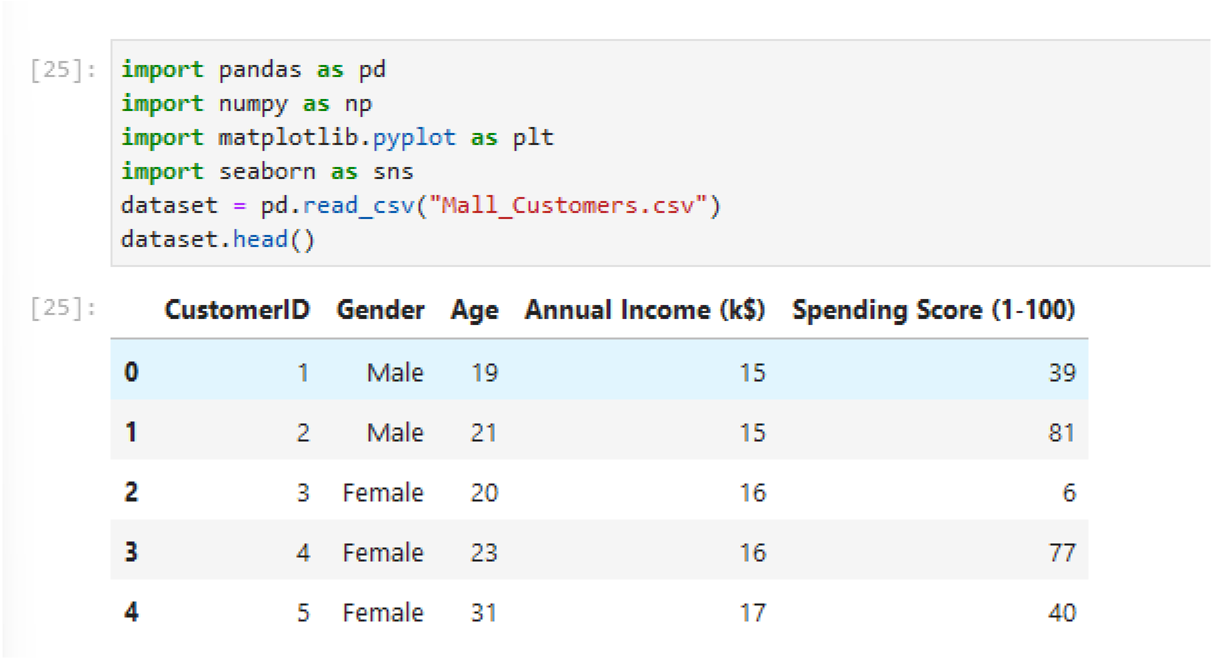
P12 Praktikum Data Mining dan Data Warehouse

2210511022

Miftah Rizky Aulia

A - S1 Informatika

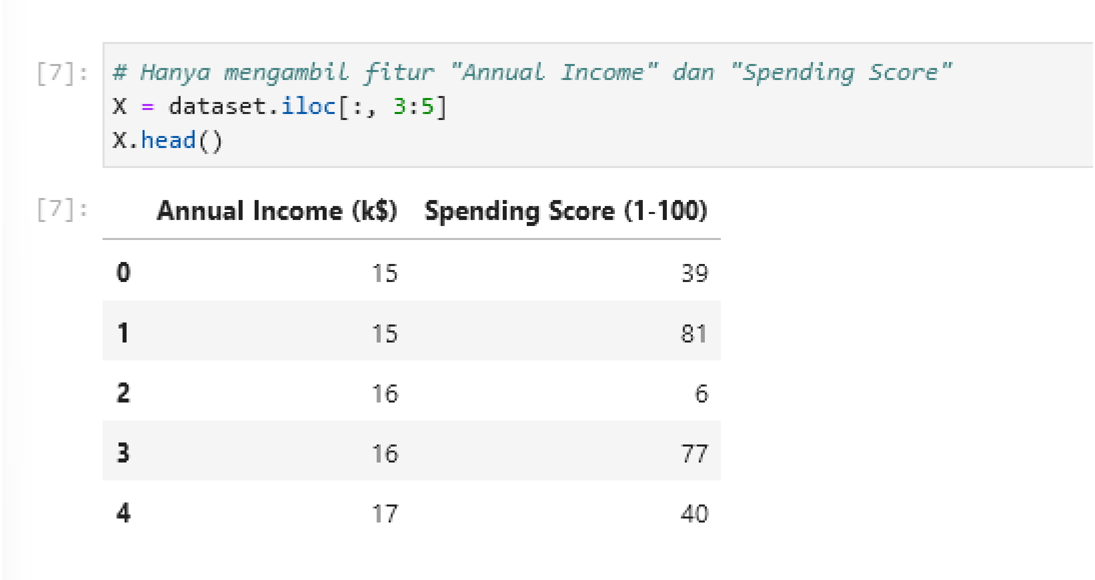


```
[25]: import pandas as pd
      import numpy as np
      import matplotlib.pyplot as plt
      import seaborn as sns
      dataset = pd.read_csv("Mall_Customers.csv")
      dataset.head()
```

