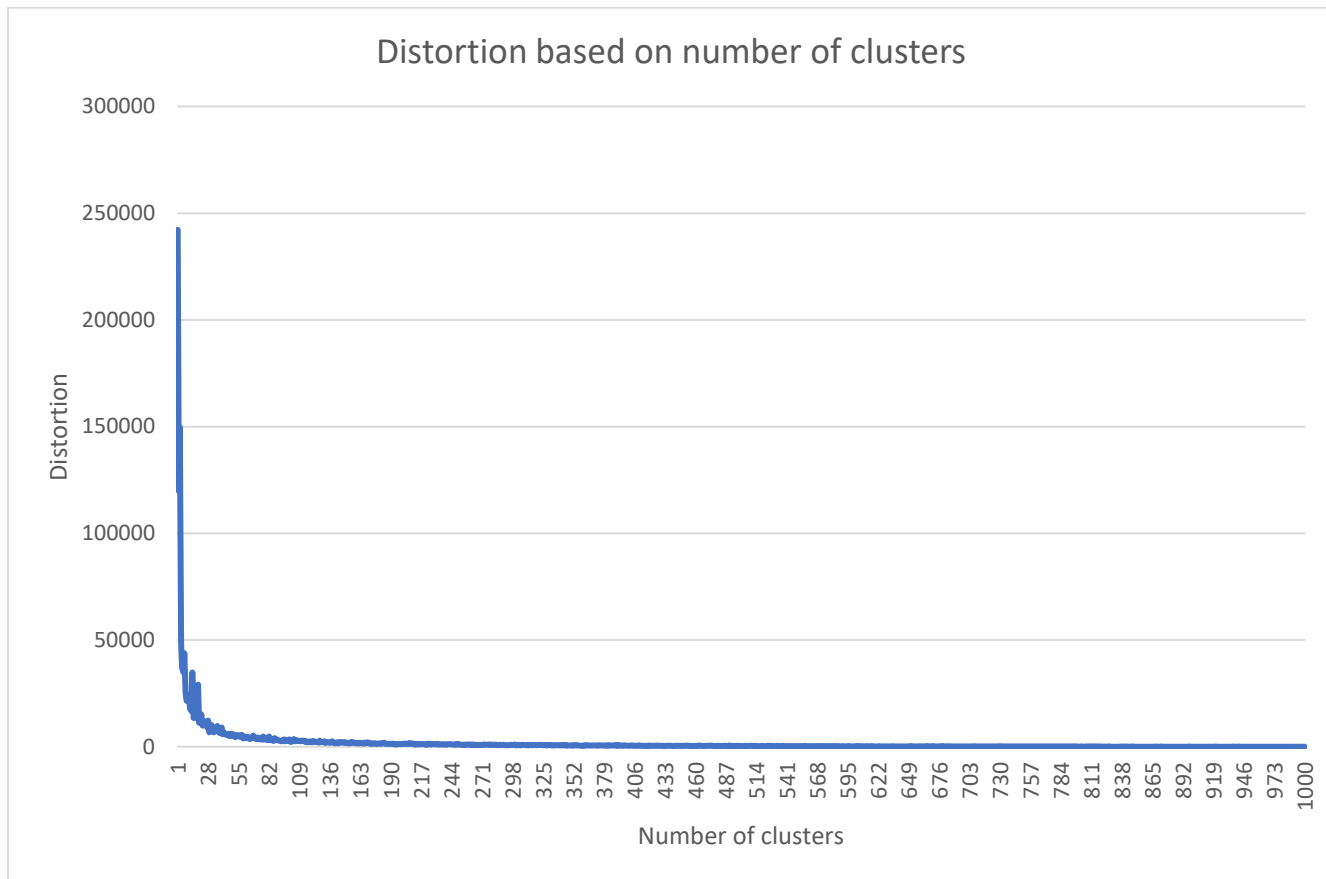


1. When you have n -points, the minimum number of clusters you can have is 1 cluster in which all n points belong to that single cluster. On the other hand, the maximum number of clusters one can have is n , 1 point for each cluster.

2.



3. The lowest possible distortion occurs when all the points in the data are the cluster centers which means the distance between the points and their assigned clusters is 0. This leads to a low distortion of 0.
4. To find the optimal number of clusters, we can plot the distortion values against the number of clusters. Once we get the graph itself, we look for the elbow on the graph. The elbow on this case is when our distortion value begins to level off. The optimal number of clusters in our case is around 5-9 clusters which varies per run on program as we use random centers leading to different distortion values in each run.