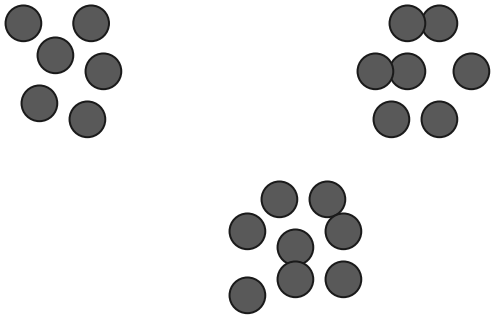
CIS 678 - Machine Learning

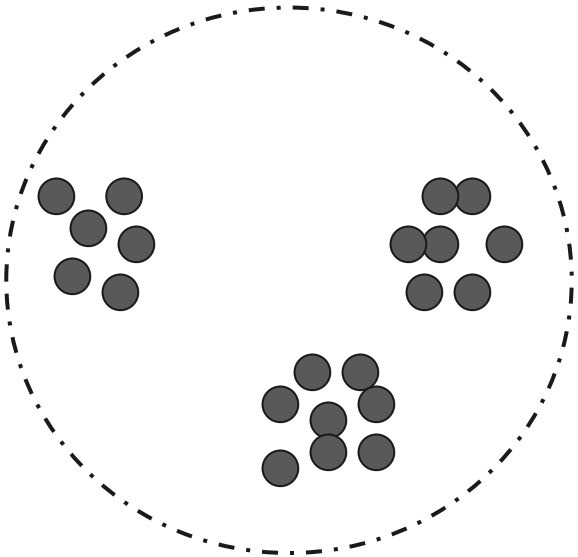
Optimal Number of Clusters

Number of clusters



How many clusters better describe these data points?

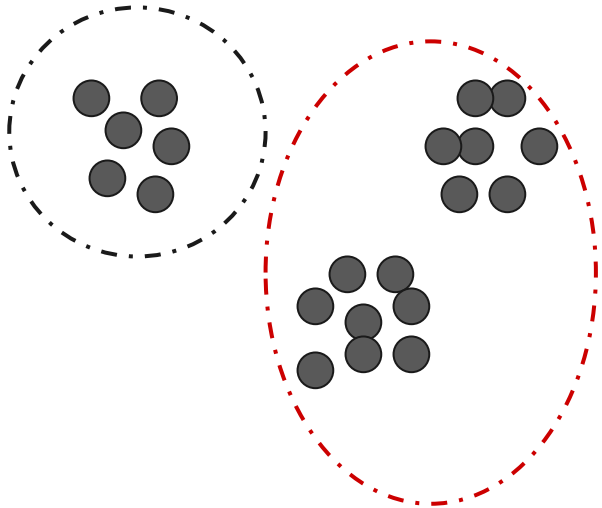
Number of clusters



How many clusters better describe these data points?

1 ?

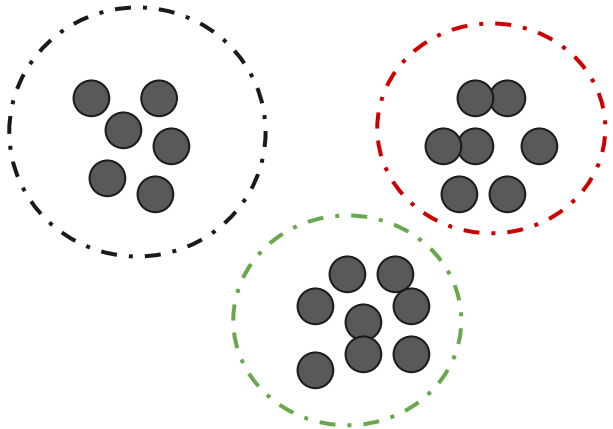
Number of clusters



How many clusters better describe these data points?

2 ?

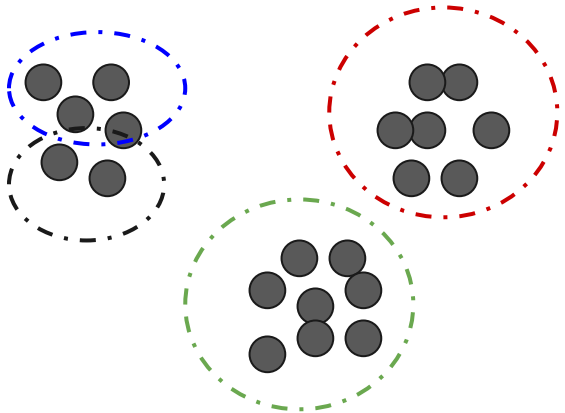
Number of clusters



How many clusters better describe these data points?