[25]:

	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

Pilih fitur atau variable yang akan divisualisasikan, dipilih 2 yaitu “Annual Income” dan “Spending Score” agar hasil cluster nantinya dapat divisualisasikan pada bidang 2 dimensi.



```
[7]: # Hanya mengambil fitur "Annual Income" dan "Spending Score"
     X = dataset.iloc[:, 3:5]
     X.head()
```

[7]:

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

Data terdiri dari 200 baris atau terdapat 200 customer. Pada tahap sebelumnya sudah dilakukan reduksi, maka kolom sekarang hanya ada 2 yaitu “Annual Income” dan “Spending Score”.

```
[8]: X.shape
```

```
[8]: (200, 2)
```

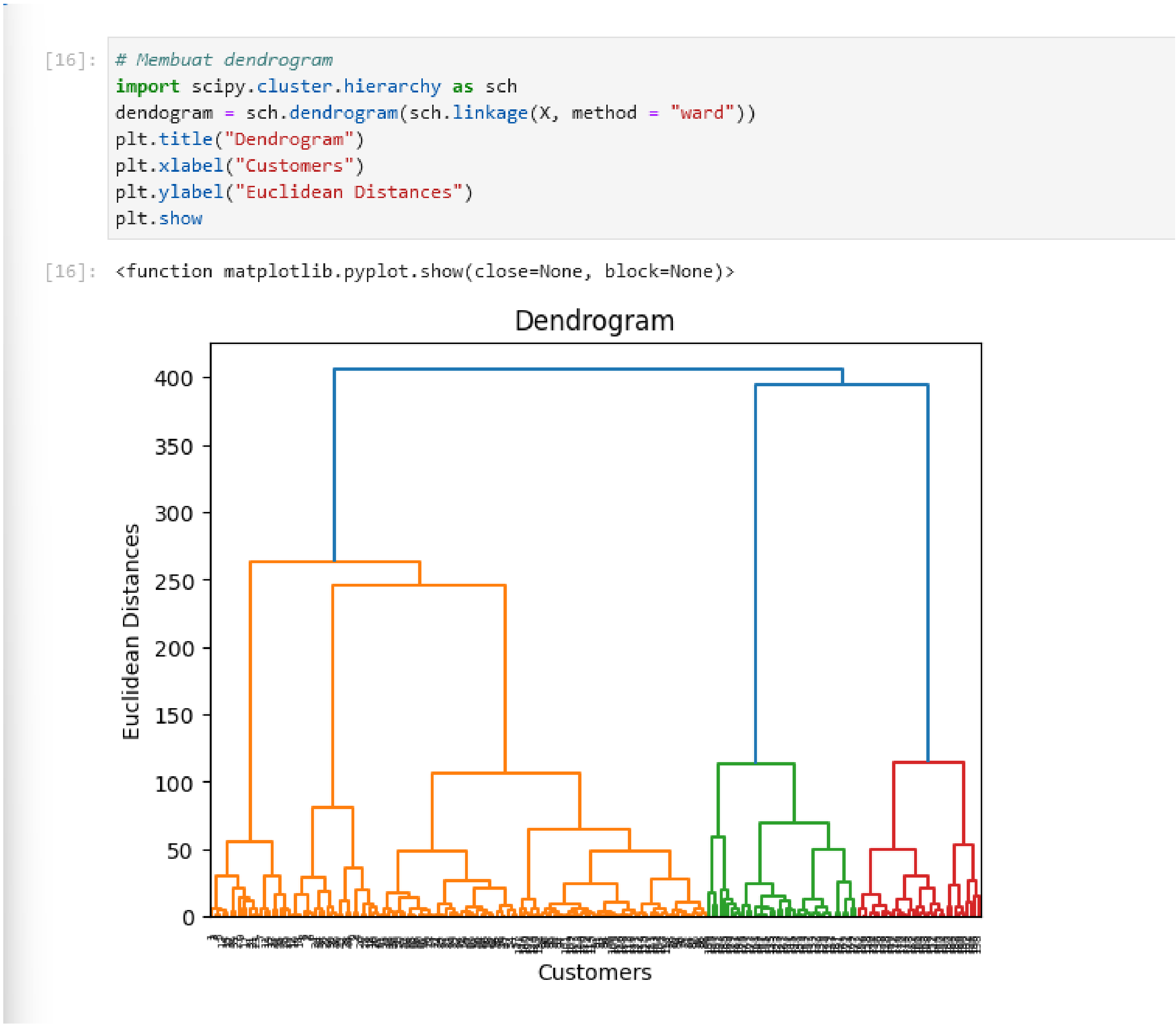
```
[61]: X.isnull().sum()
```

```
[61]: Annual Income (k$)        0
      Spending Score (1-100)    0
      dtype: int64
```

```
[60]: X.describe()
```

