k-means-clustering

November 13, 2024

[2]:

```
# k means clustering

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

[3]:

```
data = pd.read_excel(r"C:\Users\lenovo\Downloads\Clustering_ex.xlsx.xlsx")
```

[4]:

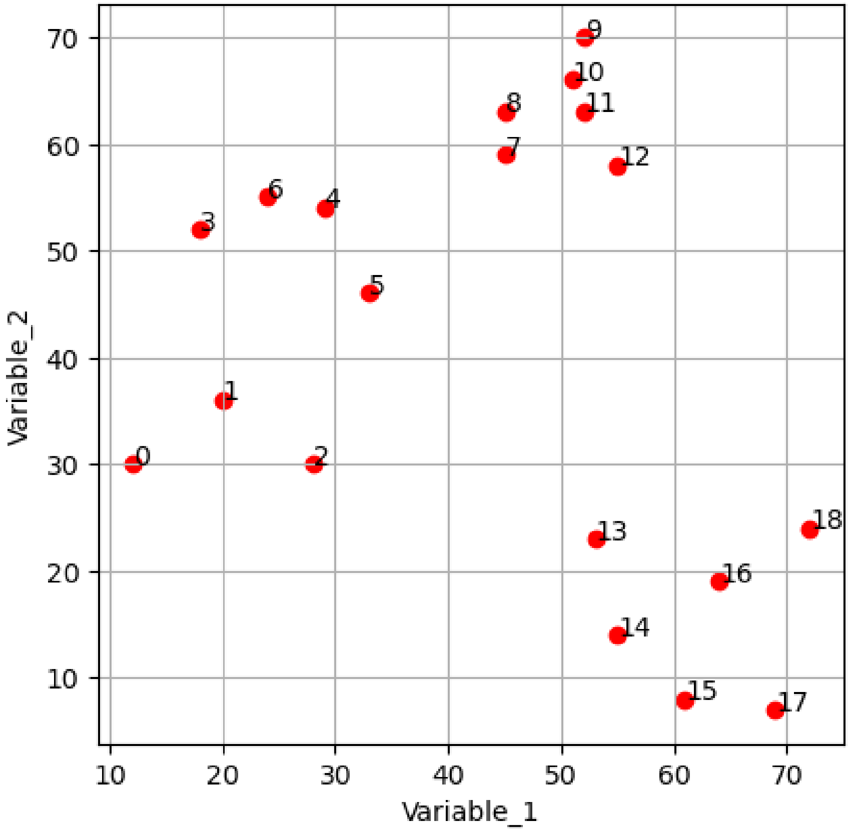
```
data
```

[4]:

```
    Variable_1  Variable_2
0           12          30
1           20          36
2           28          30
3           18          52
4           29          54
5           33          46
6           24          55
7           45          59
8           45          63
9           52          70
10          51          66
11          52          63
12          55          58
13          53          23
14          55          14
15          61           8
16          64          19
17          69           7
18          72          24
```

[5]:

```
fig = plt.figure(figsize = (5,5))
x = data["Variable_1"]
y = data["Variable_2"]
n = range(0,19)
plt.grid()
plt.scatter(x, y, marker = 'o', c = 'red' )
plt.xlabel('Variable_1')
plt.ylabel('Variable_2')
for i, txt in enumerate(n):
    plt.annotate(txt, (x[i], y[i]))
```



[51]:

```
from sklearn.cluster import KMeans
individual_clustering_score = []
for i in range(1,5):
    kmeans = KMeans(n_clusters = i)
    kmeans.fit(data)
    individual_clustering_score.append(kmeans.inertia_)
```

```
C:\Users\lenovo\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:870:
FutureWarning: The default value of `n_init` will change from 10 to 'auto' in
1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\lenovo\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:1382:
UserWarning: KMeans is known to have a memory leak on Windows with MKL, when
there are less chunks than available threads. You can avoid it by setting the
environment variable OMP_NUM_THREADS=1.
```

