資料探勘
DATA MINING

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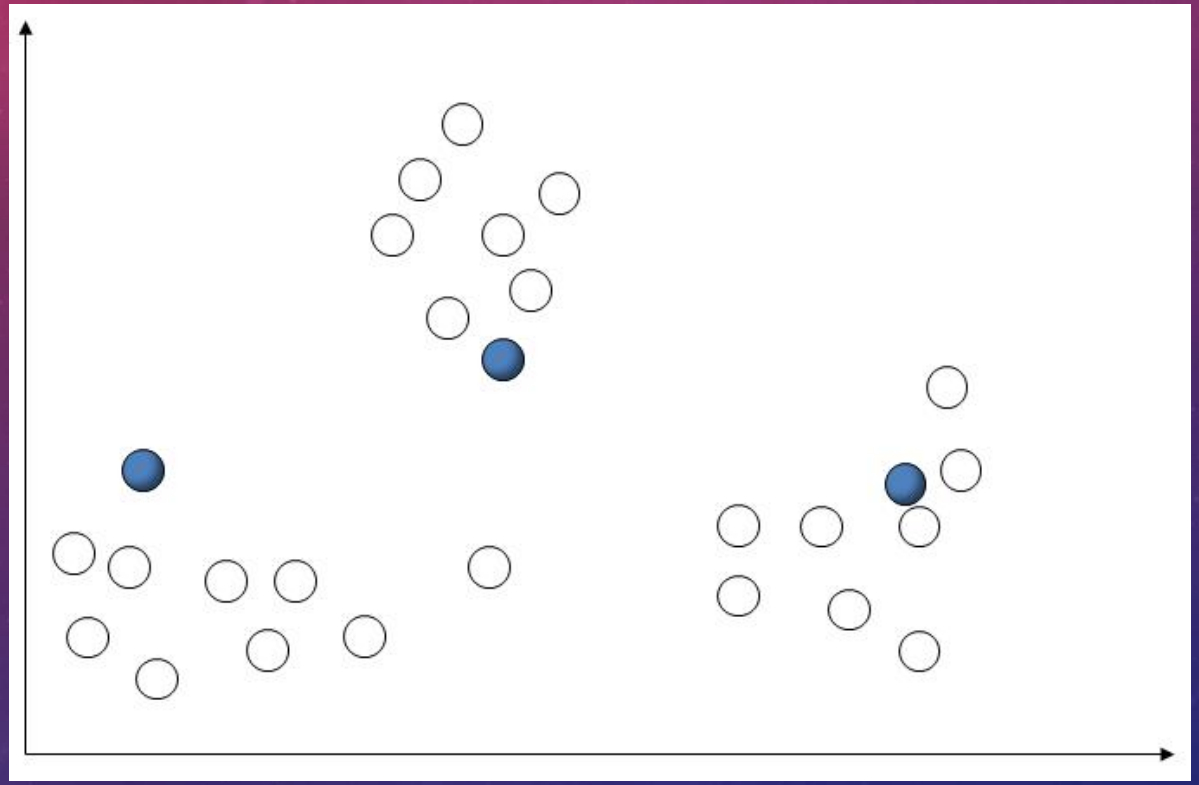
分群練習
CLUSTERING EXERCISE

