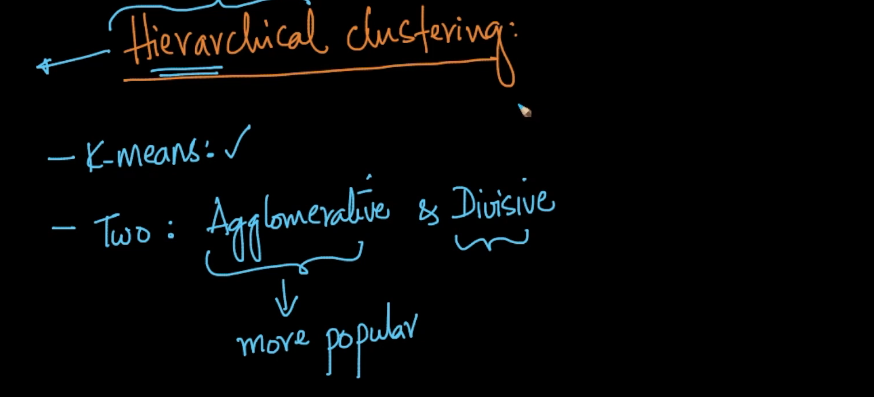
**Agglomerative & Divisive, Dendrograms**

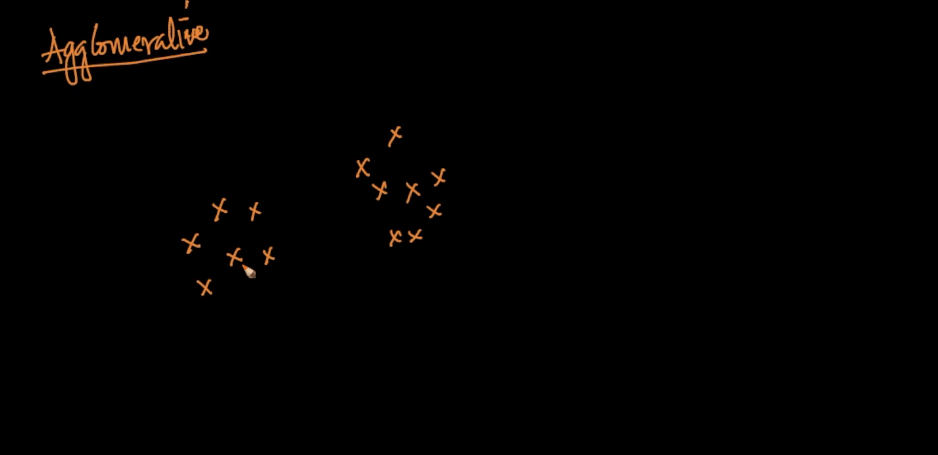
Hierarchical clustering is of two types

1. Agglomerative : it is more popular technique
2. Divisive

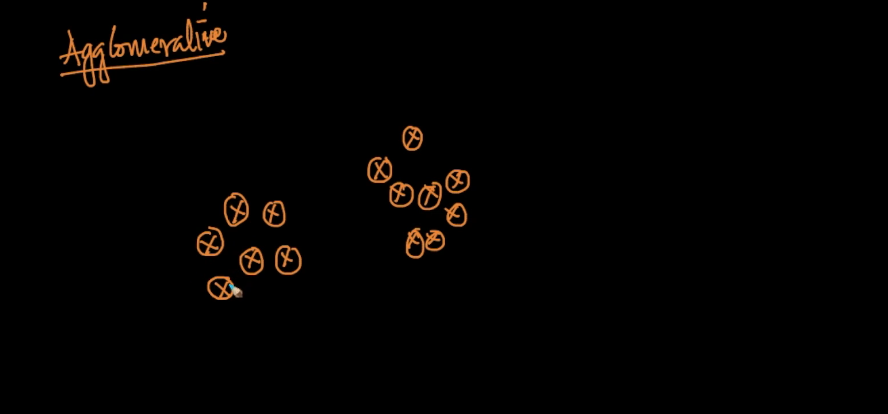


1. Agglomerative :

Suppose we took data points as shown in below figure.

