Tugas Materi 9

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3 – D4 IT - B

Code 1

```
In [2]: dataset = pd.read_csv('transaction.csv')
        dataset
```

Out[2]:

	InvoiceNo	StockCode	Qty	InvoiceDate	CustomerID	Country
0	537626	22725	830	12/7/2010 14:57	12347	Iceland
1	537626	22729	948	12/7/2010 14:57	12347	Iceland
2	537626	22195	695	12/7/2010 14:57	12347	Iceland
3	542237	22725	636	1/26/2011 14:30	12347	Iceland
4	542237	22729	536	1/26/2011 14:30	12347	Iceland
...	...	...	...	...	...	...
10541	543911	21700	455	2/14/2011 12:46	17829	United Arab Emirates
10542	543911	22111	578	2/14/2011 12:46	17829	United Arab Emirates
10543	543911	22112	163	2/14/2011 12:46	17829	United Arab Emirates
10544	564428	23296	545	8/25/2011 11:27	17844	Canada
10545	564428	23294	643	8/25/2011 11:27	17844	Canada

10546 rows × 6 columns

Membaca data csv transaction

Code 2

```
In [3]: country = pd.DataFrame(dataset['Country'].value_counts())
        country
```

Out[3]:

	Country
Germany	2269
France	2109
EIRE	1620
Netherlands	634
Spain	539
Belgium	486
Switzerland	434
Portugal	367
Australia	356
Norway	239
Italy	190
Channel Islands	184
Finland	152

Menampilkan total kemunculan tiap2 negara

Code 3

In [4]:
```
temp = dataset.drop_duplicates(subset='InvoiceNo', keep='first')
temp
```

Out[4]:

	InvoiceNo	StockCode	Qty	InvoiceDate	CustomerID	Country
0	537626	22725	830	12/7/2010 14:57	12347	Iceland
3	542237	22725	636	1/26/2011 14:30	12347	Iceland
8	549222	23076	383	4/7/2011 10:43	12347	Iceland
14	556201	23171	135	6/9/2011 13:01	12347	Iceland
19	562032	23308	490	8/2/2011 8:48	12347	Iceland
...	...	...	...	...	...	...
10515	559557	22398	948	7/11/2011 10:33	17444	Canada
10529	545579	20723	822	3/4/2011 8:10	17508	Greece
10531	555931	21733	580	6/8/2011 8:31	17828	Malta
10535	543911	21485	469	2/14/2011 12:46	17829	United Arab Emirates
10544	564428	23296	545	8/25/2011 11:27	17844	Canada

Menghapus invoice no yang kembar karena 1 transaksi = 1 invoice

Code 4

```
In [5]: transaction = pd.DataFrame(temp['Country'].value_counts())
        transaction
```

Out[5]:

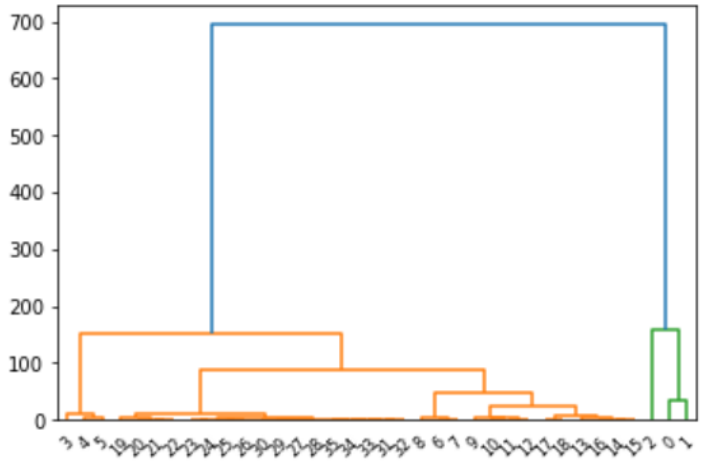
	Country
Germany	377
France	344
EIRE	224
Belgium	84
Netherlands	76
Spain	72
Australia	44
Portugal	43
Switzerland	41
Italy	31
Norway	28
Finland	26
Sweden	26
Channel Islands	21

Menampilkan total transaksi tiap2 negara

Code 5

```
In [6]: from sklearn.cluster import AgglomerativeClustering
        import scipy.cluster.hierarchy as sch
```

```
In [7]: dendrogram = sch.dendrogram(sch.linkage(transaction, method='ward'))
        model = AgglomerativeClustering(n_clusters=3, affinity='euclidean', linkage='average')
        clusters = model.fit_predict(transaction)
```




```
In [8]: clusters

Out[8]: array([1, 1, 2, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
               0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0], dtype=int64)
```

