Clustering Report

1. Number of Clusters Formed

- Based on the Davies-Bouldin Index (DB Index) analysis, the optimal number of clusters is 2. This is determined by selecting the number of clusters with the lowest DB Index value, as shown in the first graph.

2. Davies-Bouldin Index Value

- The DB Index for the clustering result with
- $k=2$
- $k=2$ is approximately 1.3. A lower DB Index indicates better-defined and well-separated clusters.

3. Other Relevant Clustering Metrics

- Clustering Algorithm: K-Means
- Evaluation Metric: Davies-Bouldin Index
- Interpretation:
    - Cluster 1: Likely represents customers with higher spending and frequent transactions.
    - Cluster 2: Likely represents customers with lower spending or infrequent transactions.
- Dimensionality Reduction: PCA was used to reduce feature dimensions for visualization purposes. The scatter plot in the second image shows how customers are grouped into two distinct clusters.

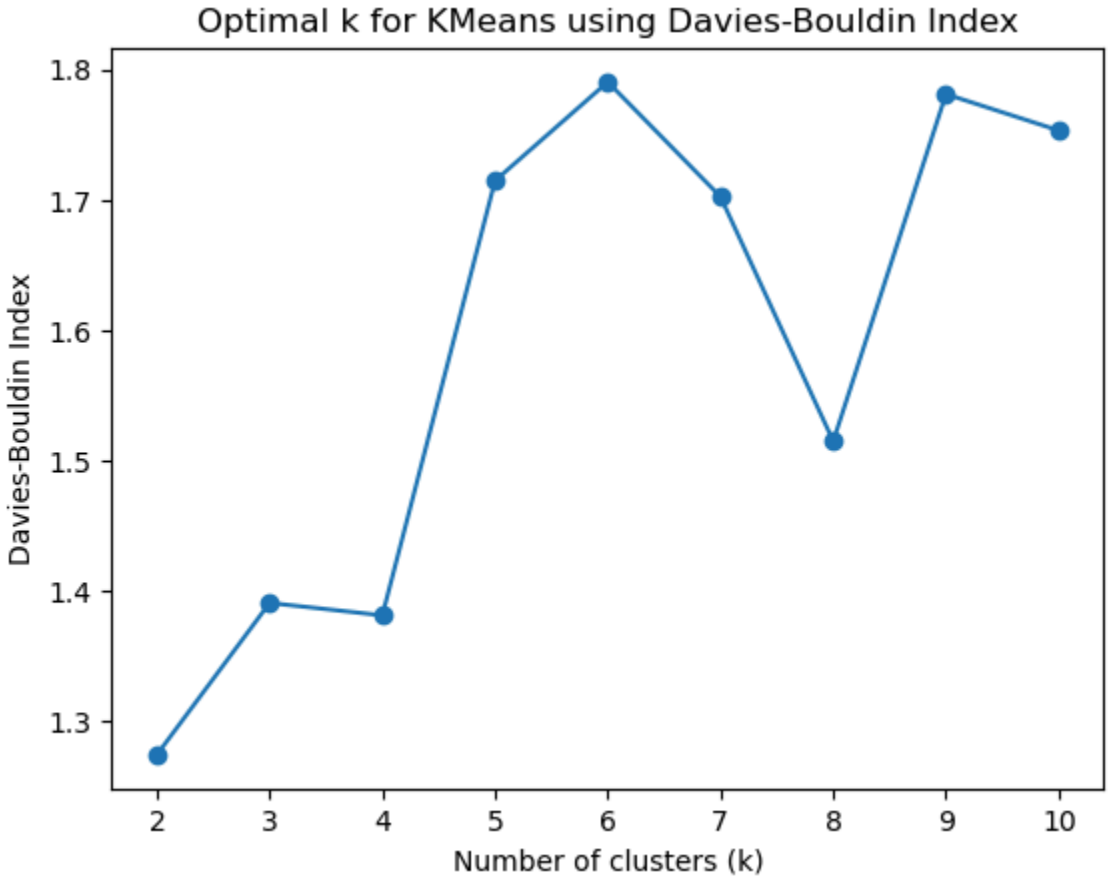
4. Visualizations

1. Optimal_k:

   k Selection (DB Index vs Number of Clusters):