3 ?

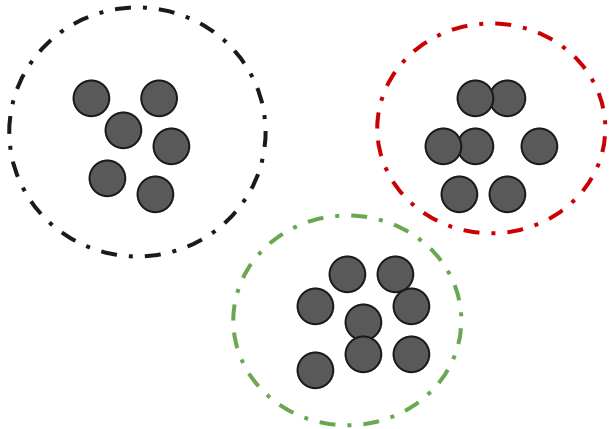
Number of clusters



How many clusters better describe these data points?

4 ?

Number of clusters



How many clusters better describe these data points?

3 could be most likely answer; right?

Number of clusters

- Elbow method
- Silhouette score based

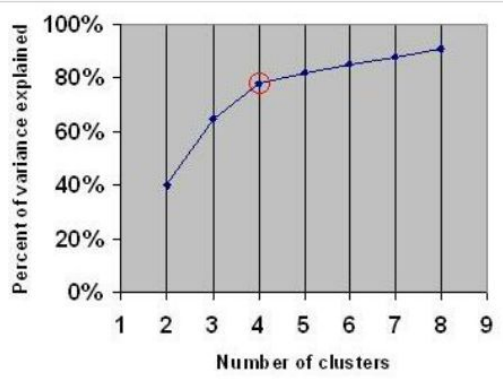
Number of clusters

- Elbow method (notebook presentation)

Elbow method

- ***Explained Variance*** method can be used for **number of clusters** selections, and also for some other applications such as **number of PCA components** etc.

> ***Explained Variance:*** Percentage of variance explained is the ratio of the between-group variance to the total variance, also known as an F-test.

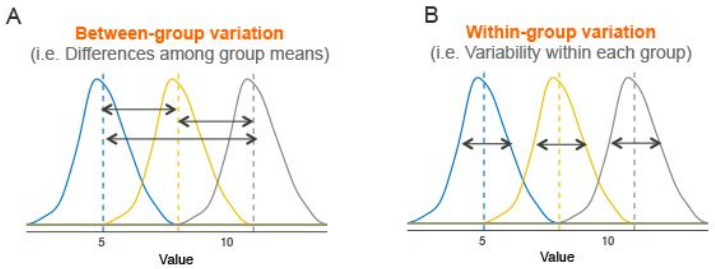


Explained Variance. The "elbow" is indicated by the red circle. The number of clusters chosen should therefore be 4.

Elbow method

- ***Explained Variance*** method can be used for **number of clusters** selections, and also for some other applications such as **number of PCA components** etc.

> ***Explained Variance:*** Percentage of variance explained is the ratio of the between-group variance to the total variance, also known as an F-test.



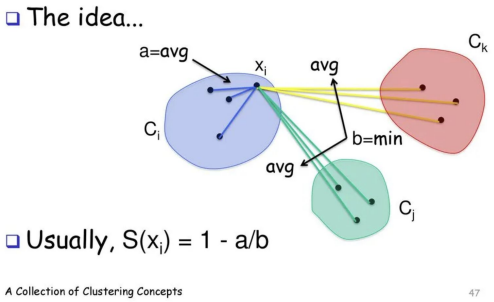
src

Silhouette score based

For each sample:

a : mean intra-cluster distance

b : mean nearest-cluster distance



Silhouette Score is the ***mean*** of the (Silhouette Coefficient for each data point)

Silhouette Coefficient:

$$sc = \frac{(b-a)}{max(a,b)}$$

-1 ← 0 → +1

Worst — Cluster overlaps — Best