Customer Clustering Report

The objective of this analysis is to perform customer segmentation using clustering techniques based on both customer profile and transaction data. The segmentation aims to group customers with similar behaviours, enabling the business to optimize marketing strategies, improve inventory management, and enhance customer engagement.

Clustering Results

1. Number of Clusters Formed

- The optimal number of clusters identified is **2**, based on the evaluation of the **Davies-Bouldin Index (DB Index)**.

2. Clustering Metric: Davies-Bouldin Index

- The DB Index for K=2 is **0.63**, the lowest value compared to other cluster sizes (K=2 to K=10).
- A lower DB Index indicates better clustering, as it reflects compact and well-separated clusters.

3. Cluster Characteristics

Cluster 0 (Yellow):

- **Description**: Customers with **lower total transaction values** and **smaller purchase quantities**.
- **Customer Behaviour**: Represents occasional or cost-conscious buyers.

Cluster 1 (Purple):

- **Description**: Customers with **higher total transaction values** and **larger purchase quantities**.
- **Customer Behaviour**: Represents high-value or frequent buyers who contribute significantly to revenue.

Visualization

A scatter plot was generated to visualize the two clusters based on normalized transaction data:

- **X-Axis**: Normalized Total Transaction Value (TotalValue)
- **Y-Axis**: Normalized Quantity of Items Purchased (Quantity)

Clusters from the Plot:

- **Cluster 0 (Yellow)**: Customers with smaller purchases and lower quantities.
- **Cluster 1 (Purple)**: Customers with larger purchases and higher quantities.

Business Insights

1. Customer Segmentation

- **Cluster 0**:
  - Represents customers with lower spending.
  - Insight: Offer targeted discounts or bundle deals to increase transaction value and frequency.
- **Cluster 1**:
  - Represents high-value customers.
  - Insight: Retain these customers with loyalty programs, exclusive deals, and personalized offers.

2. Marketing Strategy

- Allocate resources strategically to engage **Cluster 1**, the high-value customers.
- Develop campaigns tailored for **Cluster 0** to encourage higher spending.

3. Inventory Management

- Prioritize stock availability for products frequently purchased by **Cluster 1** to meet their demand and ensure satisfaction.

Conclusion

The clustering analysis successfully segmented customers into two meaningful groups with distinct behaviours. The **Davies-Bouldin Index (DB Index)** of **0.63** confirms the quality of the clustering, making this segmentation actionable for strategic business decisions. These results provide a foundation for targeted marketing, improved customer engagement, and optimized inventory management.