**PROJECT – Evaluation of Clustering Algorithms**

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COMP-344 (Section 01): Machine Learning and Data Mining II

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Goals:

Summary:

**Datasets**

**1-1.5**

**Dataset 1**

[**https://www.kaggle.com/datasets/rohan0301/unsupervised-learning-on-country-data**](https://www.kaggle.com/datasets/rohan0301/unsupervised-learning-on-country-data)

**Dataset 2**

[**https://www.kaggle.com/datasets/notshrirang/spotify-million-song-dataset/data**](https://www.kaggle.com/datasets/notshrirang/spotify-million-song-dataset/data)

**Dataset 3**

[**https://www.kaggle.com/datasets/dev0914sharma/customer-clustering**](https://www.kaggle.com/datasets/dev0914sharma/customer-clustering)

**Clustering Algorithms**

**K-Means**

K-Means is a clustering algorithm that initially requires a parameter k which represents the number of clusters.

K-Means algorithm is the following:

Step 1: k initial centroids are randomly chosen across the dataset.

Repeat:

Step 2: each data instance is assigned a cluster by assigning it to the closest centroid.

Step 3: centroids are recomputed by finding the “center of mass” of each current cluster.

Until centroids do not change (or change insignificantly, for example too few instances change their assigned clusters).

Other stopping conditions might be used, like limiting the number of iterations. This could work well in many scenarios because almost all convergence happens during first few iterations. This method is also useful because of the fact that algorithm might stuck in an infinite loop.

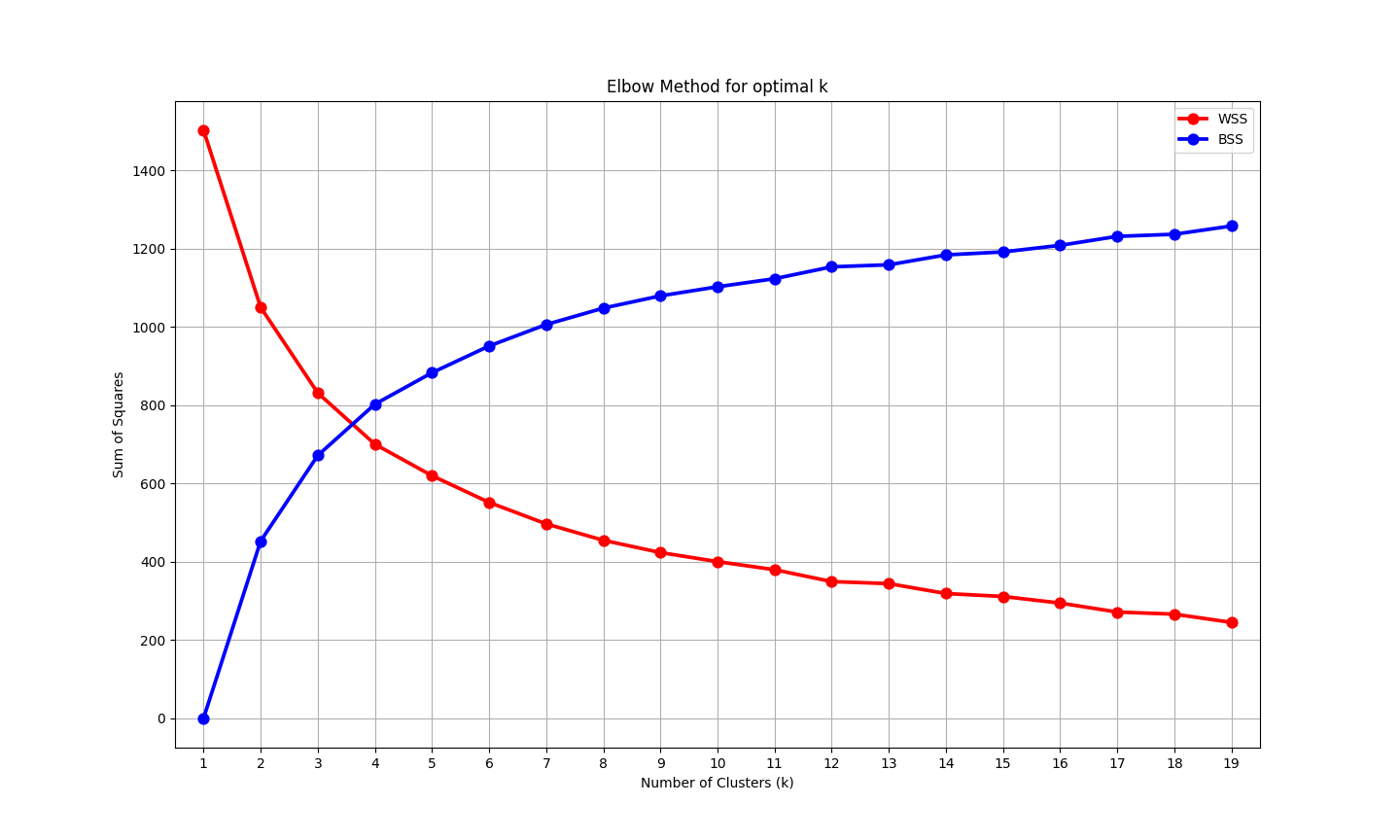
Advantages of the K-Means are that it is easy to implement and easy to interpret results. It is computationally fast efficient as well. The disadvantage, however, is that the number of clusters is not known in the beginning, so it is not clear which value of parameter k to choose. Besides, as the initial centroids are chosen randomly, it leads to different clustering on the same dataset from one run of the algorithm to another. Moreover, K-Means does not work well when it comes to dataset containing non-spherical clusters.