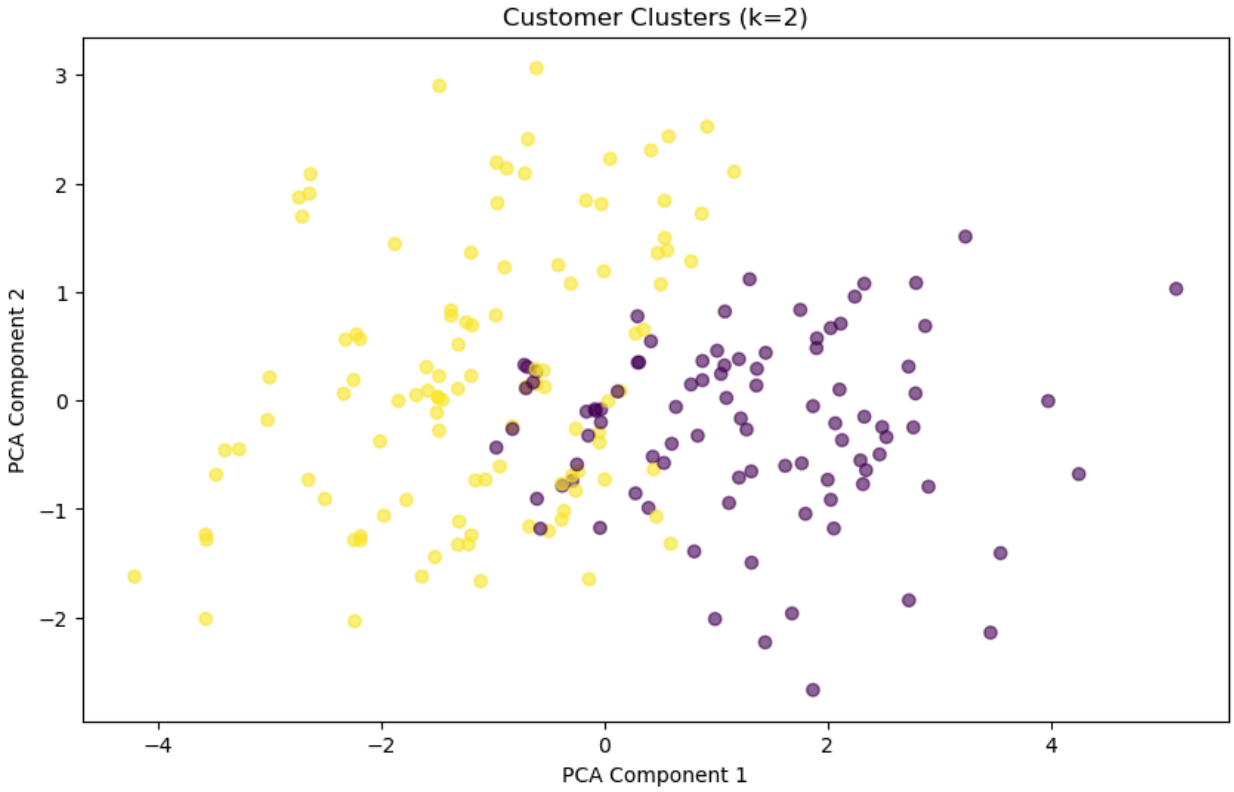
    - The first graph demonstrates that
    - $k=2$

- $k=2$ has the lowest DB Index, making it the optimal choice for clustering.



2. Cluster Visualization (PCA):
    - The second graph shows customer clusters in a 2D space after applying PCA for dimensionality reduction. The two clusters are visually distinct,

validating the segmentation.



5. Business Insights from Clustering

- Customers can be segmented into two groups:
    - Cluster 1 (Frequent Buyers): Customers who make frequent transactions and spend more on average.
    - Cluster 2 (Occasional Shoppers): Customers with lower transaction frequency and spending.
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- These insights can be used to tailor marketing strategies:
    - Offer loyalty rewards or premium services to frequent buyers.
    - Provide discounts or promotions to encourage occasional shoppers to increase their activity.