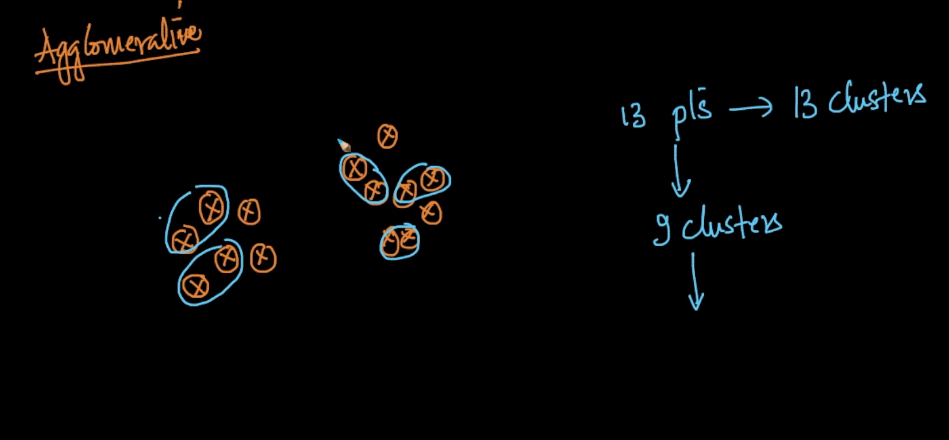


Now agglomerative initially consider each point as a cluster. Therefore there are 13 clusters in starting

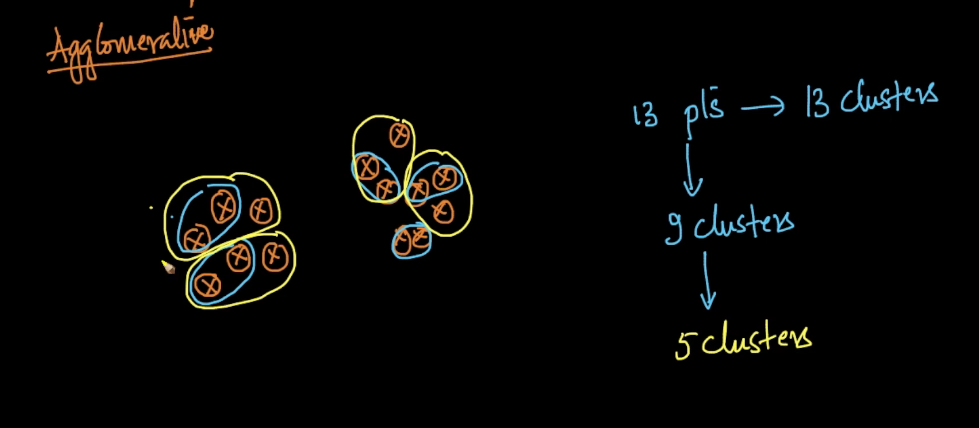


Now after considering distances or similarity it combines two or more cluster and make it one

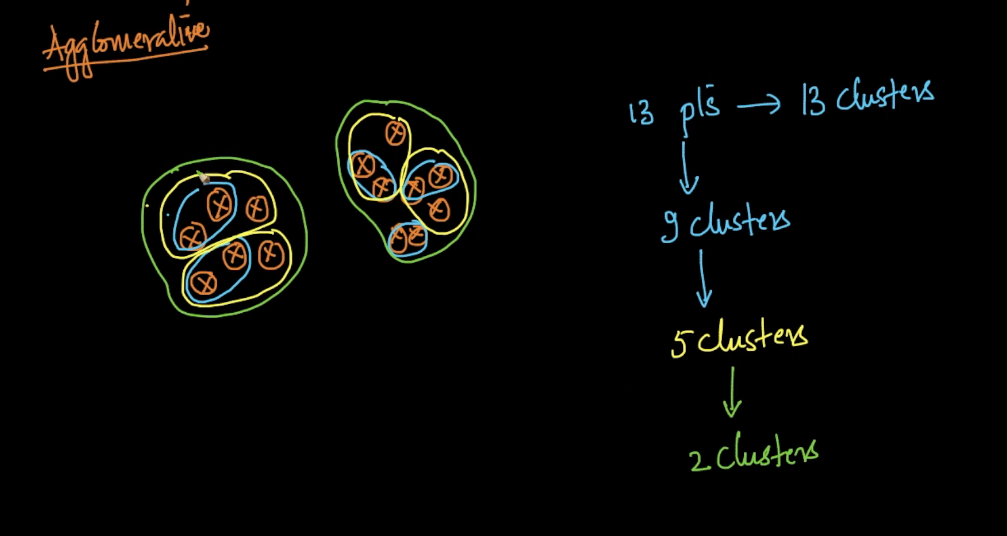
Therefore we have only 9 clusters now.

