Customer Segmentation Report

Number of Clusters Formed

- Based on the evaluation of the Davies-Bouldin (DB) Index for clusters ranging from 2 to 10, the optimal number of clusters formed is **5**.

Davies-Bouldin Index (DB Index)

- The DB Index for the 5-cluster configuration is **1.3**.

- The DB Index measures the compactness and separation of clusters; lower values indicate better-defined clusters. The 5-cluster configuration achieved the lowest DB Index, making it the optimal choice.

Cluster Characteristics

The 5 clusters represent distinct customer groups based on spending habits, transaction frequencies, and product category preferences:

- **Cluster 1:**

    - High spenders with frequent transactions.

    - Predominantly purchase Electronics.

- **Cluster 2:**

    - Moderate spenders with balanced category preferences.

    - Exhibit regular shopping patterns.

- **Cluster 3:**

    - Low-frequency shoppers, primarily buying Books.

- **Cluster 4:**

    - Customers focused on Home Decor with high average transaction values.

- **Cluster 5:**

    - Clothing-focused customers with moderate spending.

Visualizations

- **DB Index Visualization:**

    - A line plot of DB Index values across 2–10 clusters confirms that 5 clusters yield the best clustering performance.

- **PCA-Based Cluster Visualization:**

    - PCA was used to reduce the feature space to 2 dimensions for visualization.

    - A scatter plot of the PCA components shows distinct separations between the 5 clusters, validating the segmentation.

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