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Summary

Dataset Used:

The Wine dataset from the UCI repository (available through scikit-learn) was used. It contains 178 samples of wines with 13 numeric chemical properties as features, such as alcohol content, malic acid, and color intensity.

Number of Clusters:

Based on the Elbow method and dendrogram analysis, 3 clusters were chosen for both K-Means and Hierarchical Clustering algorithms.

Algorithm Comparison:

K-Means produced well-separated spherical clusters, while Hierarchical Clustering provided a dendrogram visualization that helped in understanding the nested grouping structure. Both methods largely agreed on cluster assignments, but slight differences arose due to their different distance and linkage criteria.

Cluster Interpretation:

The clusters corresponded to distinct groups of wines with similar chemical profiles. For example, one cluster showed higher alcohol and phenol levels, indicating a likely association with a particular wine variety. This clustering reveals natural groupings in the chemical characteristics of wines, useful for quality assessment and classification.