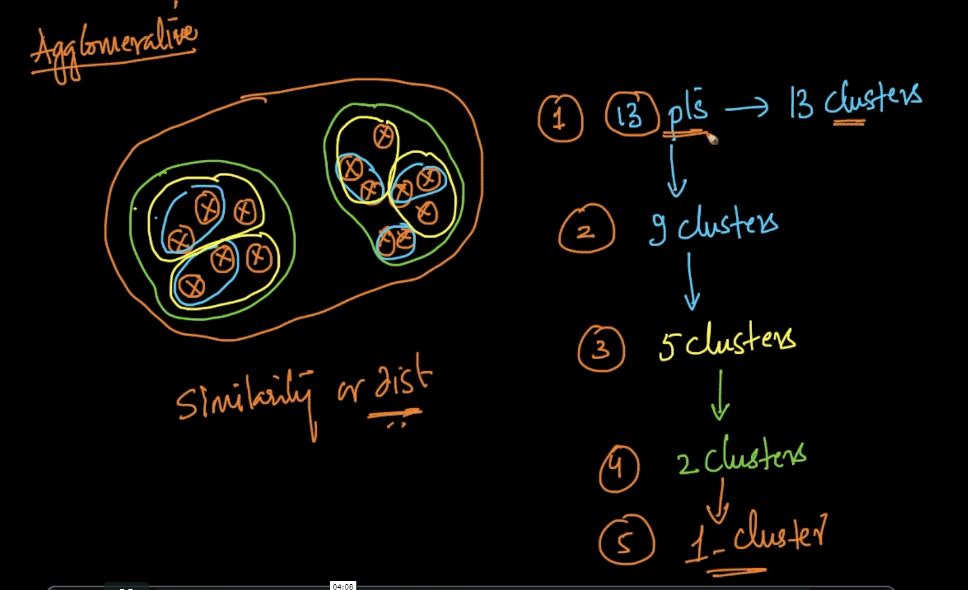


In each iteration it do same thing and generate new clusters therefore now we have 5 clusters



This iteration is continue till we have only 1 cluster.