概念

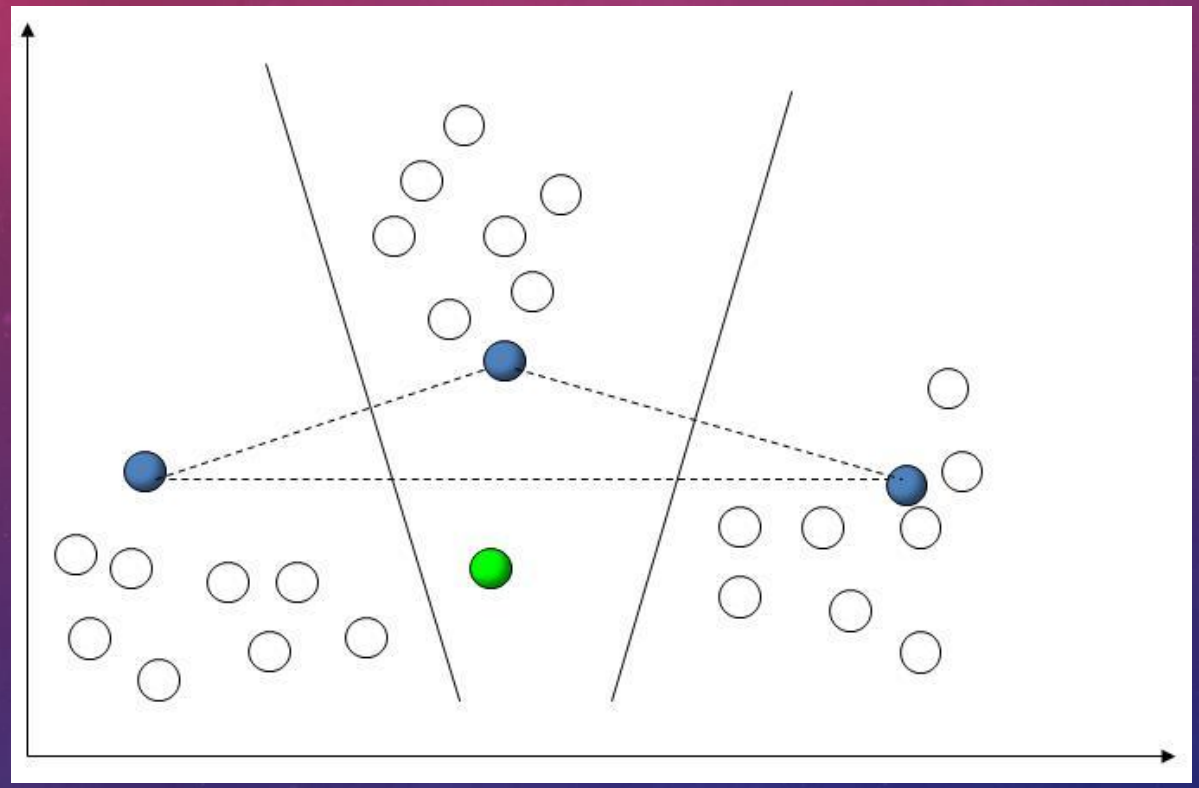
- 把許多事物按照某種標準歸為數個類別，其中較為相近/類似的聚為一類，反之較不相近的則聚為不同類。
- 目的是企圖從一大堆雜亂無章的原始資料中，找出少數幾個較小的群體，使得群體內的分子在某些變項的測量值均很類似，而群體與群體間的分子在該測量值上差異較大。
- 同一組樣本會因不同目的、資料輸入方式、所選擇分群特徵或資料屬性，形成不同的分群結果