```
  warnings.warn(
C:\Users\lenovo\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:870:
FutureWarning: The default value of `n_init` will change from 10 to 'auto' in
1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\lenovo\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:1382:
UserWarning: KMeans is known to have a memory leak on Windows with MKL, when
there are less chunks than available threads. You can avoid it by setting the
environment variable OMP_NUM_THREADS=1.
  warnings.warn(
C:\Users\lenovo\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:870:
FutureWarning: The default value of `n_init` will change from 10 to 'auto' in
1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\lenovo\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:1382:
UserWarning: KMeans is known to have a memory leak on Windows with MKL, when
there are less chunks than available threads. You can avoid it by setting the
environment variable OMP_NUM_THREADS=1.
  warnings.warn(
C:\Users\lenovo\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:870:
FutureWarning: The default value of `n_init` will change from 10 to 'auto' in
1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\lenovo\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:1382:
UserWarning: KMeans is known to have a memory leak on Windows with MKL, when
there are less chunks than available threads. You can avoid it by setting the
environment variable OMP_NUM_THREADS=1.
  warnings.warn(
```

[61]:

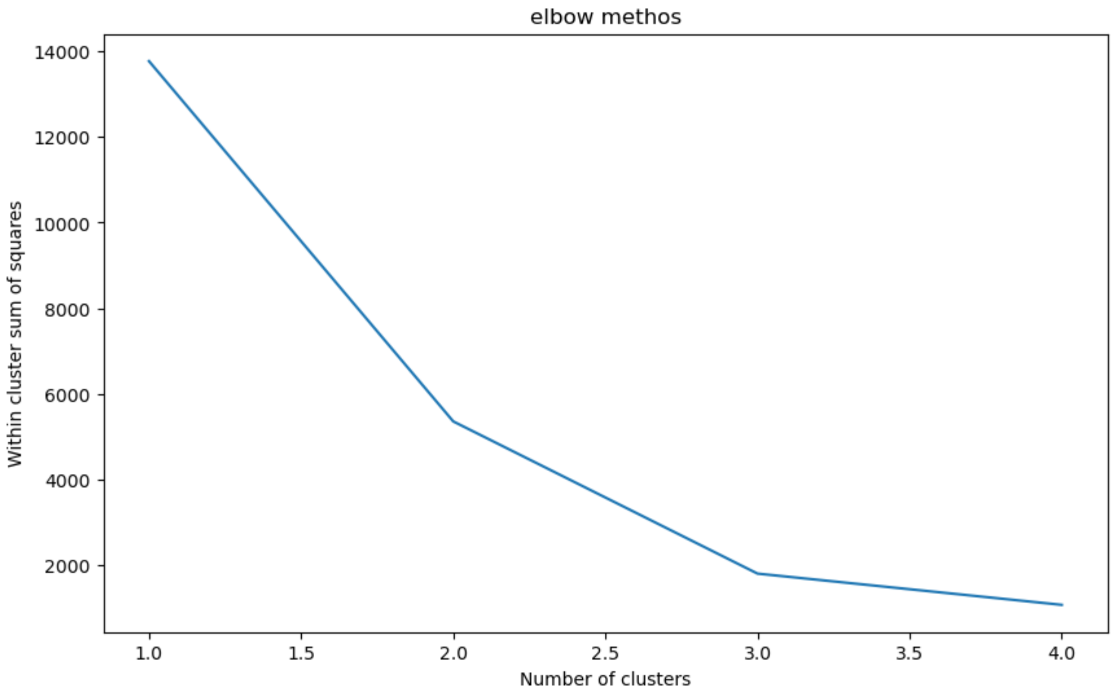
```
individual_clustering_score
```

[61]:

```
[13773.57894736842, 5352.166666666667, 1794.142857142857, 1063.75]
```

[62]:

```
plt.figure(figsize=(10,6))
plt.plot(range(1,5), individual_clustering_score)
plt.title("elbow methos")
plt.xlabel("Number of clusters")
plt.ylabel("Within cluster sum of squares")
plt.show()
```