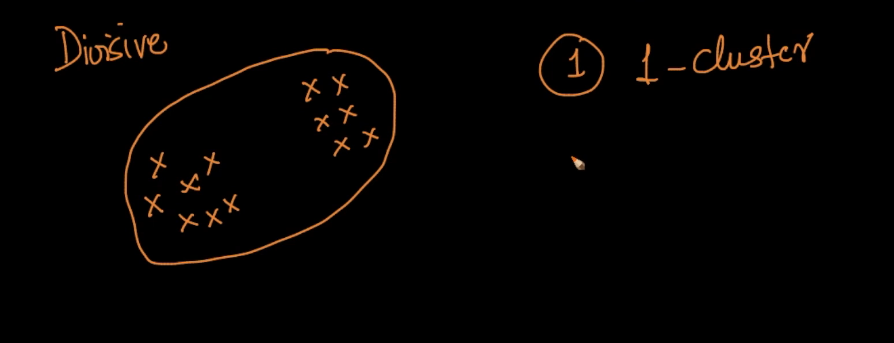


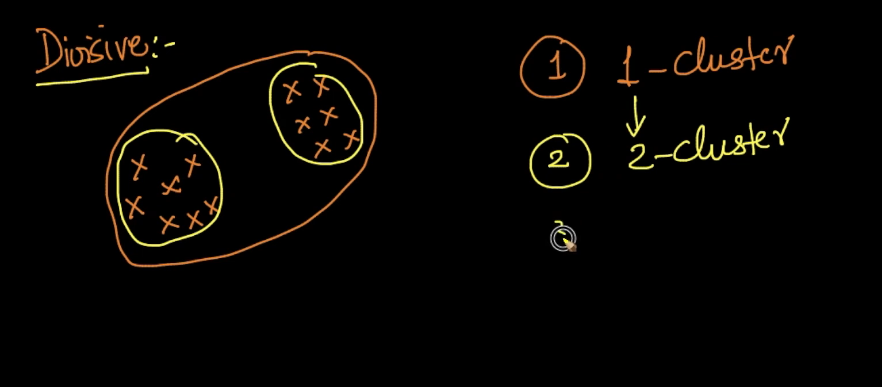


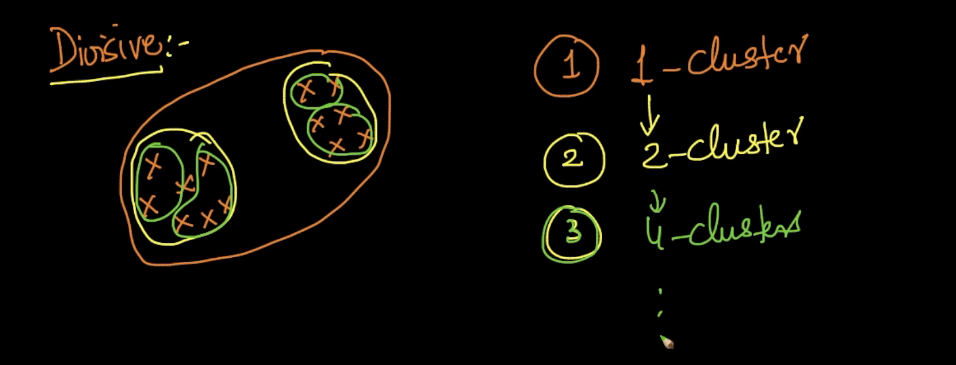
2)Divisive :

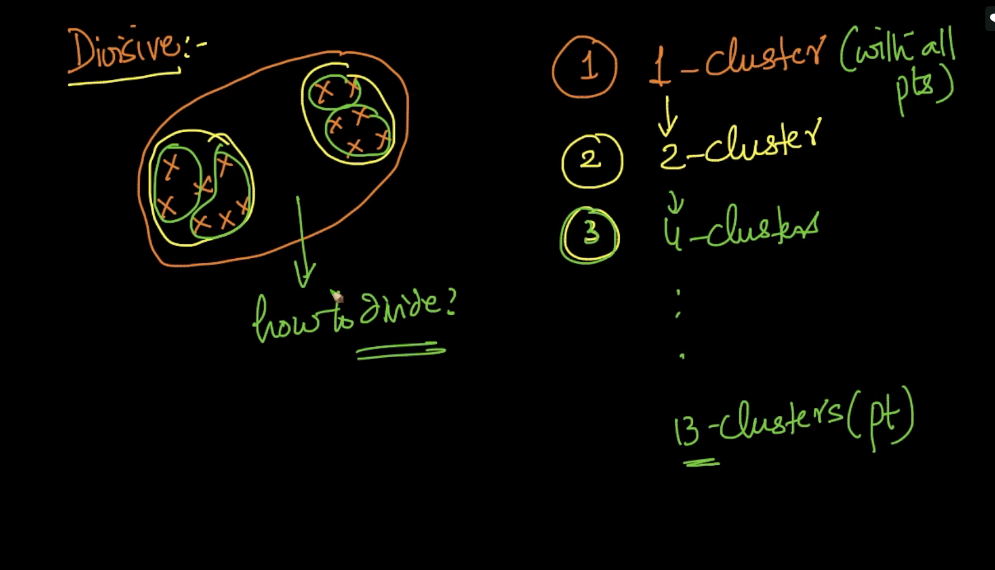
It is opposite to agglomerative technique.

In divisive initially it took all points in 1 cluster, and at each iteration it divide this cluster based on distance or similarity to form new clusters and this iteration/process continue till each points consider as a single cluster