K-MEANS

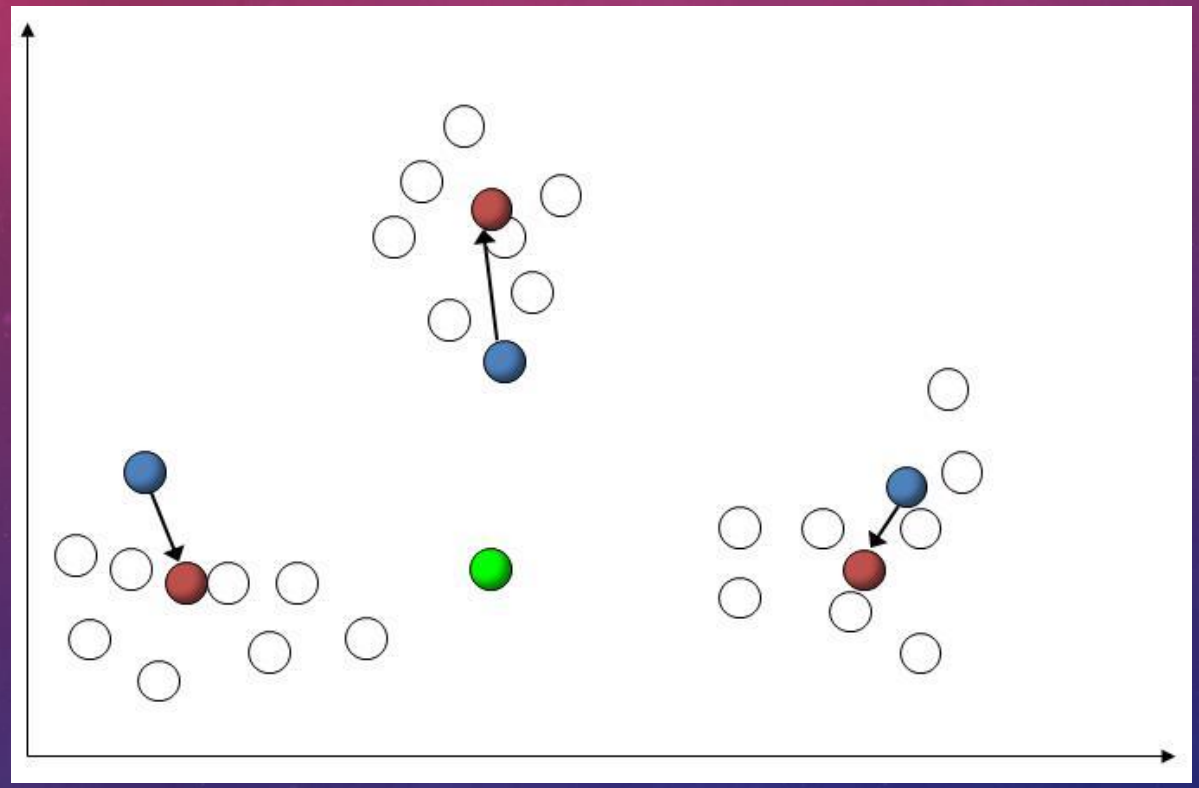
STEP 1. 隨機指派群集中心



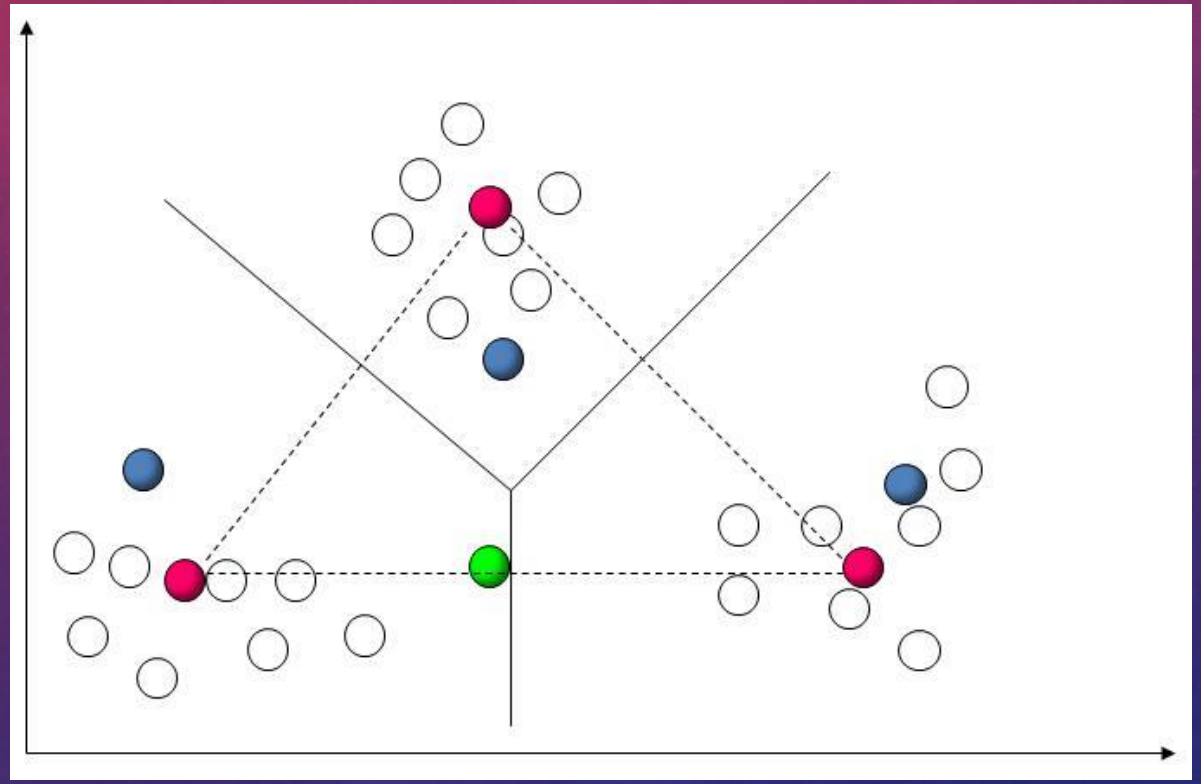
STEP 2. 產生初始群集



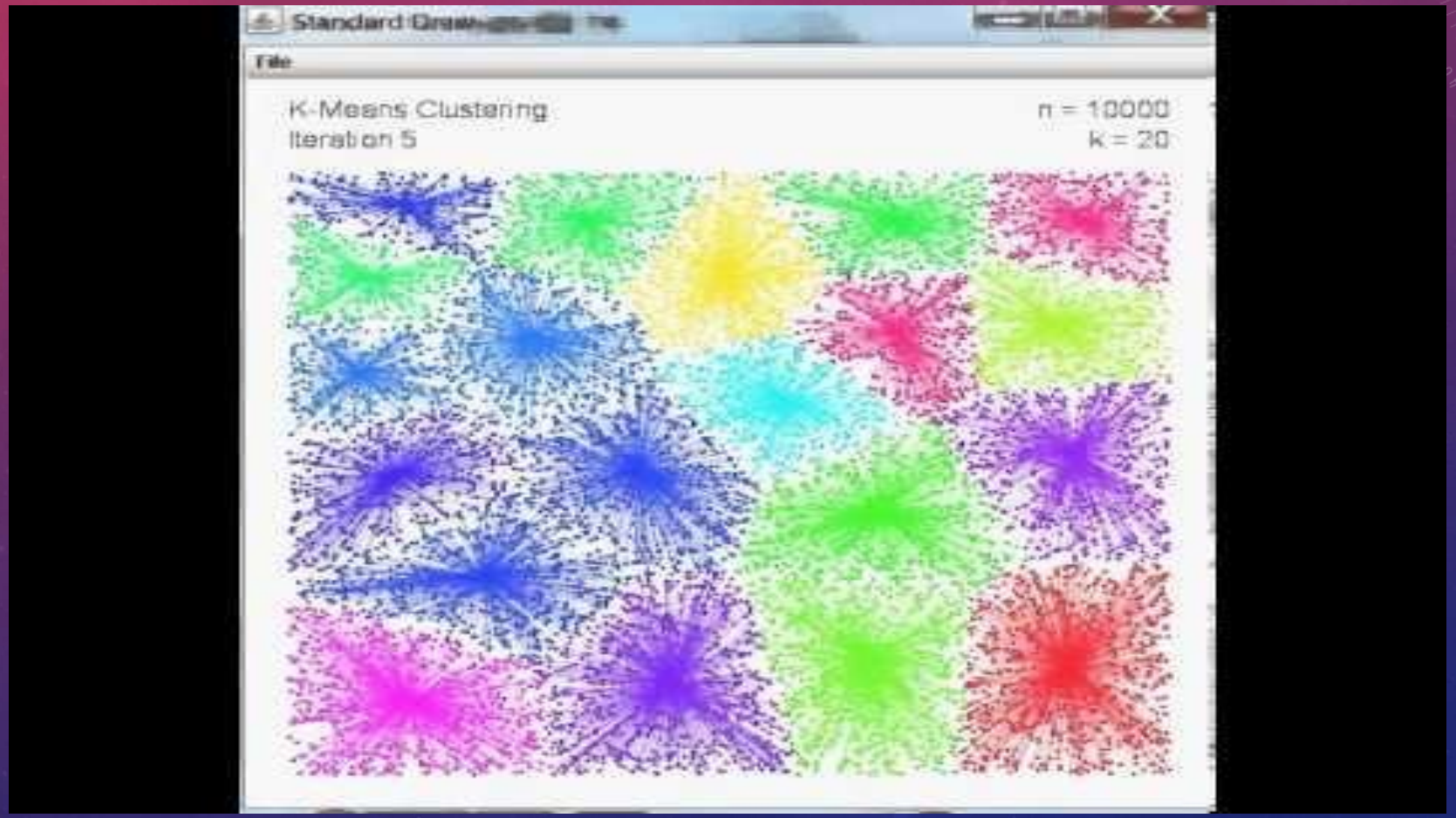
STEP 3. 產生新的質量中心



STEP 4. 變動群集邊界



EXAMPLE



https://youtu.be/BVFG7fd1H30

鳶尾花資料集

- 花瓣（Petal）的長
- 花瓣（Petal）的寬
- 花萼（Sepal）的長
- 花萼（Sepal）的寬

[5.1 3.5 1.4 0.2]

在設定某K的KMEANS

```python
from sklearn import cluster, datasets

# 讀入鳶尾花資料
iris = datasets.load_iris()
iris_X = iris.data

# KMeans 演算法
kmeans_fit = cluster.KMeans(n_clusters = 3).fit(iris_X)

# 印出分群結果
cluster_labels = kmeans_fit.labels_
print("分群結果：")
print(cluster_labels)
print("---")

# 印出品種看看
iris_y = iris.target
print("真實品種：")
print(iris_y)
```

