K-means Clustering

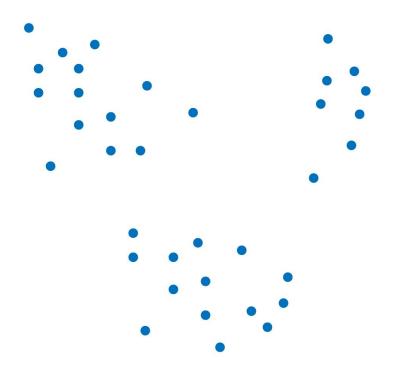




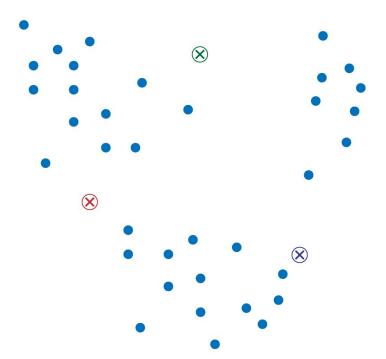
Brief Overview

- 1. K-Means partition *n* data points into *k* clusters
- 2. Each data point belongs to the cluster with the nearest mean
- 3. The algorithm produces exactly **k** different clusters of greatest possible distinction
- 4. But the process is sensitive to our choice of **k** and the initialisation

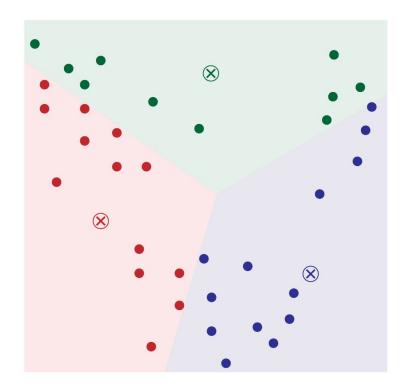




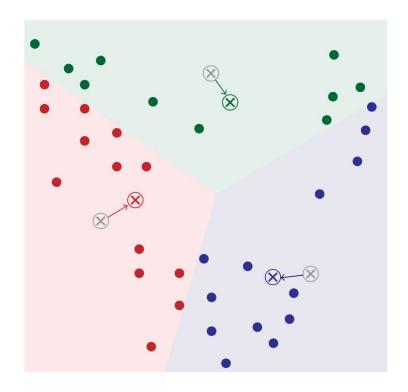




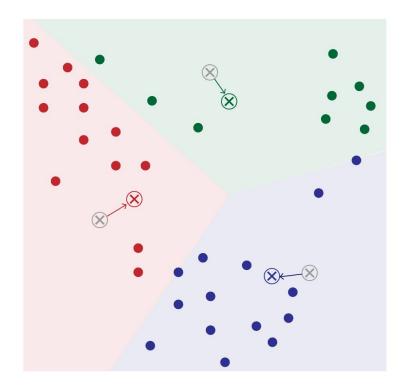




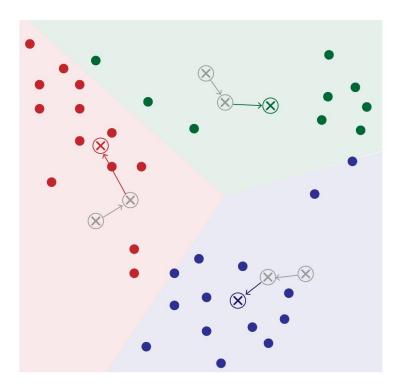




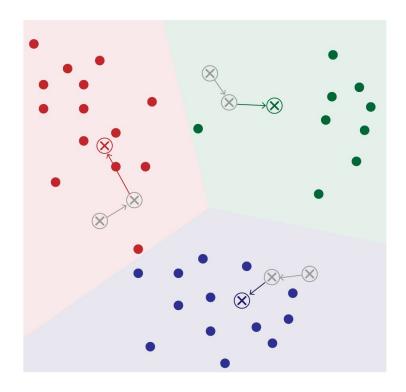




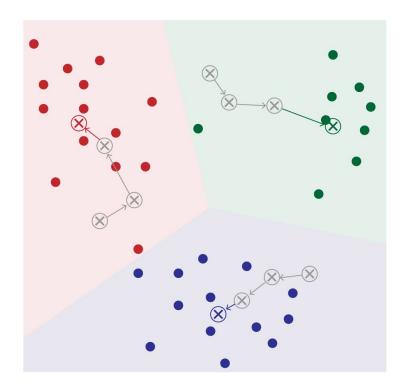




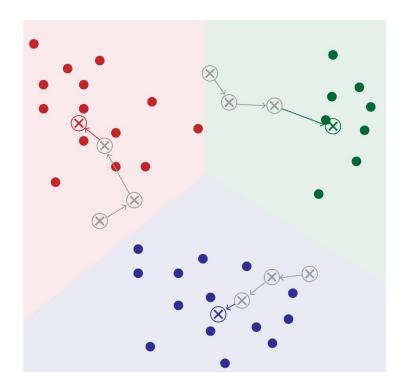














K-means - Summary

- Start with k "means" drawn at random
- Assign data points to the nearest k
- Update the position of each **k** to correspond to the mean of its assigned points
- Rinse and repeat...



K-means - Pros and cons

Pros

- Cheap to compute
- Easy to interpret
- Efficient implementations available
- Assigning a new point is straightforward

Cons

- Need to guess k
- Clusters are globular
- Sensitive to initialisation
- Sensitive to noise



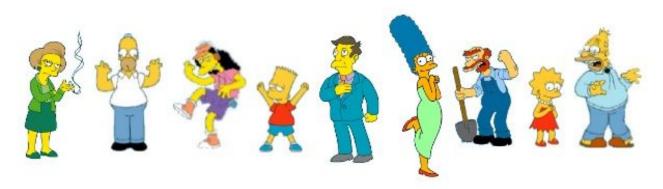


Hands-on session

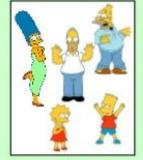
kmeans.ipynb



What is a natural grouping among these objects?



Clustering is subjective



Simpson's Family



School Employees



Females



Males

