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# Machine learning Part-D

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Part of Future Connect  
Media's IT Course

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# Topics to be covered:

Hierarchical Clustering

Hierarchical Clustering Technique

Visualizing Hierarchical Clustering

Similarities Between 2 Clusters

# Hierarchical Clustering

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- Hierarchical clustering, also known as hierarchical cluster analysis, is an algorithm that groups similar objects into groups called clusters. The endpoint is a set of clusters, where each cluster is distinct from each other cluster, and the objects within each cluster are broadly similar to each other



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# Hierarchical Clustering Technique

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- Agglomerative
- Divisive

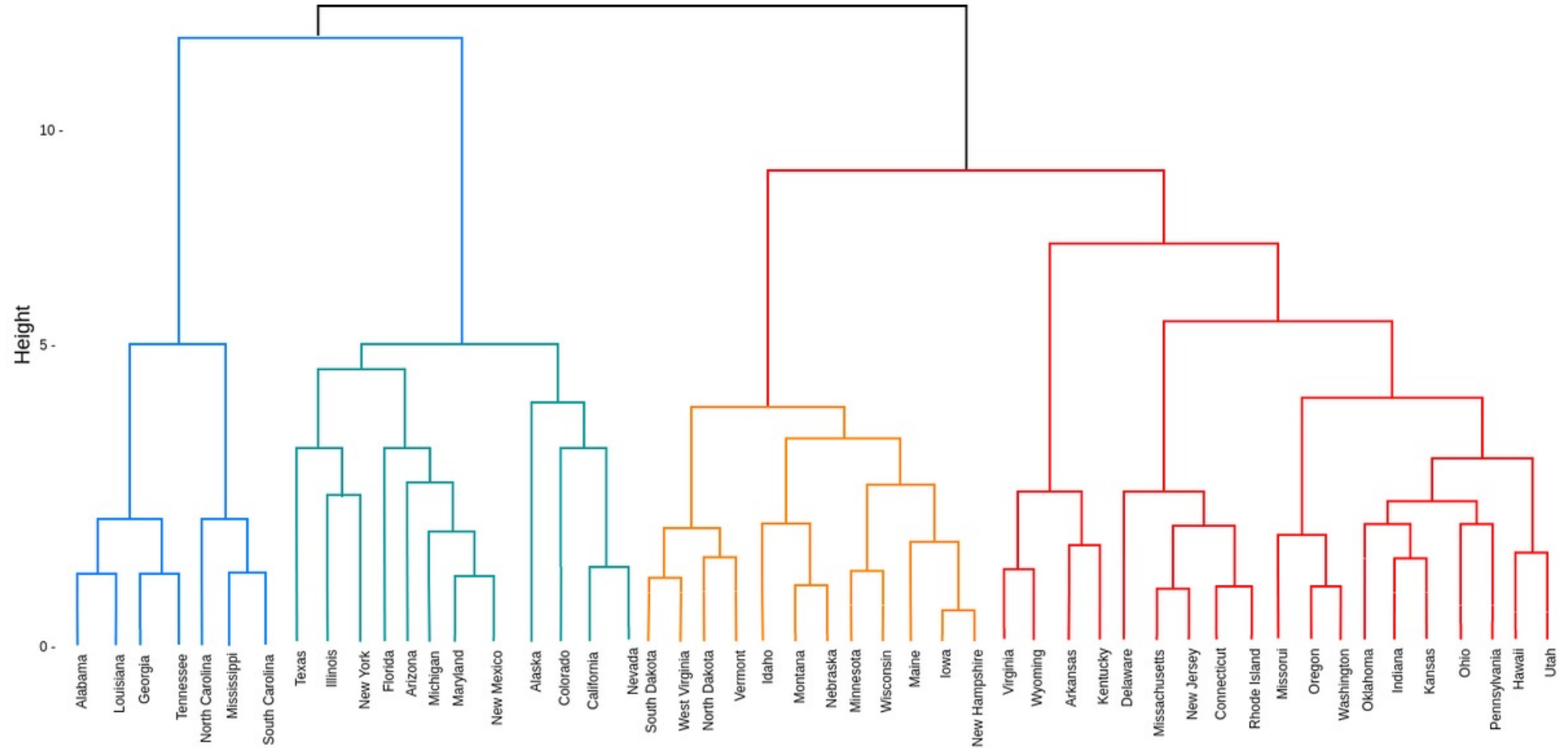


**Agglomerative Hierarchical clustering Technique:** In this technique, initially each data point is considered as an individual cluster. At each iteration, the similar clusters merge with other clusters until one cluster or K clusters are formed.

**Divisive Hierarchical clustering Technique:** Divisive Hierarchical clustering is exactly the opposite of the Agglomerative Hierarchical clustering. In Divisive Hierarchical clustering, we consider all the data points as a single cluster and in each iteration, we separate the data points from the cluster which are not similar. Each data point which is separated is considered as an individual cluster. In the end, we'll be left with n clusters.



# Visualization of HC Dendrogram

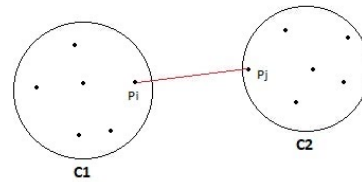


# Similarities Between 2 clusters

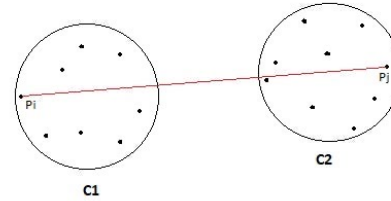
Calculating the similarity between two clusters is important to merge or divide the clusters. There are certain approaches which are used to calculate the similarity between two clusters:

- MIN
- MAX
- Group Average
- Distance Between Centroids
- Ward's Method

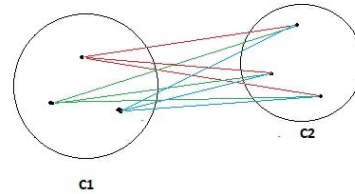
- Min



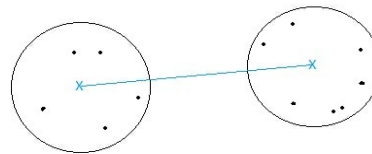
- Max



- Group Average



- Distance Between Centroids



- Ward's Method

The same as Group Average except that Ward's method calculates the sum of the square of the distances