[60]:

	Annual Income (k$)	Spending Score (1-100)
count	200.000000	200.000000
mean	60.560000	50.200000
std	26.264721	25.823522
min	15.000000	1.000000
25%	41.500000	34.750000
50%	61.500000	50.000000
75%	78.000000	73.000000
max	137.000000	99.000000



```
[16]: # Membuat dendrogram
      import scipy.cluster.hierarchy as sch
      dendogram = sch.dendrogram(sch.linkage(X, method = "ward"))
      plt.title("Dendrogram")
      plt.xlabel("Customers")
      plt.ylabel("Euclidean Distances")
      plt.show
```

```
[16]: <function matplotlib.pyplot.show(close=None, block=None)>
```

```
[19]: from sklearn.cluster import AgglomerativeClustering
       #Menggunakan Cluster - 5
       ac = AgglomerativeClustering(n_clusters = 5, affinity = "euclidean", linkage = "ward")
       ac.fit(X)
```

```
/lib/python3.11/site-packages/sklearn/cluster/_agglomerative.py:1006: FutureWarning: Attribute `affini
version 1.2 and will be removed in 1.4. Use `metric` instead
  warnings.warn(
```

```
[19]: ▾               AgglomerativeClustering
       AgglomerativeClustering(affinity='euclidean', n_clusters=5)
```