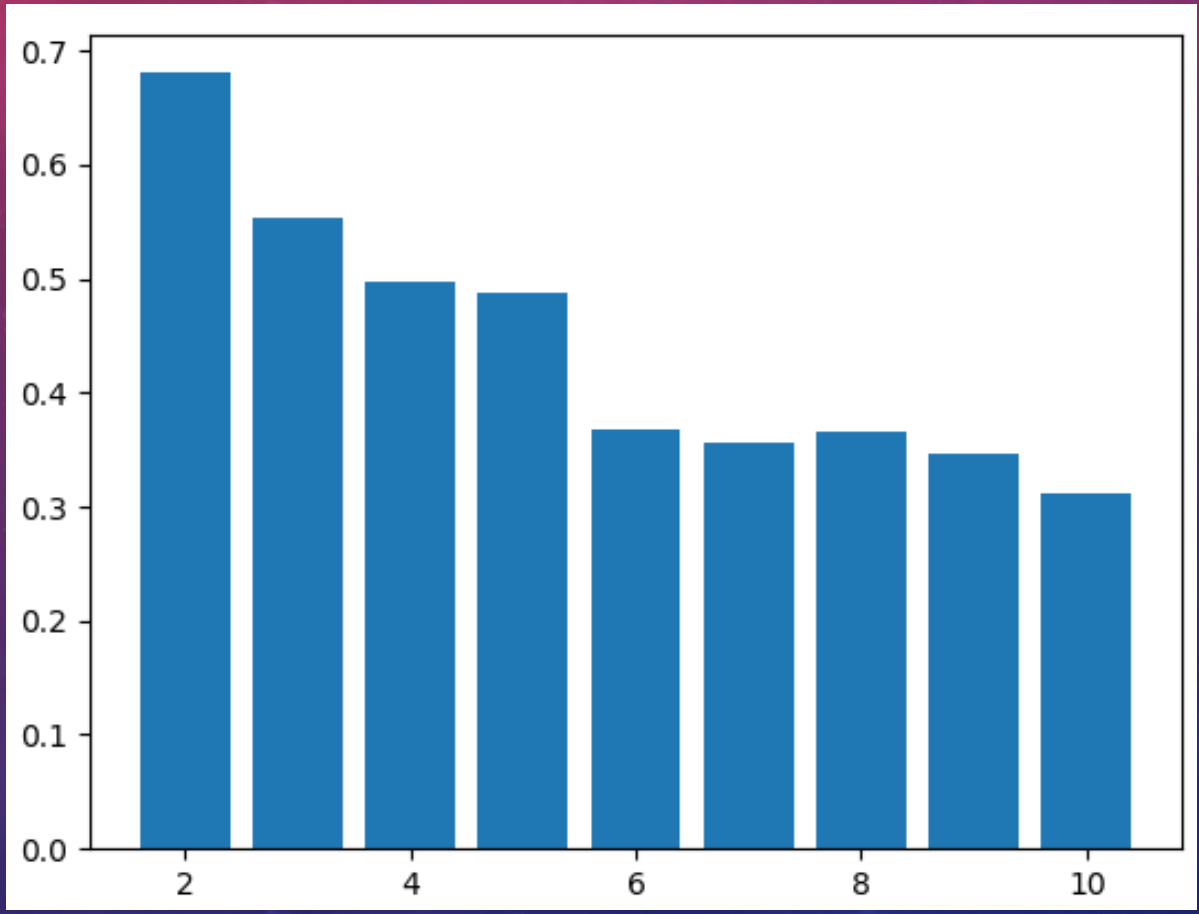
在設定某K的KMEANS

```
[5.1 3.5 1.4 0.2]
分群結果：
[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 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 0 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 0 2 0 0 0 0 2 0 0 0 0 2 0 0
 0 0 2 2 0 0 0 0 2 0 2 0 2 0 0 2 2 0 0 0 0 2 0 0 0 2 0 0 0 2 0 0 0 2 0 0 2
 0 2]
---
真實品種：
[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 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 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 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 2 2 2 2 2 2
 2 2]
```

