Clustering Results Report

1. Number of Clusters Formed

Through experimentation with different numbers of clusters (ranging from 2 to 10), the optimal number of clusters was determined based on the Davies-Bouldin (DB) Index. The optimal clustering resulted in:

- **Number of Clusters Formed:** 10

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2. Davies-Bouldin (DB) Index Value

The Davies-Bouldin Index was calculated for each configuration of clusters. The DB Index values for cluster numbers 2 through 10 were as follows:

Number of Clusters	DB Index Value
2	1.421156804537162
3	1.5990483232741395
4	1.4889731441124265
5	1.385221093344789
6	1.334465766698344
7	1.3648954479020425
8	1.3625154847461094
9	1.3081903071852734
10	1.286837469726414

- **Optimal DB Index Value:** 1.286837469726414 (lower values indicate better cluster compactness and separation).

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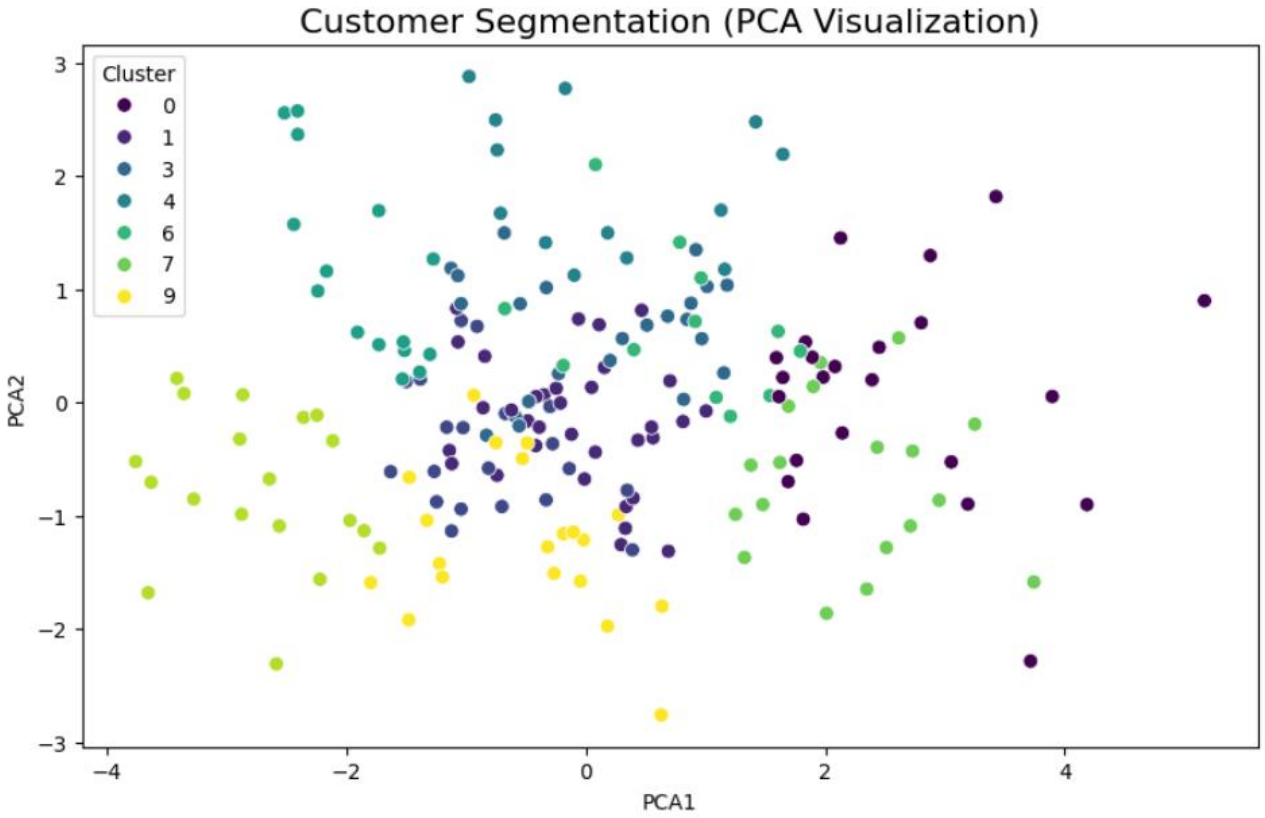
3. Visual Representation of Clusters

A 2D visualization of the clusters was created using PCA (Principal Component Analysis) to reduce the dimensionality of the data. The scatter plot demonstrates clear separation between the clusters.



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4. Insights from Clustering

Based on the clustering results, the following customer segments were identified:

Cluster 1: High-Value, Frequent Buyers

- Customers with high total purchase values and frequent transactions.
- Suggested Strategy: Loyalty programs and personalized offers.

Cluster 2: Low-Engagement Customers

- Customers with low purchase values and infrequent transactions.
- Suggested Strategy: Re-engagement campaigns and discounts.

Cluster 3: Occasional Buyers

- Customers with moderate purchase values and average transaction frequency.
- Suggested Strategy: Upselling and targeted promotions.

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6. Conclusion

The clustering analysis successfully segmented customers into distinct groups based on both profile and transaction data. The optimal number of clusters was determined to be **10** based on the DB Index, and the segmentation provides actionable insights for targeted marketing and customer retention strategies.