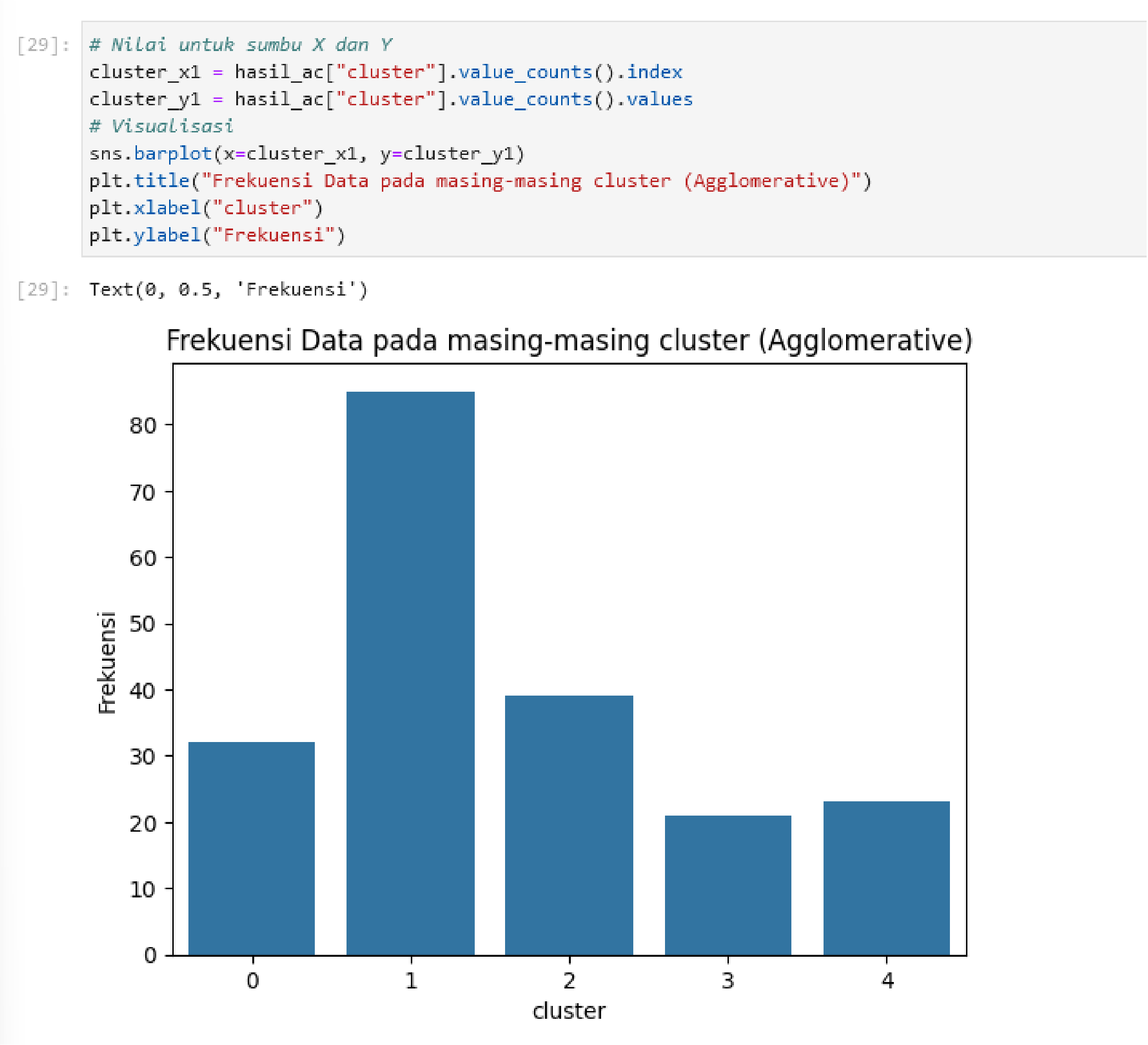
```
[20]: ac.labels_
```

```
[20]: 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, 1,
              4, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
              1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
              1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
              1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 1, 2, 1, 2, 0, 2, 0, 2,
              1, 2, 0, 2, 0, 2, 0, 2, 0, 2, 1, 2, 0, 2, 1, 2, 0, 2, 0, 2, 0, 2,
              0, 2, 0, 2, 0, 2, 1, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2,
              0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2,
              0, 2], dtype=int32)
```

```
[58]: hasil_ac = X.copy()
       hasil_ac2 = dataset.copy().iloc[:,0]
       hasil_ac["cluster"] = ac.labels_
       hasil_ac2["CustomerID"] = ac.labels_

       hasil_ac2.head()
```

```
[58]: 0    1
       1    2
       2    3
       3    4
       4    5
       Name: CustomerID, dtype: object
```