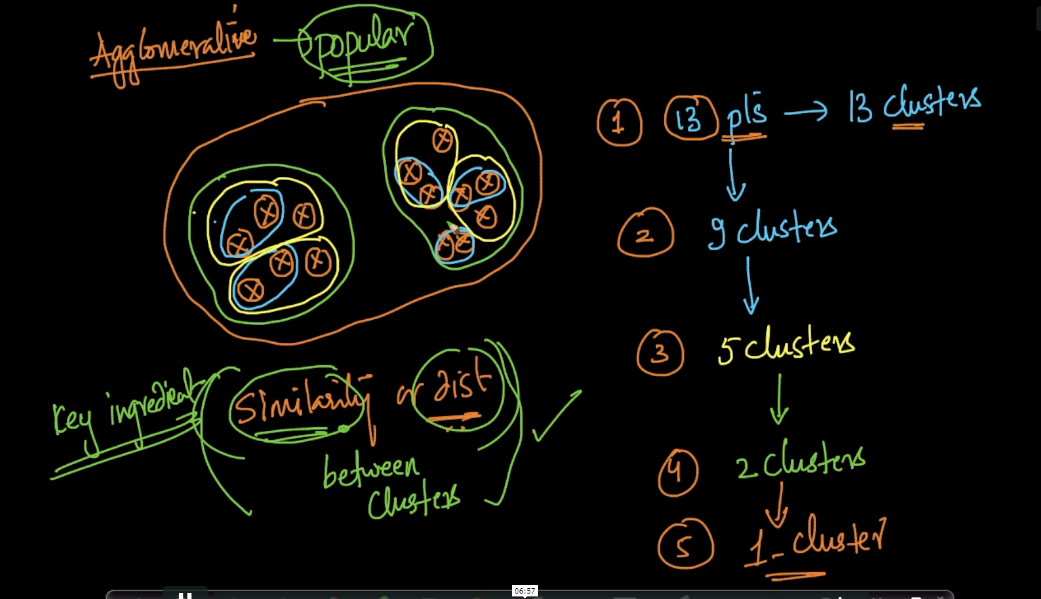








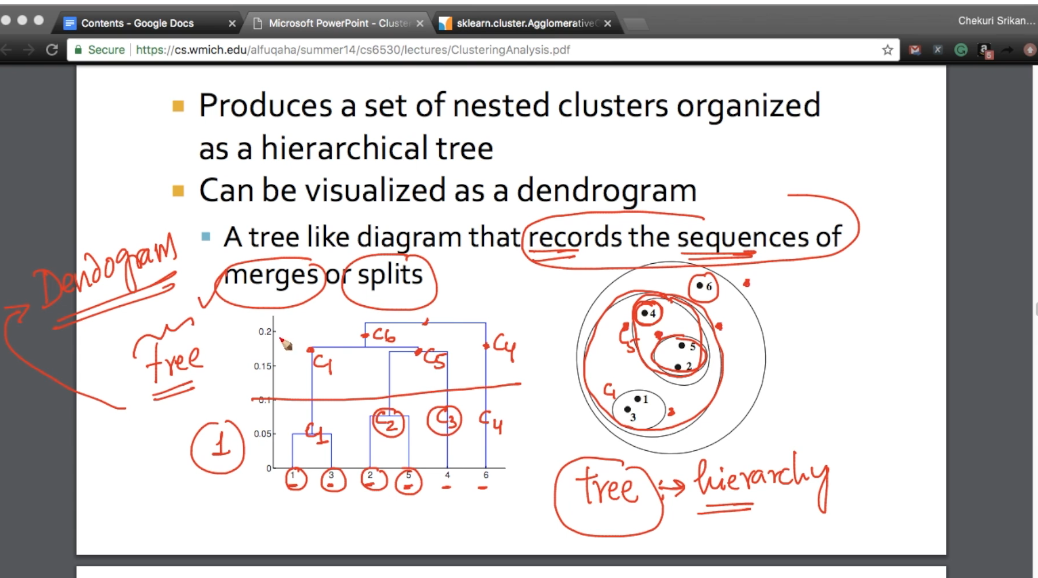
Key ingredient of agglomerative is similarity or distance between two clusters



**Dendogram** :

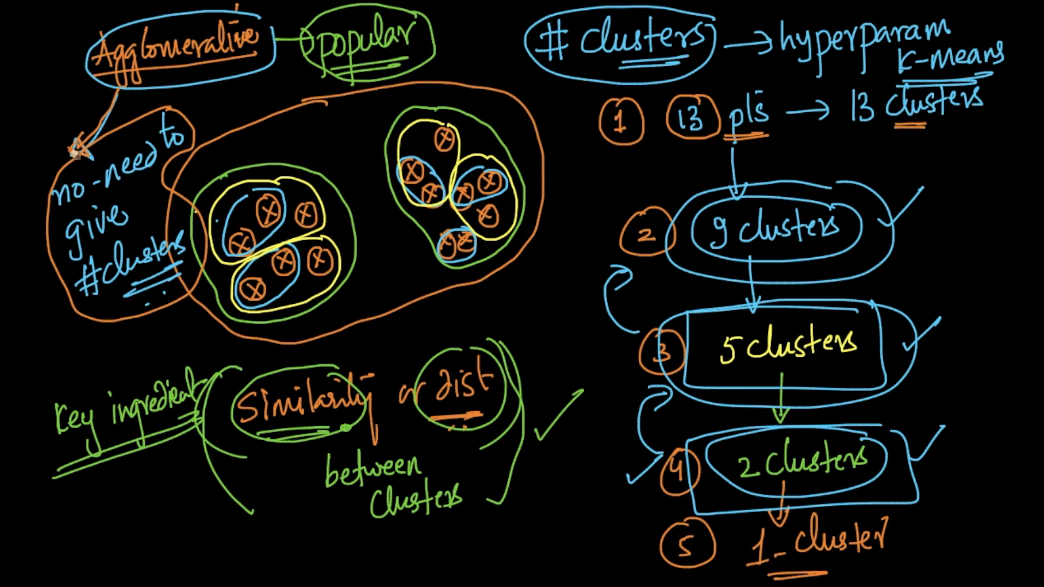
Dendogram is a tree which records the sequence of merges(for agglomerative) and splits(for divisive) .