K從2到10的KMEANS效能

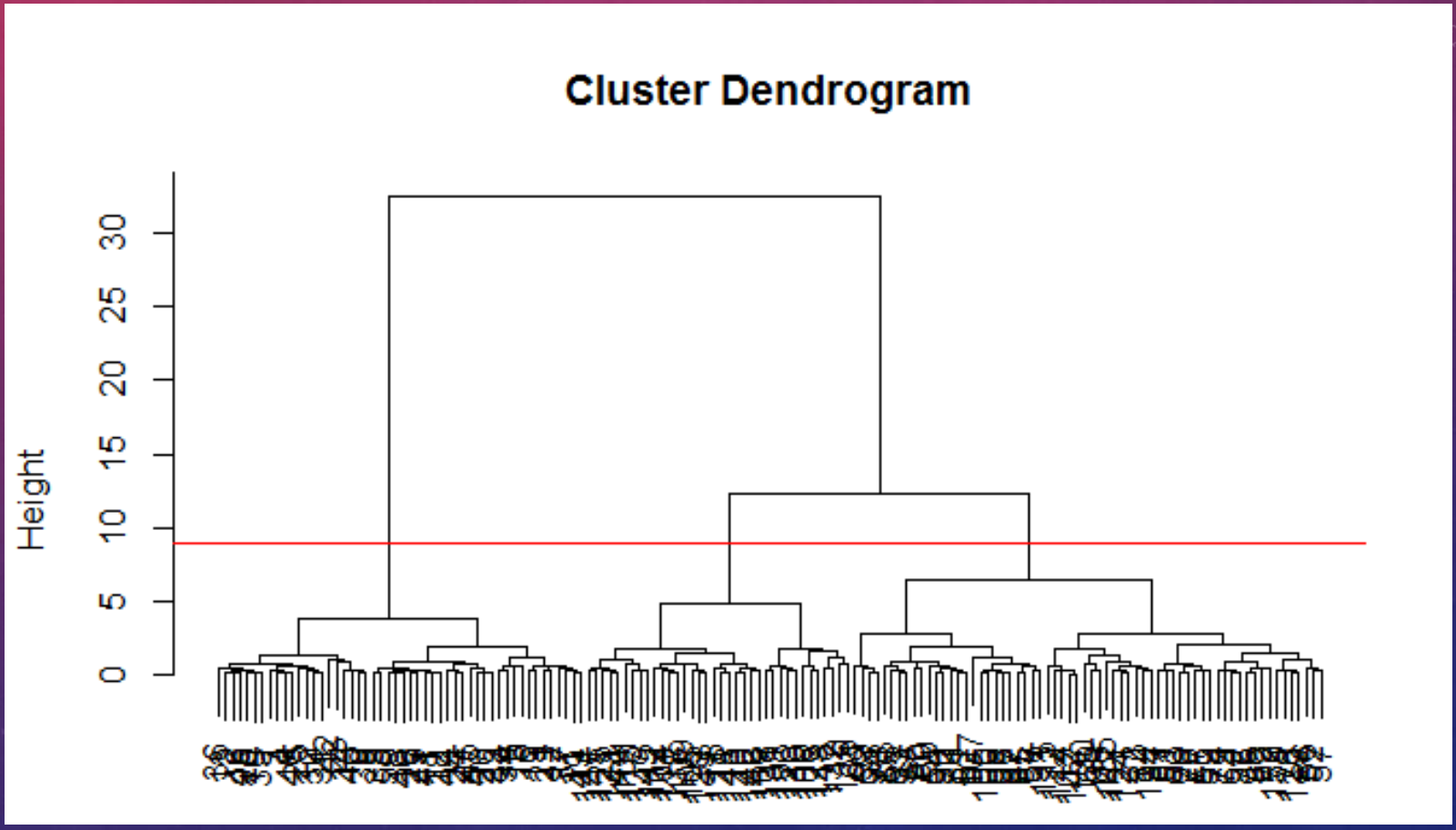
```python
from sklearn import cluster, datasets, metrics
import matplotlib.pyplot as plt

# 讀入鳶尾花資料
iris = datasets.load_iris()
iris_X = iris.data

# 迴圈
silhouette_avgs = []
ks = range(2, 11)
for k in ks:
    kmeans_fit = cluster.KMeans(n_clusters = k).fit(iris_X)
    cluster_labels = kmeans_fit.labels_
    silhouette_avg = metrics.silhouette_score(iris_X, cluster_labels)
    silhouette_avgs.append(silhouette_avg)

# 作圖並印出 k = 2 到 10 的績效
plt.bar(ks, silhouette_avgs)
plt.show()
print(silhouette_avgs)
```

