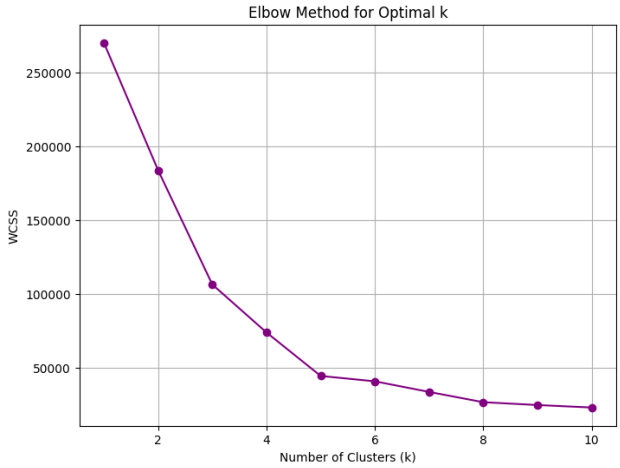
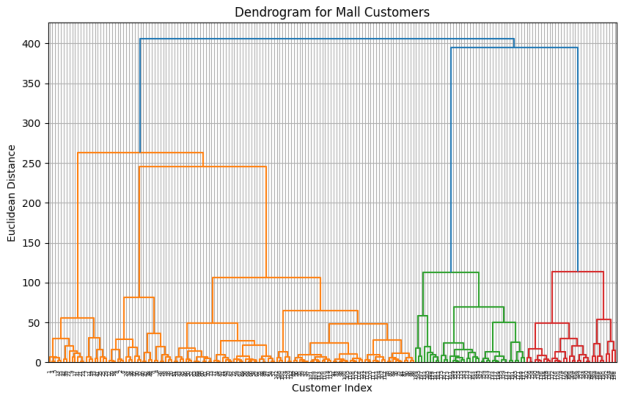
Report

Answer the following questions:

1. What was the optimal number of clusters you identified for K-Means and Hierarchical Clustering? Justify your choices using the Elbow Method plot and the Dendrogram.

Ans: I took, Optimal number of clusters = 5

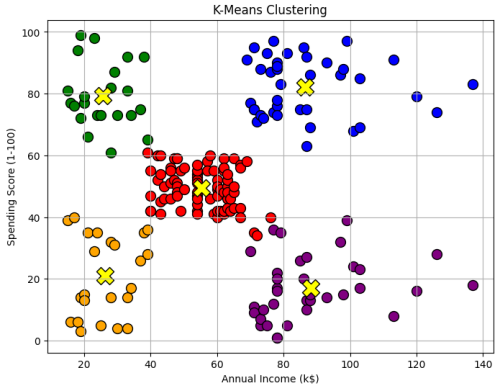


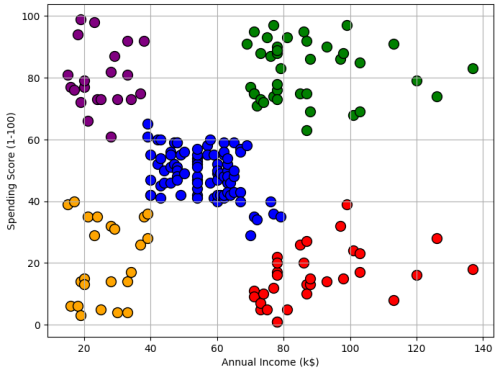


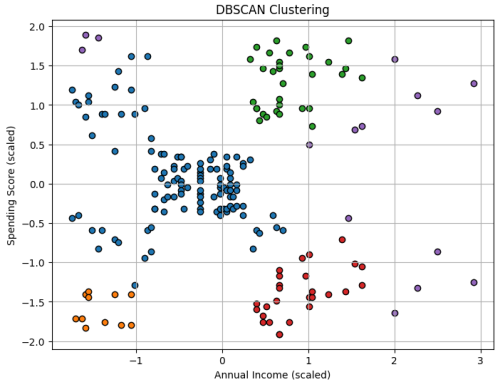
Observing Elbow method, at point 5 graph was dropping has started flattening now and in dendrogram passing a horizontal line through graph it intersects 5 vertical lines. It also does for 3 but Points within a cluster are more spread out in that case

2. Visually compare the results of the three algorithms. Did they produce similar clusters? Describe any notable differences.

Ans:







In DBSCAN number of cluster is automatically determined and for other two inputed by us.

In DBSCAN we can handle noise and not in other two.

K-mean is Centroid-based, Hierarchical Clustering is Connectivity-based and DBSCAN is Density-based

3. How did DBSCAN perform on this dataset? Did it identify any noise points? How did its results compare to the other methods which force every point into a cluster?

Ans: It performed well, divided dataset into 4 clusters and also identified some noise points. Other are more spherical shaped and this one is more arbitrary.

4. Based on your results, which algorithm do you think was most suitable for this specific dataset and why? Consider the shape and density of the clusters.

Ans: K-Mean was most suitable because The Clusters were more compact and spherical. The Elbow Method also said an optimal cluster count of 5. The dendrogram supported the same 5-cluster structure, but the method is less scalable and not that effective for large dataset.

5. Describe a hypothetical real-world business scenario where the customer segments you identified could be used by the mall's marketing team. For example, how would you target the group with high income but low spending score?

Ans: The mall can use customer segments to send targeted promotions. For example, customers with high income but low spending scores. To attract them the mall can offer:
VIP memberships
Invitations to exclusive events
Personalized discounts on luxury items