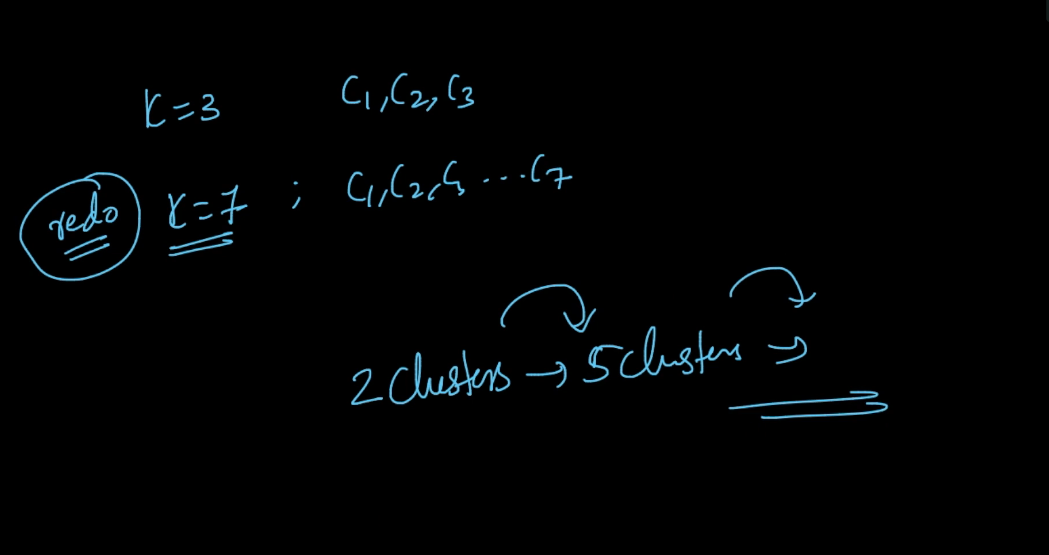
In this x-axis have data points and y-axis have the distance or dissimilarity between clusters.



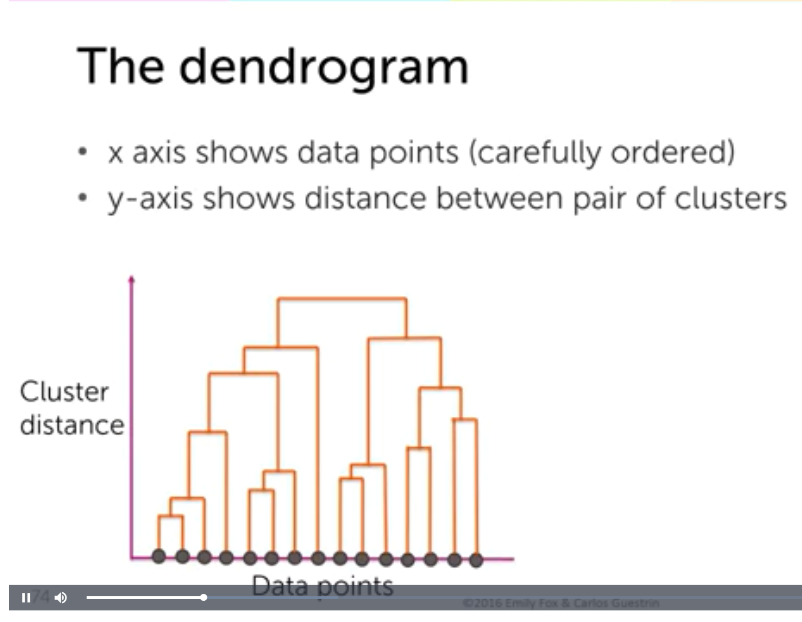
Major advantage of hierarchical technique is we don’t need to give no. of clusters or hyperparameter like we give in k-means.