K從2到10的KMEANS效能

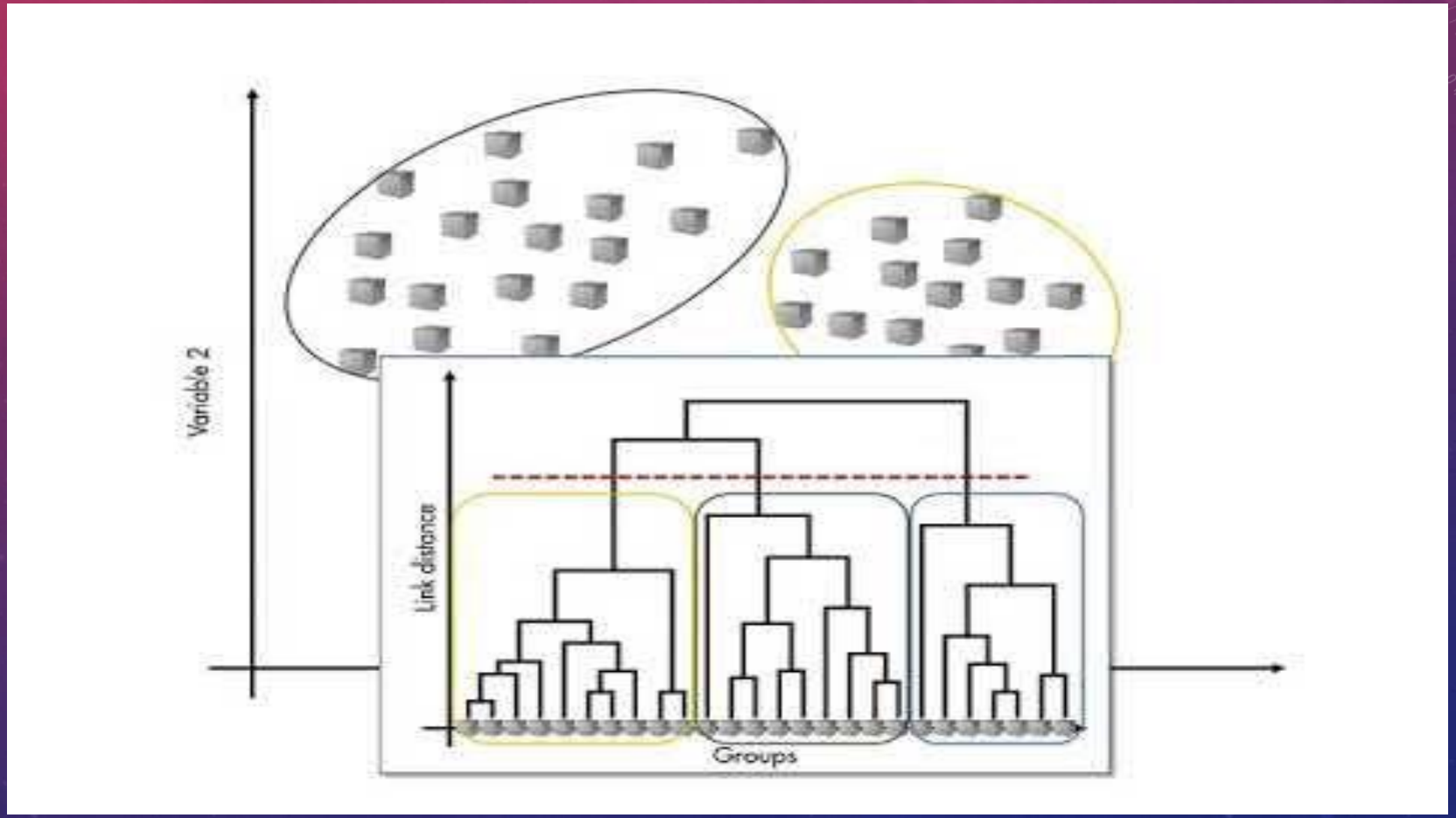


階層式分群法
HIERARCHICAL CLUSTERING

PROCESSES



EXAMPLE



https://youtu.be/iy7-Q7Y1Klk

鳶尾花資料集

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- 花萼（Sepal）的寬

[5.1 3.5 1.4 0.2]

在設定某K的HIERARCHICAL CLUSTERING

```python
from sklearn import cluster, datasets

# 讀入鳶尾花資料
iris = datasets.load_iris()
iris_X = iris.data

# 印出單筆測資
print(iris_X[0])

# Hierarchical Clustering 演算法
hclust = cluster.AgglomerativeClustering(linkage = 'ward', affinity = 'euclidean', n_clusters = 3)

# 印出分群結果
hclust.fit(iris_X)
cluster_labels = hclust.labels_
print(cluster_labels)
print("---")

# 印出品種看看
iris_y = iris.target
print(iris_y)
```

在設定某K的HIERARCHICAL CLUSTERING

```
[5.1 3.5 1.4 0.2]
[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
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 2 2 0 0 2 2 2 2 0 2 0 2 0 2 2 0 0 2 2 2 2 2 0 0 2 2 2 0 2 2 2 0 2 2 2 0 2
 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 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 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 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 2 2 2 2 2
 2 2]
```