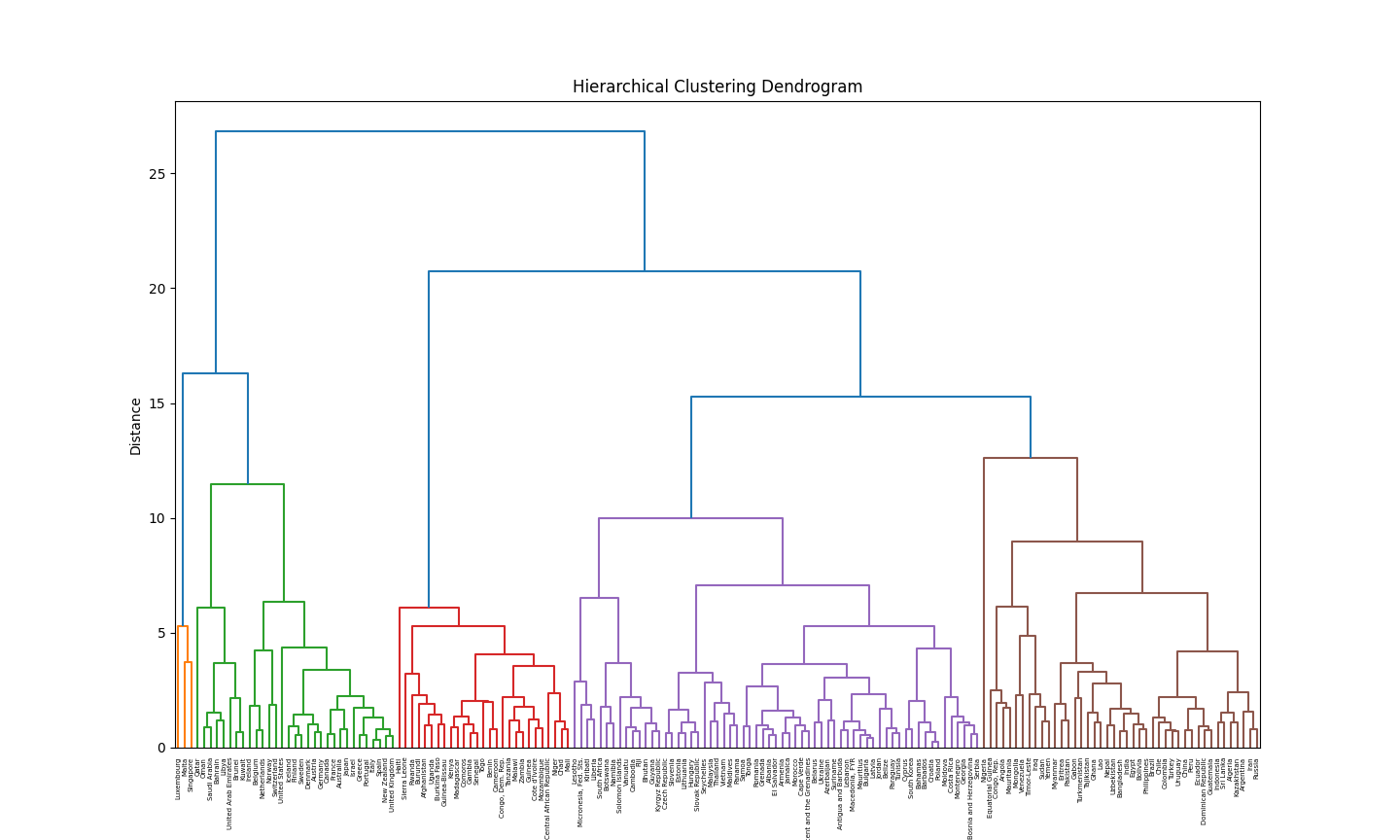
**Hierarchical (Agglomerative)**