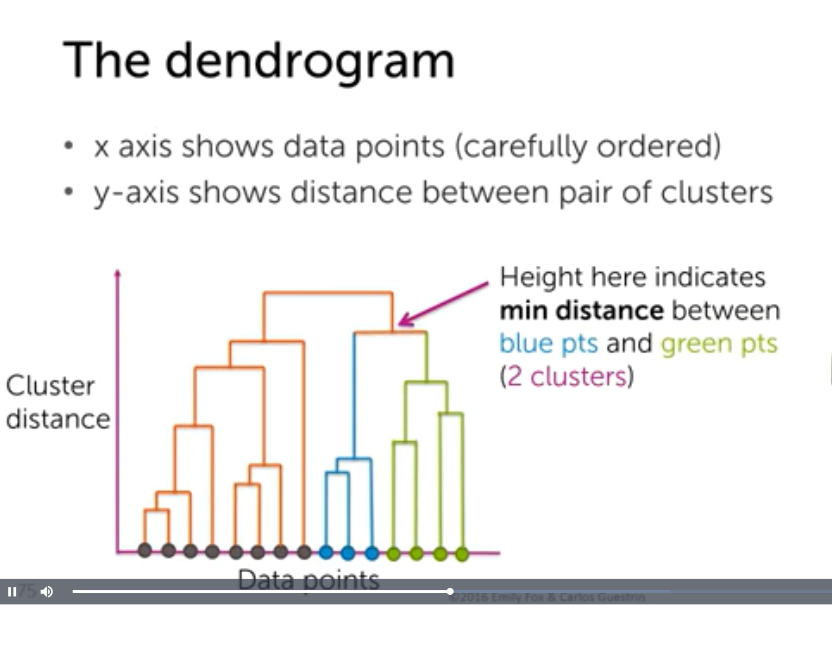
We take an example of agglomerative it generates clusters from 13 to 1 cluster in one run we can take any number after running it in single time unlike K-means where we have to run model again n again to get different number of clusters.