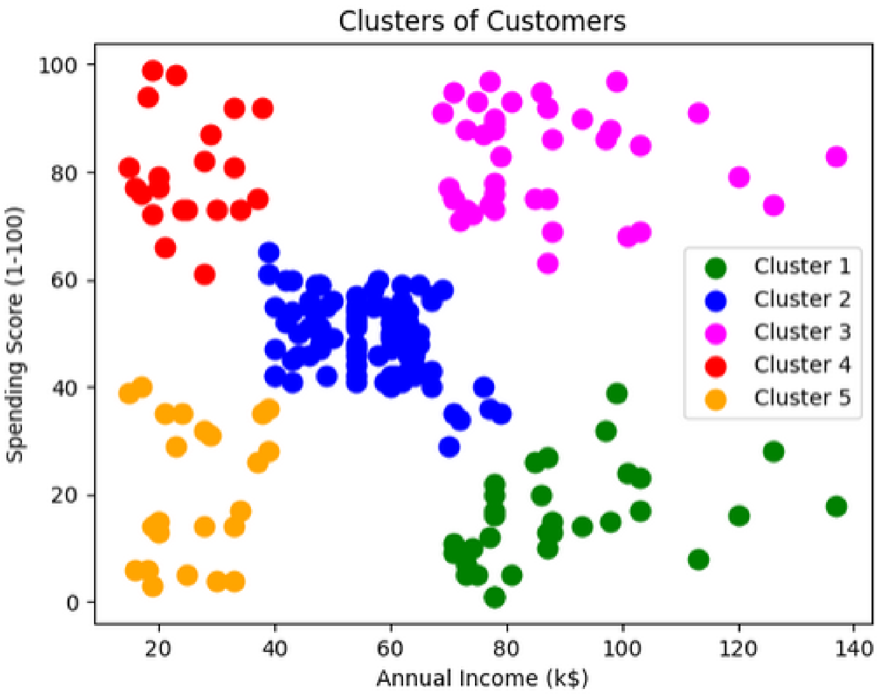


```
[29]: # Nilai untuk sumbu X dan Y
      cluster_x1 = hasil_ac["cluster"].value_counts().index
      cluster_y1 = hasil_ac["cluster"].value_counts().values
      # Visualisasi
      sns.barplot(x=cluster_x1, y=cluster_y1)
      plt.title("Frekuensi Data pada masing-masing cluster (Agglomerative)")
      plt.xlabel("cluster")
      plt.ylabel("Frekuensi")
```

```
[29]: Text(0, 0.5, 'Frekuensi')
```

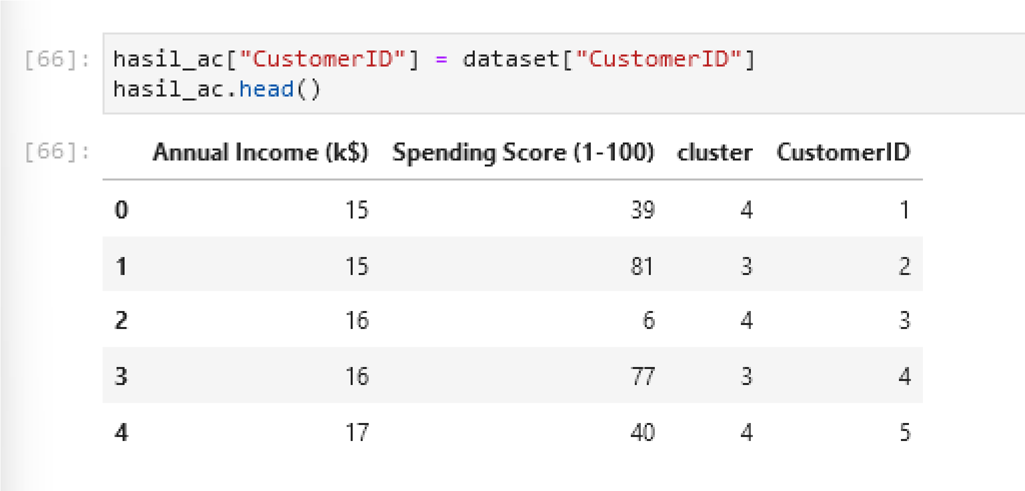
[30]:
```
# Nilai fitur/variabel dari masing-masing cluster
ann_ac0 = hasil_ac[hasil_ac["cluster"] == 0].iloc[:, 0]
spend_ac0 = hasil_ac[hasil_ac["cluster"] == 0].iloc[:, 1]
ann_ac1 = hasil_ac[hasil_ac["cluster"] == 1].iloc[:, 0]
spend_ac1 = hasil_ac[hasil_ac["cluster"] == 1].iloc[:, 1]
ann_ac2 = hasil_ac[hasil_ac["cluster"] == 2].iloc[:, 0]
spend_ac2 = hasil_ac[hasil_ac["cluster"] == 2].iloc[:, 1]
ann_ac3 = hasil_ac[hasil_ac["cluster"] == 3].iloc[:, 0]
spend_ac3 = hasil_ac[hasil_ac["cluster"] == 3].iloc[:, 1]
ann_ac4 = hasil_ac[hasil_ac["cluster"] == 4].iloc[:, 0]
spend_ac4 = hasil_ac[hasil_ac["cluster"] == 4].iloc[:, 1]
```