Clustering dengan menggunakan average linkage dan menampilkan hirarkinya
Menggunakan library scipy

Code 6

```
In [9]: from sklearn.cluster import KMeans

In [10]: clustering = KMeans(n_clusters=3).fit(transaction)
         clusters=clustering.labels_
         clusters

Out[10]: array([1, 1, 1, 0, 0, 0, 0, 0, 0, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
                2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2])

In [11]: centroid = clustering.cluster_centers_
         centroid

Out[11]: array([[ 60.        ],
                [315.        ],
                [  9.62962963]])
```

Karena pada average linkage tidak terdapat function cluster center
Kita ulang clustering menggunakan k-means dan menampilkan centroidnya

Code 7

In [12]:
```
sortedIndex = np.argsort(centroid.sum(axis=1))
zeroArray = np.zeros_like(sortedIndex)
zeroArray[sortedIndex] = np.arange(3)

sortedCentroid =centroid[zeroArray]
sortedCentroid
```

Out[12]:
```
array([[  9.62962963],
       [ 60.        ],
       [315.        ]])
```

In [13]:
```
sortedLabel = zeroArray[clusters]
sortedLabel
```

Out[13]:
```
array([2, 2, 2, 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0], dtype=int64)
```

Mengurutkan label dan centroid secara ascending

Code 8

In [14]:
```
label_2 = (sortedLabel == 2).nonzero()
countryHigh = transaction.index[label_2]
countryHigh
```

Out[14]:
```
Index(['Germany', 'France', 'EIRE'], dtype='object')
```

In [15]:
```
label_1 = (sortedLabel == 1).nonzero()
countryMid = transaction.index[label_1]
countryMid
```

Out[15]:
```
Index(['Belgium', 'Netherlands', 'Spain', 'Australia', 'Portugal',
       'Switzerland'],
      dtype='object')
```

In [16]:
```
label_0 = (sortedLabel == 0).nonzero()
countryLow = transaction.index[label_0]
countryLow
```

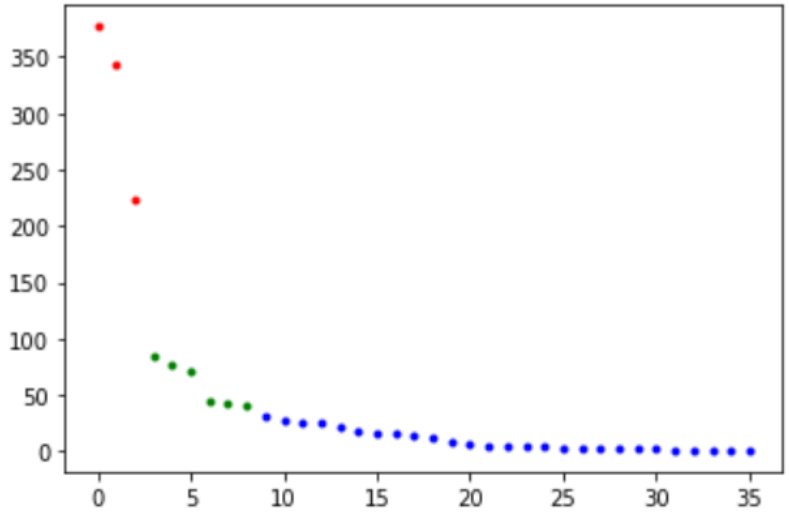
Out[16]:
```
Index(['Italy', 'Norway', 'Sweden', 'Finland', 'Channel Islands', 'Denmark',
       'Poland', 'Cyprus', 'Japan', 'Austria', 'Unspecified', 'Iceland',
       'Greece', 'USA', 'Israel', 'Singapore', 'Canada', 'European Community',
       'Lithuania', 'Malta', 'United Arab Emirates', 'Czech Republic', 'RSA',
       'Lebanon', 'Saudi Arabia', 'Brazil', 'Bahrain'],
      dtype='object')
```

Menampilkan transaksi tinggi, menengah, dan rendah

Code 9

In [17]:
```
import matplotlib.pyplot as plt
```

In [18]:
```
plt.plot(label_2, transaction.iloc[label_2].to_numpy().reshape((1, -1)), 'r.')
plt.plot(label_1, transaction.iloc[label_1].to_numpy().reshape((1, -1)), 'g.')
plt.plot(label_0, transaction.iloc[label_0].to_numpy().reshape((1, -1)), 'b.')
plt.show()
```



Menampilkan plot dengan x = urutan country dan y = transaksi