Report on Clustering Metrics:

A report on your clustering results, including:

- The number of clusters formed.
- DB Index value.
- Other relevant clustering metrics.

I used K-Means clustering to group customers based on their spending habits, transaction patterns, and regions. The goal was to identify distinct customer segments to support tailored marketing and business strategies.

K-Means clustering is an unsupervised machine learning algorithm used to group data points into a specified number of clusters (k). It works by dividing a dataset into clusters such that the points in the same cluster are more similar to each other than to those in other clusters.

Number of Clusters :

Number of clusters formed : **4**

Davies-Bouldin Index:

- DB Index value: **0.897**
- It shows how similar one cluster is to another . With a score of 0.897 ,the clusters show moderate separation.
- The Davies-Bouldin Index suggests moderate separation between clusters, indicating room for improvement in the clustering structure.

.Other relevant clustering metrics

Sihoutte Score:

- Sihoutte score **: 0.425**

- It measures how well a customer fits into their assigned cluster compared to others .

Inertia :

- Inertia value : **260**
- It measures how tightly data points are clustered around their centers .
- It's best used alongside the Davies-Bouldin Index and Silhouette Score for a complete analysis.

Cluster Characteristics:

By analyzing the cluster centers, the following groups were identified:

Cluster 0: Customers in this cluster exhibit high TotalSpending and a high TransactionCount, indicating they are frequent and high-value customers.

Cluster 1: Customers in this cluster have the lowest TotalSpending, TransactionCount, and AvgTransactionValue, suggesting they are infrequent buyers and spend less compared to other clusters. They represent a segment of less engaged customers.

Cluster 2: Customers in this cluster are characterized by moderate TotalSpending and TransactionCount with a high AvgTransactionValue. They might represent a segment of customers who make occasional but relatively large purchases.

Cluster 3: Customers in this cluster have low TotalSpending and TransactionCount, with an average AvgTransactionValue. This segment might represent customers who have recently started engaging with the business or those who make small, infrequent purchases.