[32]:
```
# VISUALISASI HASIL CLUSTERING (AGGLOMERATIVE)
plt.scatter(ann_ac0, spend_ac0, s = 80, c = "green", label = "Cluster 1")
plt.scatter(ann_ac1, spend_ac1, s = 80, c = "blue", label = "Cluster 2")
plt.scatter(ann_ac2, spend_ac2, s = 80, c = "magenta", label = "Cluster 3")
plt.scatter(ann_ac3, spend_ac3, s = 80, c = "red", label = "Cluster 4")
plt.scatter(ann_ac4, spend_ac4, s = 80, c = "orange", label = "Cluster 5")
plt.title("Clusters of Customers")
plt.xlabel("Annual Income (k$)")
plt.ylabel("Spending Score (1-100)")
plt.legend()
plt.show()
```



Task 1

1. Dari hasil pada langkah 10, masukan kembali customer id dalam hasil sehingga di dapatkan hasil sebagai berikut :

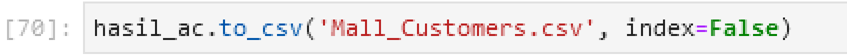


```
[66]: hasil_ac["CustomerID"] = dataset["CustomerID"]
      hasil_ac.head()
```

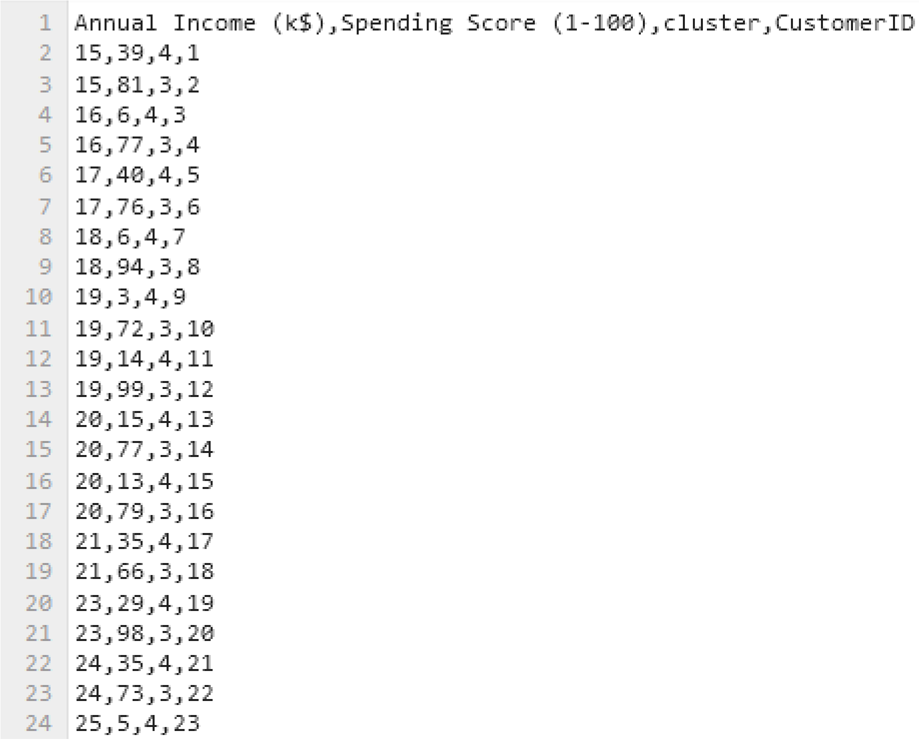
[66]:

	Annual Income (k$)	Spending Score (1-100)	cluster	CustomerID
0	15	39	4	1
1	15	81	3	2
2	16	6	4	3
3	16	77	3	4
4	17	40	4	5

2. 2. Menggunakan perintah pada python lakukan Export hasil clustering dalam format csv



```
[70]: hasil_ac.to_csv('Mall_Customers.csv', index=False)
```



```
Annual Income (k$),Spending Score (1-100),cluster,CustomerID
15,39,4,1
15,81,3,2
16,6,4,3
16,77,3,4
17,40,4,5
17,76,3,6
18,6,4,7
18,94,3,8
19,3,4,9
19,72,3,10
19,14,4,11
19,99,3,12
20,15,4,13
20,77,3,14
20,13,4,15
20,79,3,16
21,35,4,17
21,66,3,18
23,29,4,19
23,98,3,20
24,35,4,21
24,73,3,22
25,5,4,23
```