```
[63]: labels = kmeans.predict(data)
```

```
[64]: labels
```

```
[64]: array([3, 3, 3, 0, 0, 0, 0, 2, 2, 2, 2, 2, 2, 1, 1, 1, 1, 1, 1])
```

```
[65]: kmeans.labels_
```

```
[65]: array([3, 3, 3, 0, 0, 0, 0, 2, 2, 2, 2, 2, 2, 1, 1, 1, 1, 1, 1])
```

```
[66]: centroids = kmeans.cluster_centers_
```

```
[60]: # cluster centers
      centroids
```

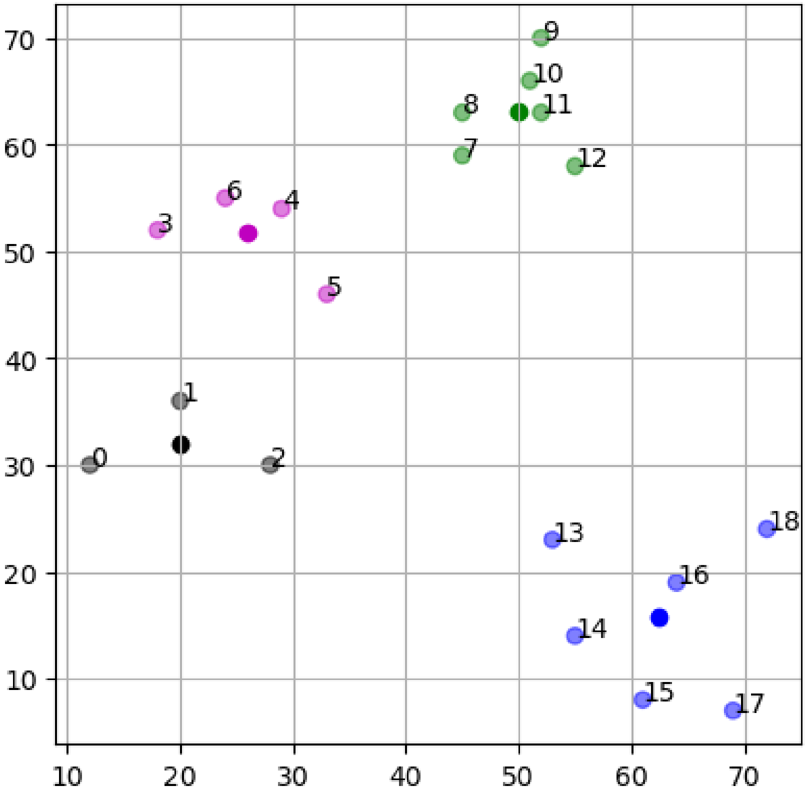
```
[60]: array([[26.        , 51.75      ],
             [62.33333333, 15.83333333],
             [50.        , 63.16666667],
             [20.        , 32.        ]])
```

```
[84]: fig = plt.figure(figsize = (5,5))
      # dictionary- map numbers to colors
      colmap = {1:'m', 2:'b', 3:'g', 4:'k'}
      # map will assign colors to labels
```

```
colors = map(lambda x: colmap[x+1], labels)

colors1=list(colors)
plt.scatter(x, y, color= colors1, alpha = 0.5 )
# plotting the centroids wrt color
for idx, centroid in enumerate(centroids):
    plt.scatter(*centroid, color = colmap[idx+1])
# labeling the points as 0,1,2,....18
for i, txt in enumerate(n):
    plt.annotate(txt, (x[i], y[i]))
plt.grid()
```

```
<map object at 0x0000025EB57B2080>
```



[16]:
```
from sklearn.metrics import silhouette_score
silhouette_score(data, labels)
```

[16]:
```
0.6179376814567372
```

[86]:
```
print(colors1)
```

```
['k', 'k', 'k', 'm', 'm', 'm', 'm', 'g', 'g', 'g', 'g', 'g', 'g', 'b', 'b', 'b',
'b', 'b', 'b']
```

```
[ ]:
```