K從2到10的效能

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# 迴圈
silhouette_avgs = []
ks = range(2, 11)
for k in ks:
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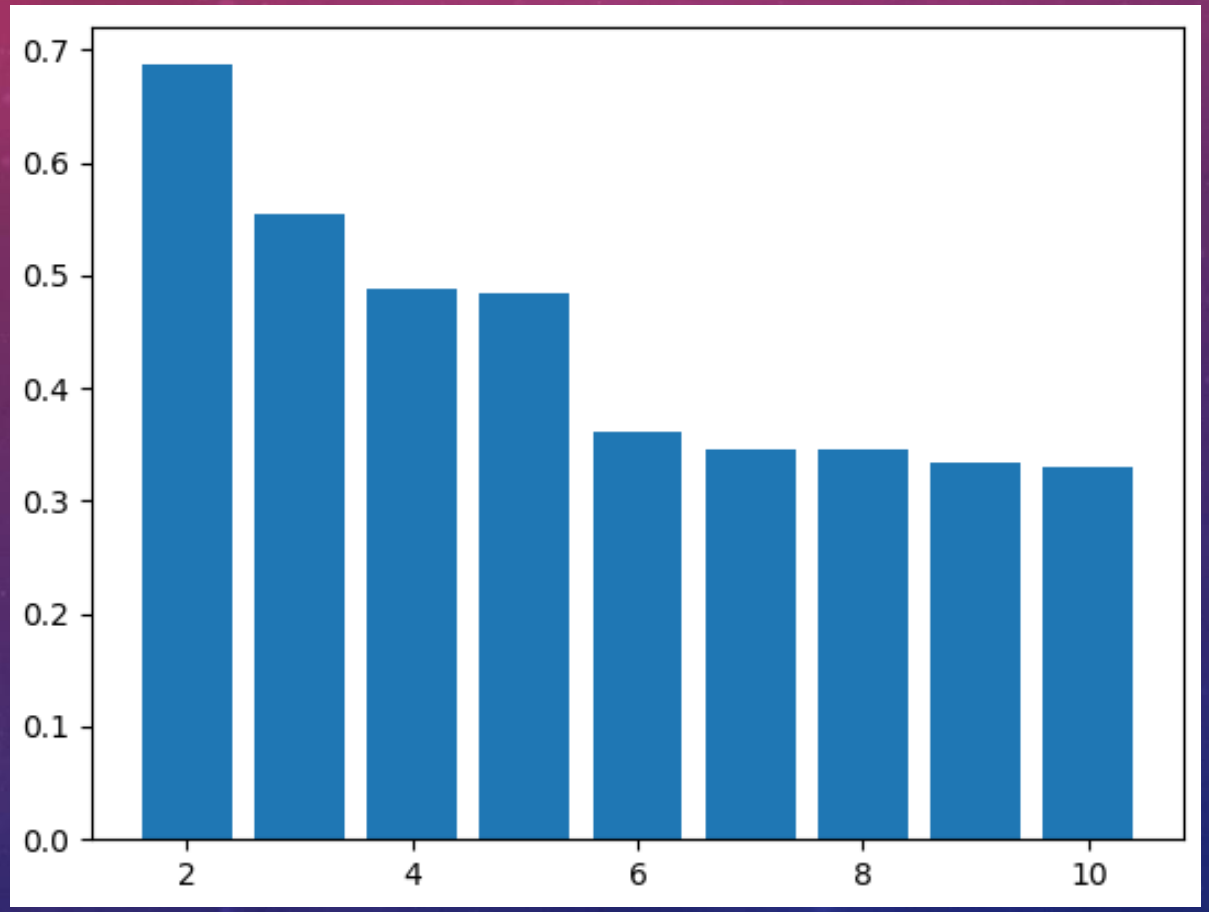
    cluster_labels = hclust_fit.labels_
    silhouette_avg = metrics.silhouette_score(iris_X, cluster_labels)
    silhouette_avgs.append(silhouette_avg)

# 作圖並印出 k = 2 到 10 的績效
plt.bar(ks, silhouette_avgs)
plt.show()
print(silhouette_avgs)
```

K從2到10的效能



自行練習

Wine Dataset

[1.207e+01, 2.160e+00, 2.170e+00, 2.100e+01, 8.500e+01, 2.600e+00, 2.650e+00, 3.700e-01, 1.350e+00, 2.760e+00, 8.600e-01, 3.280e+00, 3.780e+02]

(1) Alcohol → 1.207e+01

(2) Malic acid → 2.160e+00

(3) Ash → 2.170e+00

(4) Alcalinity of ash → 2.100e+01

(5) Magnesium → 8.500e+01

(6) Total phenols → 2.600e+00

(7) Flavanoids → 2.650e+00

(8) Nonflavanoid phenols → 3.700e-01

(9) Proanthocyanins → 1.350e+00

(10)Color intensity → 2.760e+00

(11)Hue → 8.600e-01

(12)OD280/OD315 of diluted wines → 3.280e+00

(13)Proline→ 3.780e+02

THANK YOU