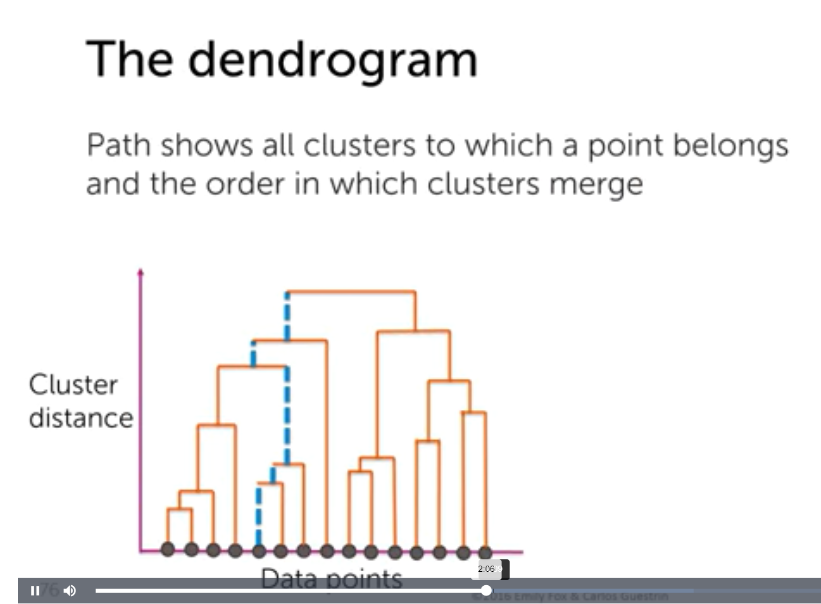


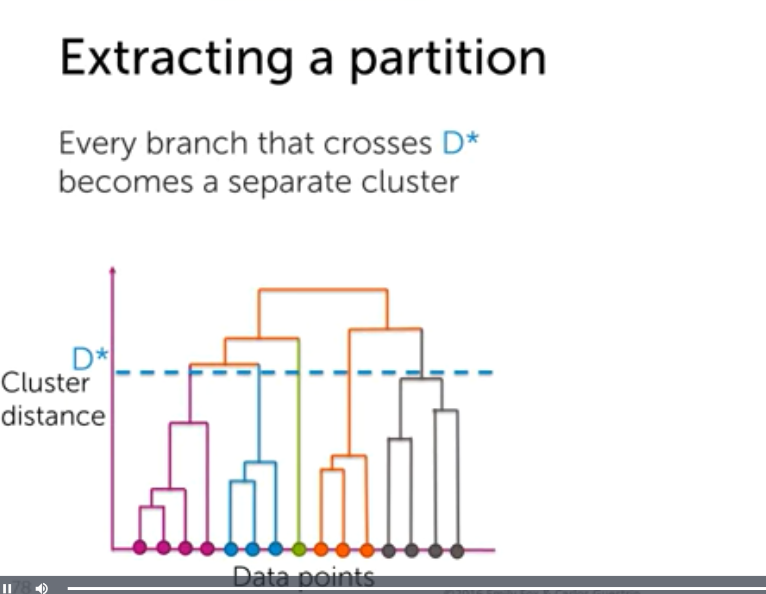


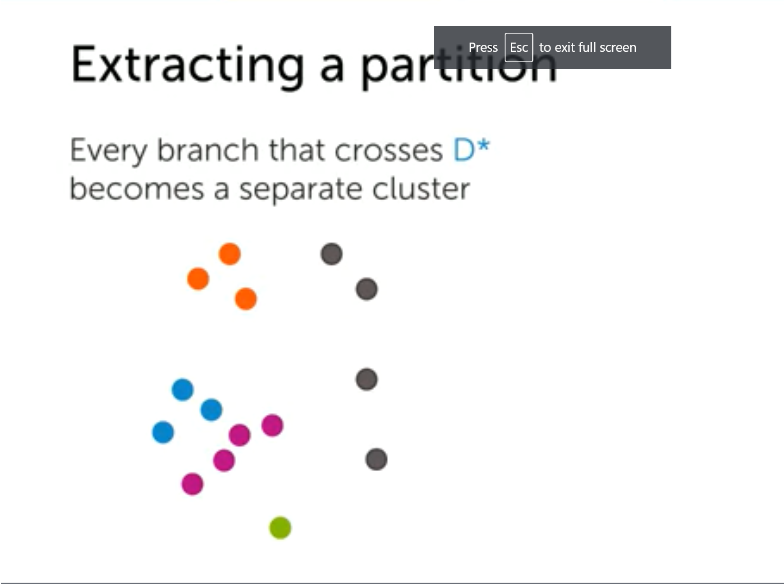
Dendogram :



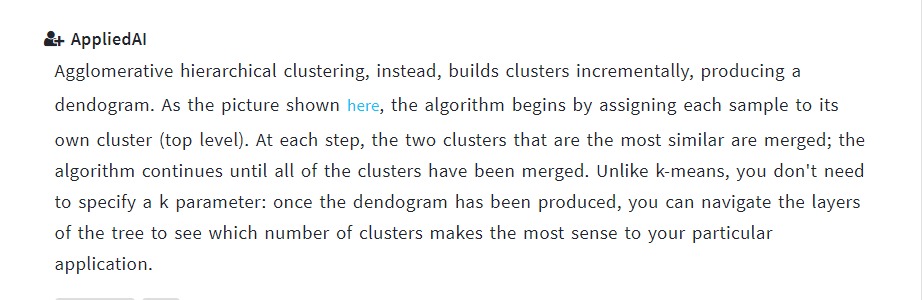








Comments :



Links:

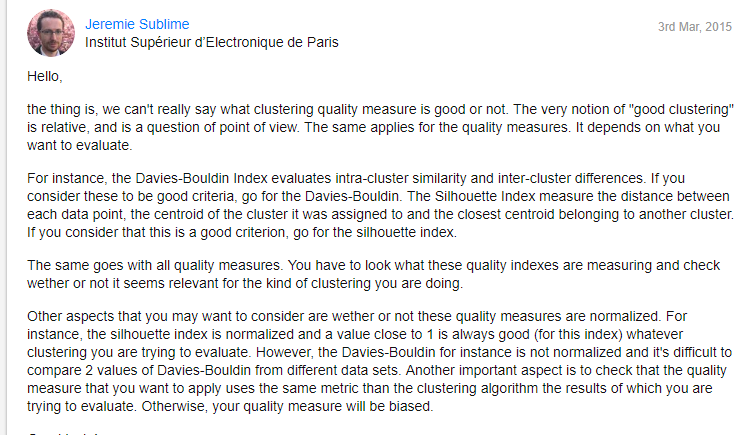
<https://pt.coursera.org/lecture/ml-clustering-and-retrieval/agglomerative-clustering-details-mFZqI>

Hierarichal clustering examples: very good read:

<https://towardsdatascience.com/hierarchical-clustering-and-its-applications-41c1ad4441a6>

showing dendrogram: <https://stackabuse.com/hierarchical-clustering-with-python-and-scikit-learn/>

when to use which metric for clustering:



<https://stats.stackexchange.com/questions/11691/how-to-tell-if-data-is-clustered-enough-for-clustering-algorithms-to-produce-m>