Machine Learning for Natural Language Processing

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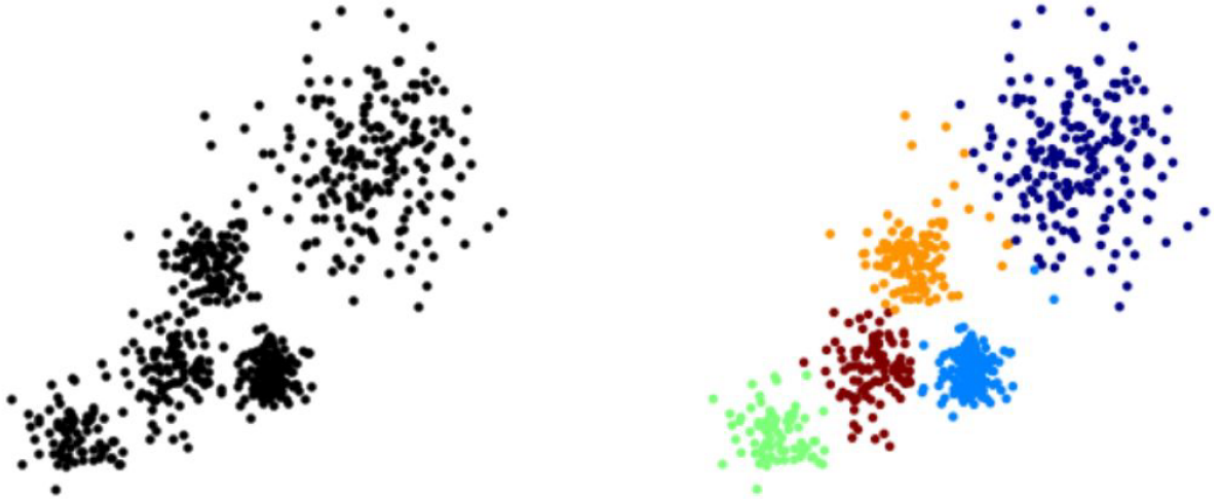
[1]Based on: Chapter 10 of Introduction to Statistical Learning By Gareth James, et al.

K Means Clustering

- K Means Clustering is an unsupervised learning algorithm that will attempt to group similar clusters together in your data.
- So what does a typical clustering problem look like?
  - Cluster Similar Documents
  - Cluster Customers based on Features
  - Market Segmentation
  - Identify similar physical groups

K Means Clustering

The overall goal is to divide data into distinct groups such that observations within each group are similar

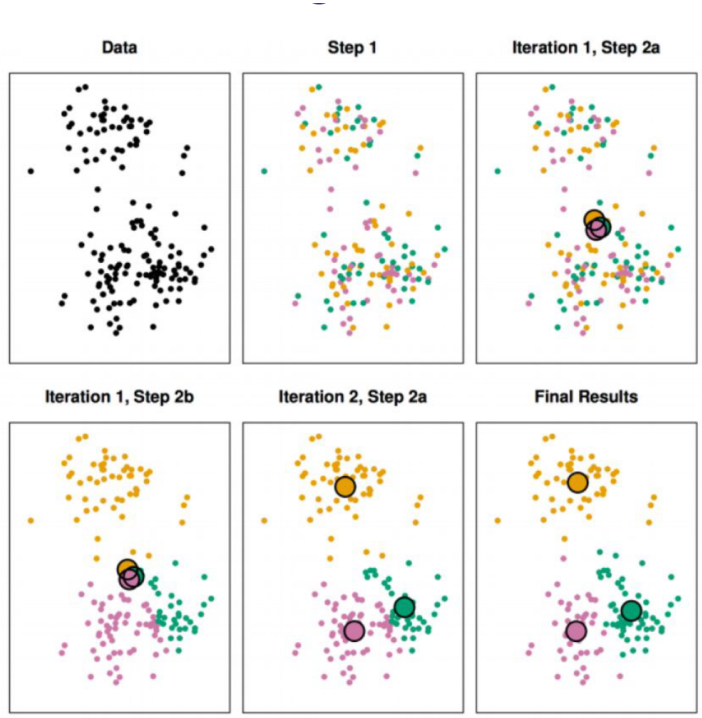


K Means Clustering

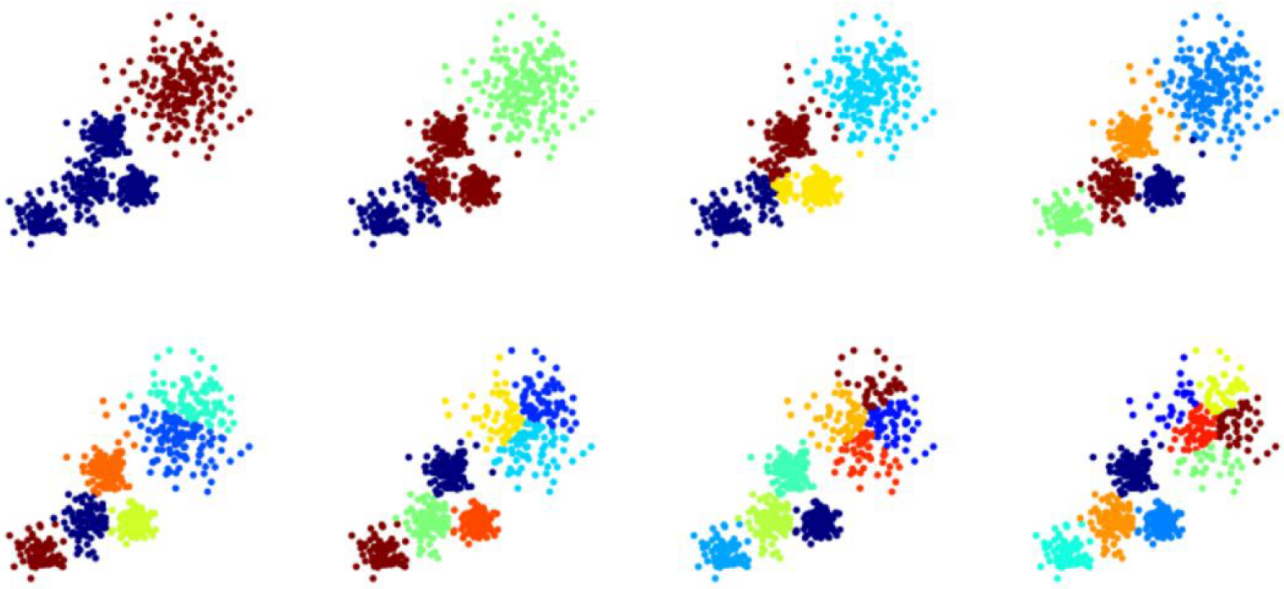
Choose a number of Clusters "K"

- Randomly assign each point to a cluster
- Until clusters stop changing, repeat the following:
  - For each cluster, compute the cluster centroid by taking the mean vector of points in the cluster
  - Assign each data point to the cluster for which the centroid is the closest

K Means Clustering Algorithm



Choosing K



Choosing K

There is no easy answer for choosing a "best" K value
One way is the elbow method

- First of all, compute the sum of squared error (SSE) for some values of k (for example 2, 4, 6, 8, etc.)
- The SSE is defined as the sum of the squared distance between each member of the cluster and its centroid
- If you plot k against the SSE, you will see that the error decreases as k gets larger; this is because when the number of clusters increases, they should be smaller, so distortion is also smaller
- The idea of the elbow method is to choose the k at which the SSE decreases abruptly
- This produces an "elbow effect" in the graph, as you can see in the following picture:

Elbow Method