Kmeans

September 10, 2024

[1]:
```
from sklearn.datasets import load_iris
from sklearn.cluster import KMeans
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
```

[2]:
```
iris = load_iris()
iris_df = pd.DataFrame(data = iris.data,columns = iris.feature_names)
iris_df['target'] = iris.target
iris_df.head()
```

[2]:
```
   sepal length (cm)  sepal width (cm)  petal length (cm)  petal width (cm)  \
0                5.1               3.5                1.4               0.2
1                4.9               3.0                1.4               0.2
2                4.7               3.2                1.3               0.2
3                4.6               3.1                1.5               0.2
4                5.0               3.6                1.4               0.2

   target
0       0
1       0
2       0
3       0
4       0
```

[3]:
```
kmeans = KMeans(n_clusters=3, init='k-means++', max_iter = 300, random_state =␣
 ↪0)
kmeans.fit(iris_df)
print(kmeans.labels_)
```

```
[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 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 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 2 2 2 2 2 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 2 2 2 2 2 2 2 2 2 2 2 2 2 2
 2 2]
```

[4]:
```
iris_df['cluster'] = kmeans.labels_
iris_df.groupby(['target','cluster']).agg({'sepal length (cm)':'count'})
```

```
[4]:                 sepal length (cm)
     target cluster
     0      1                       50
     1      0                       49
            2                        1
     2      0                        1
            2                       49
```

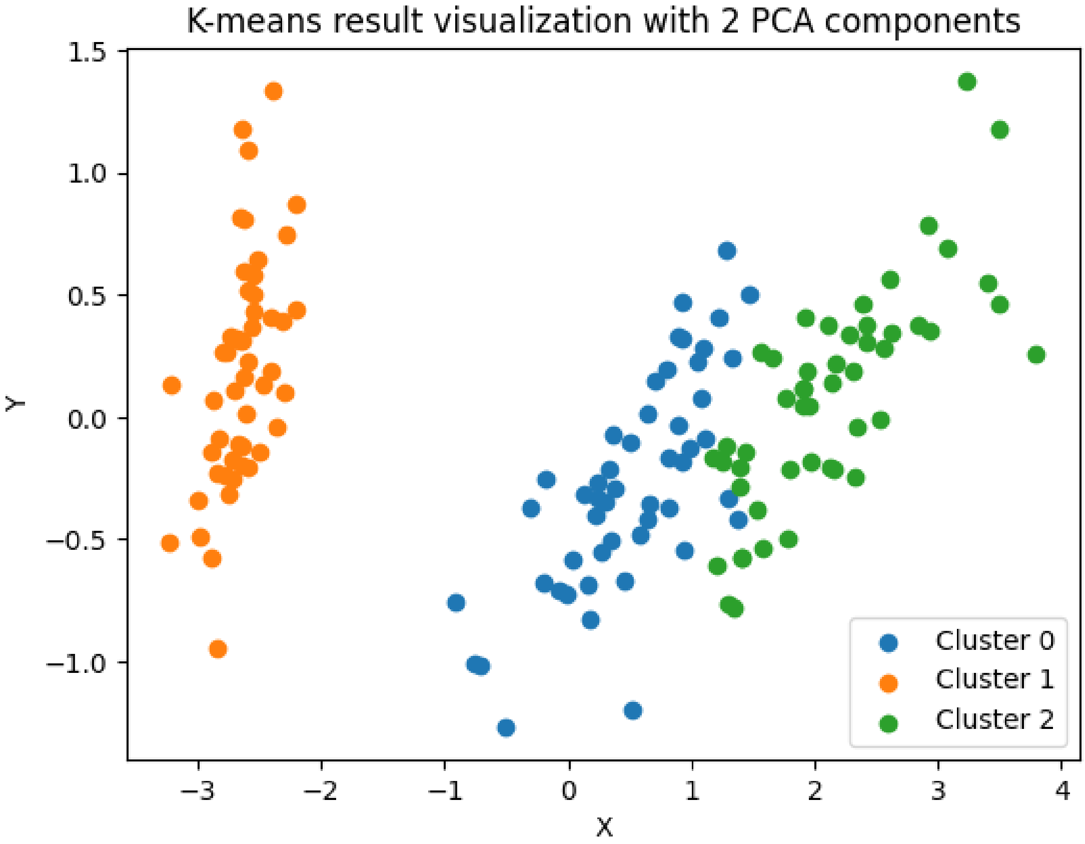
```
[5]: from sklearn.decomposition import PCA
     pca = PCA(2)
     pca_res = pca.fit_transform(iris.data)
     iris_df['X'] = pca_res[:, 0]
     iris_df['Y'] = pca_res[:, 1]
     iris_df.head()
```

```
[5]:    sepal length (cm)  sepal width (cm)  petal length (cm)  petal width (cm)  \
     0                5.1               3.5                1.4               0.2
     1                4.9               3.0                1.4               0.2
     2                4.7               3.2                1.3               0.2
     3                4.6               3.1                1.5               0.2
     4                5.0               3.6                1.4               0.2

        target  cluster         X         Y
     0       0        1 -2.684126  0.319397
     1       0        1 -2.714142 -0.177001
     2       0        1 -2.888991 -0.144949
     3       0        1 -2.745343 -0.318299
     4       0        1 -2.728717  0.326755
```

```
[6]: cluster_0 = iris_df[iris_df['cluster'] == 0]
     cluster_1 = iris_df[iris_df['cluster'] == 1]
     cluster_2 = iris_df[iris_df['cluster'] == 2]

     plt.scatter(cluster_0['X'],cluster_0['Y'], label = 'Cluster 0')
     plt.scatter(cluster_1['X'],cluster_1['Y'], label = 'Cluster 1')
     plt.scatter(cluster_2['X'],cluster_2['Y'], label = 'Cluster 2')
     plt.legend()
     plt.title('K-means result visualization with 2 PCA components')
     plt.xlabel('X')
     plt.ylabel('Y')
     plt.show()
```


K-means result visualization with 2 PCA components
1.5
1.0
0.5
0.0
−0.5
−1.0
Y
−3
−2
−1
0
1
2
3
4
X
Cluster 0
Cluster 1
Cluster 2