Clustering Results Report

Summary of Clustering Analysis

1. Number of Clusters Formed

The optimal number of clusters determined during the analysis is **clusters**. This was selected based on the Davies-Bouldin Index (DB Index), which measures cluster compactness and separation.

2. Davies-Bouldin Index (DB Index)

The minimum DB Index value achieved was , indicating the best cluster configuration among the tested range (2 to 10 clusters). Lower DB Index values suggest better clustering quality.

3. Other Relevant Metrics

Silhouette Score (Optional Metric)

While not computed in this analysis, the silhouette score is another metric that could validate the quality of clustering. It measures how similar data points are within a cluster compared to other clusters.

Visualization of Clusters

Two visualizations were generated to illustrate the clusters:

1. **DB Index Plot**: Shows the Davies-Bouldin Index for different cluster counts (2 to 10). The optimal number of clusters corresponds to the lowest point on this plot.
    - **Key Insight**: The optimal cluster count minimizes the DB Index.
2. **Scatter Plot of Clusters**: Visualizes the clusters on key metrics (e.g., Total Spent vs. Average Order Value) with each cluster highlighted in distinct colors.
    - **Key Insight**: Distinct clusters indicate segments of customers with varying spending habits and order behaviors.

Key Findings and Insights

1. **Customer Segments**:
    - Each cluster represents a unique customer segment with distinct characteristics such as spending habits, frequency of purchases, and recency of last purchase.
    - For example:
        - Cluster A: High spenders with frequent purchases.
        - Cluster B: Low spenders with infrequent purchases.
2. **Actionable Insights**:
    - **Retention Strategies**: Focus retention efforts on customers in Cluster , who contribute the most revenue.

- **Promotions**: Offer promotions to encourage higher spending among customers in Cluster .
- **Personalization**: Tailor marketing campaigns based on cluster-specific preferences and behaviors.

Conclusion

The clustering analysis successfully identified meaningful customer segments. The results provide actionable insights for targeting and retaining customers, improving overall business strategy. Further refinement using additional metrics, such as silhouette scores or alternative clustering methods, could enhance these findings.