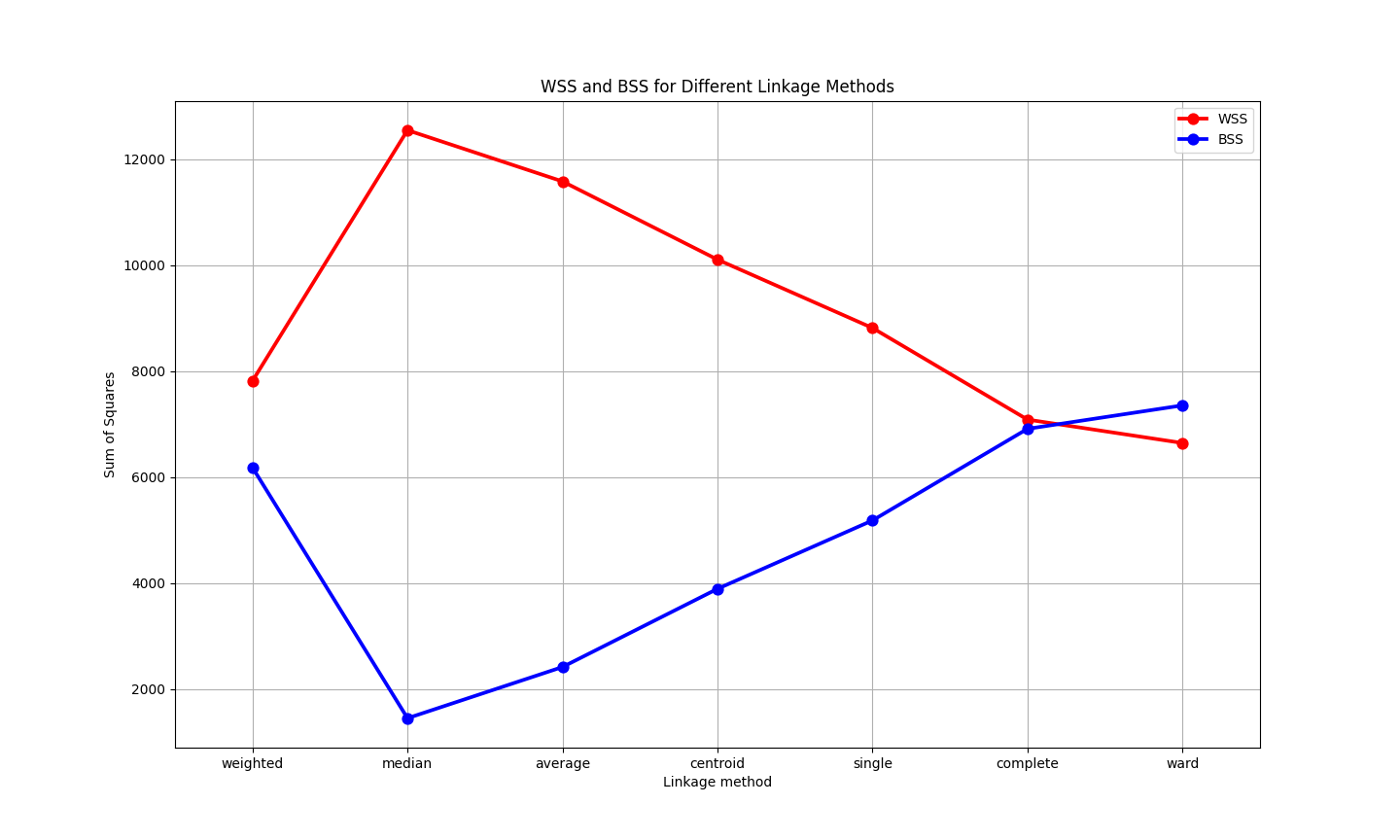
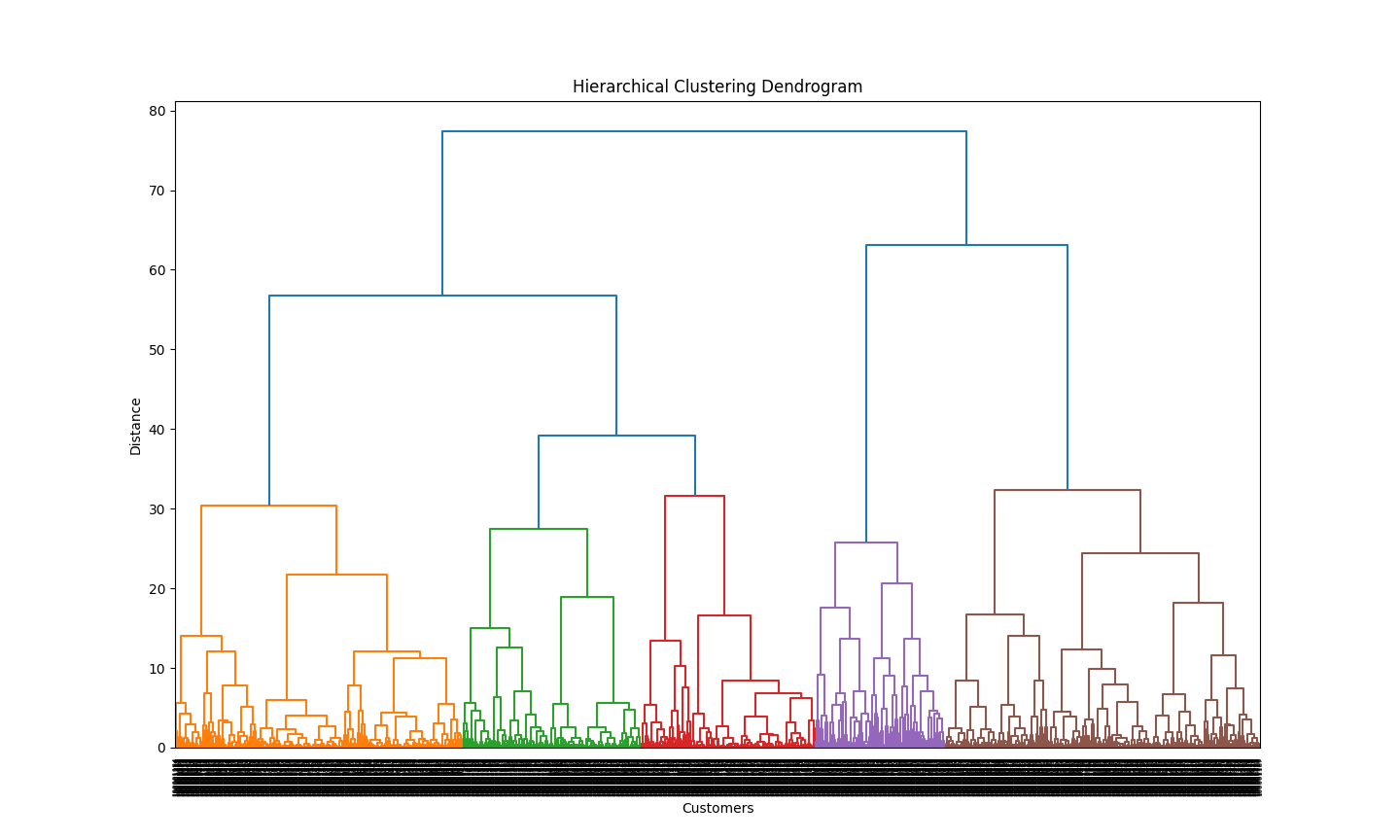
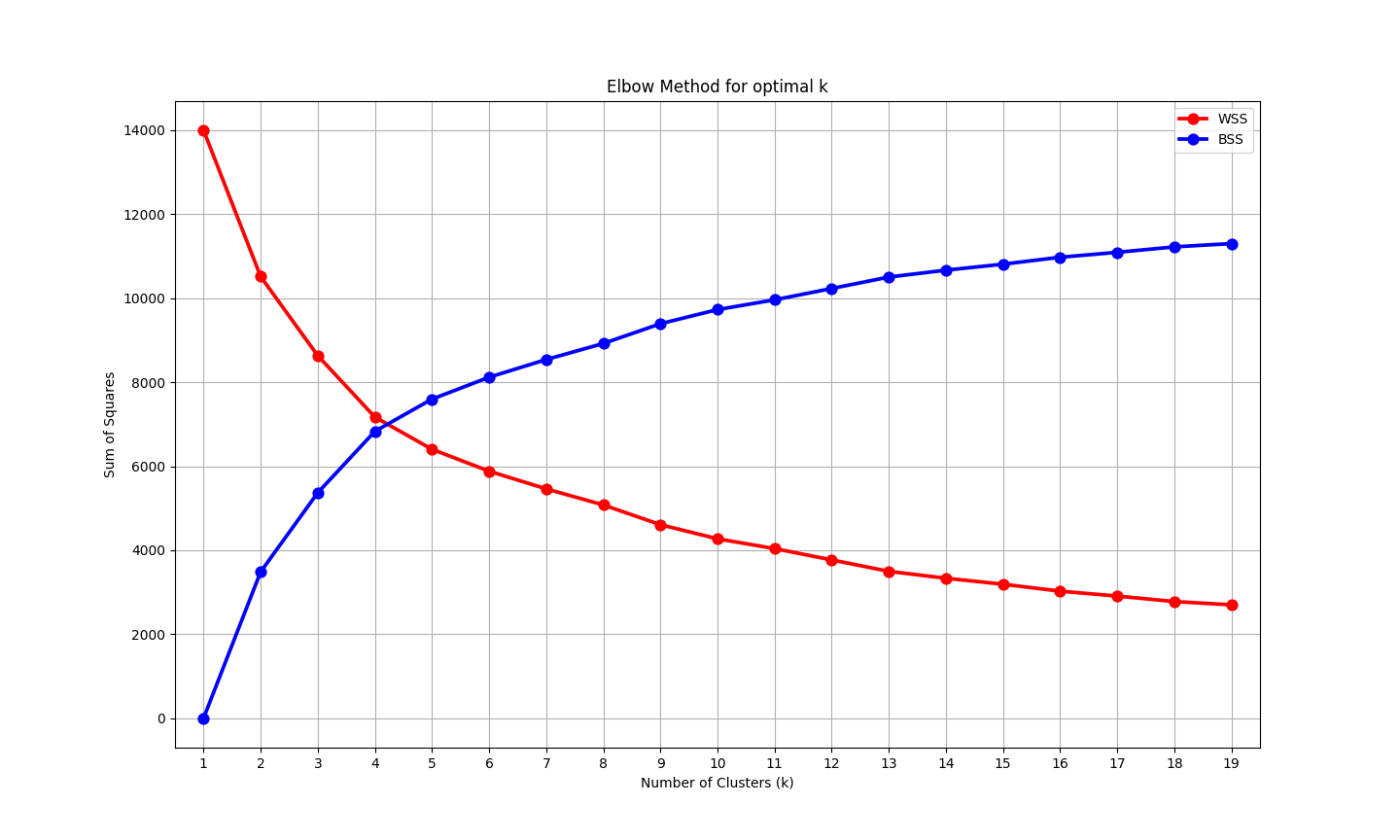
