmeans.inertia_)
```

```
plt.plot(range(1,11), wcss)
plt.xlabel("Number of Clusters")
plt.ylabel("WCSS")
plt.show()
```




```
kmeans = KMeans(n_clusters = 5, init = "k-means++", random_state = 42)
y_kmeans = kmeans.fit_predict(X)
```

```
y_kmeans
```

```
array([3, 1, 0, ..., 0, 2, 1], dtype=int32)
```

```
plt.scatter(X[y_kmeans == 0, 0], X[y_kmeans == 0, 1], s = 60, c = 'red', label = 'Cluster1
plt.scatter(X[y_kmeans == 1, 0], X[y_kmeans == 1, 1], s = 60, c = 'blue', label = 'Cluster
plt.scatter(X[y_kmeans == 2, 0], X[y_kmeans == 2, 1], s = 60, c = 'green', label = 'Cluste
plt.scatter(X[y_kmeans == 3, 0], X[y_kmeans == 3, 1], s = 60, c = 'violet', label = 'Clust
plt.scatter(X[y_kmeans == 4, 0], X[y_kmeans == 4, 1], s = 60, c = 'yellow', label = 'Clust
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:, 1], s = 100, c = 'bl
plt.xlabel('Quantity Ordered')
plt.ylabel('Price Each')
plt.legend()

plt.show()
```