Clustering Results Report

Overview

This report focuses on the clustering results derived from the provided dataset, detailing the number of clusters formed, evaluation metrics, and key insights from the segmentation process.

Number of Clusters Formed

The optimal number of clusters identified through evaluation metrics is 5.

Evaluation Metrics

1. Davies-Bouldin Index

- Value: 0.6582

- Description: The DB Index measures the compactness and separation of clusters. Lower values indicate better clustering quality.

2. Silhouette Score

- Value: 0.72

- Description: This score assesses how well-separated clusters are, with higher values indicating better-defined clusters. A score of 0.72 reflects meaningful segmentation.

Cluster Characteristics

The following table summarizes the key statistics for each cluster:

Cluster	Avg Spending	Median Spending	Avg Transactions	Customer Count
0	$3,175.12	$3,087.69	4.57	49
1	$3,311.16	$3,034.21	5.30	46
2	$3,717.84	$3,434.77	5.15	59
3	$5,658.01	$5,550.99	7.63	19
4	$2,124.87	$2,187.21	3.19	26

Regional Distribution

1. Cluster 0: 100% of customers from Europe.

2. Cluster 1: 100% from North America.

3. Cluster 2: 100% from South America.

4. Cluster 3: Predominantly Asia (94.7%) with some from Europe (5.3%).

5. Cluster 4: 100% from Asia.

Cluster Insights

1. Cluster 3: Represents high-spending and frequent buyers, averaging $5,658.01 in spending with 7.63 transactions.

2. Cluster 4: Comprises low-spending and infrequent buyers, with average spending of $2,124.87 and 3.19 transactions.

3. Clusters 0, 1, and 2: Exhibit moderate spending and transaction behavior, varying by region.

Dimensionality Reduction

PCA (Principal Component Analysis) was applied to visualize the clusters in a 2D space. The visualization confirmed distinct separation between the clusters, validating the segmentation process.

Representative Customers

The following table highlights one representative customer from each cluster:

Cluster	CustomerID	Spending	Transactions	Region
0	C0041	$6,149.78	7	Europe
1	C0065	$7,663.70	10	North America
2	C0082	$7,572.91	7	South America
3	C0141	$10,673.87	10	Europe
4	C0040	$3,969.40	3	Asia

Conclusion

The clustering results provide actionable insights into customer behavior. These insights can guide targeted marketing campaigns, loyalty programs, and product bundling strategies to maximize engagement and revenue growth.