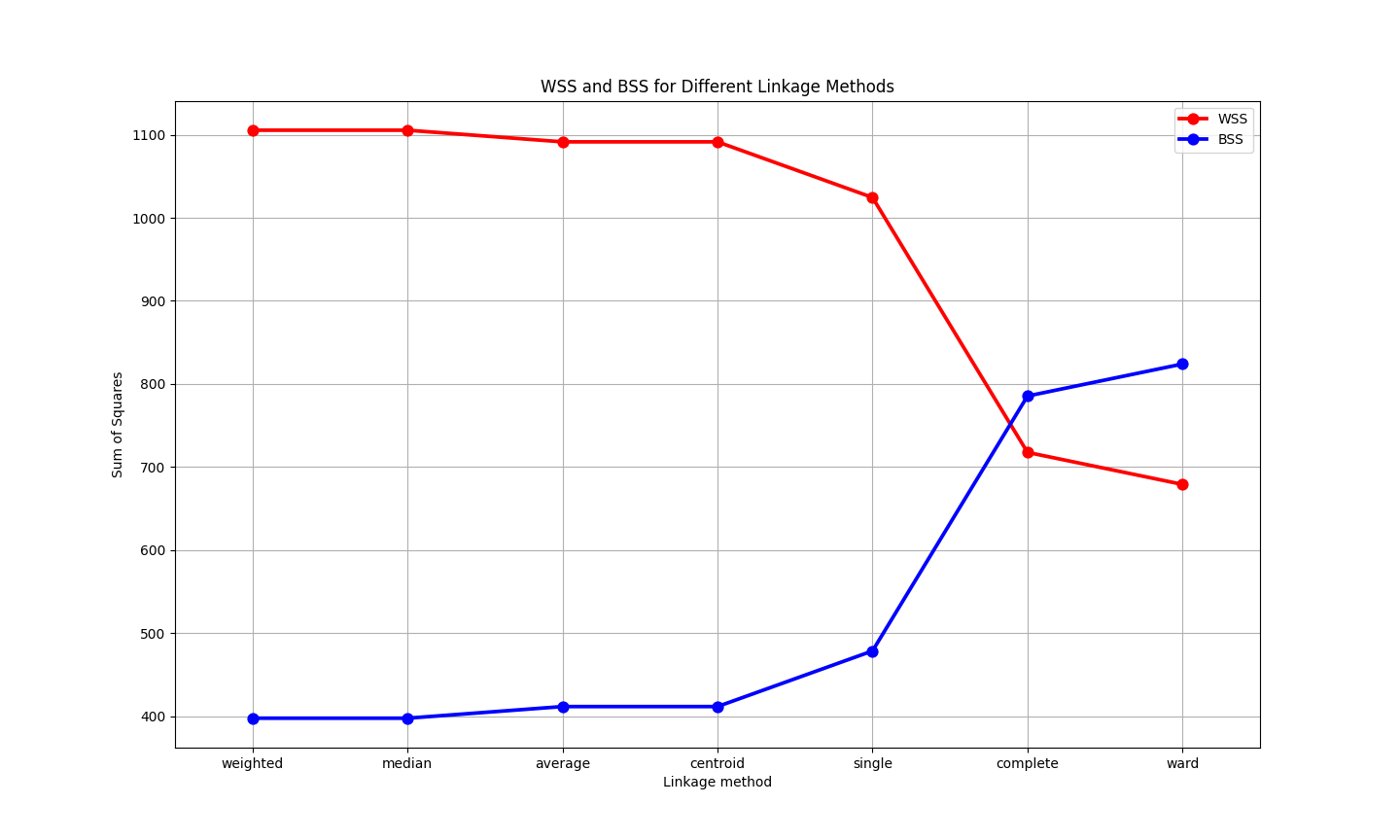
Hierarchical clustering

**DBSCAN**

**Results**

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**Discussion**

**Conclusions**

**References**

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