Customer Segmentation / Clustering

1. Objective : The objective is task to perform customer segmentation using clustering technique,

- Utilizing Dataset Customer profile information from Customers.csv
- Transactional details information from Transactions.csv.

2. Methodology

A. Feature Engineering:

- TotalValue: Total revenue generated by each customer.
- Quantity: Total quantity of items purchased. TransactionID:
- Number of transactions made by the customer. ProductID:
- Number of unique products purchased.

B. Clustering Algorithm:

- Used KMeans Clustering with 5 clusters
- Evaluated the clustering performance using the Davies-Bouldin Index (DB Index).

C. Dimensionality Reduction:

- Applied Principal Component Analysis (PCA) to reduce high-dimensional data to 2 dimensions for visualization.

B. Visualization:

- Generated a scatter plot to visualize the clusters in a 2D space, where each cluster is represented by a unique colour.

3. Results

3.1 Key Metrics

- Davies-Bouldin Index: 0.9174 (Lower values indicate better clustering quality).
- Number of Clusters: 5.

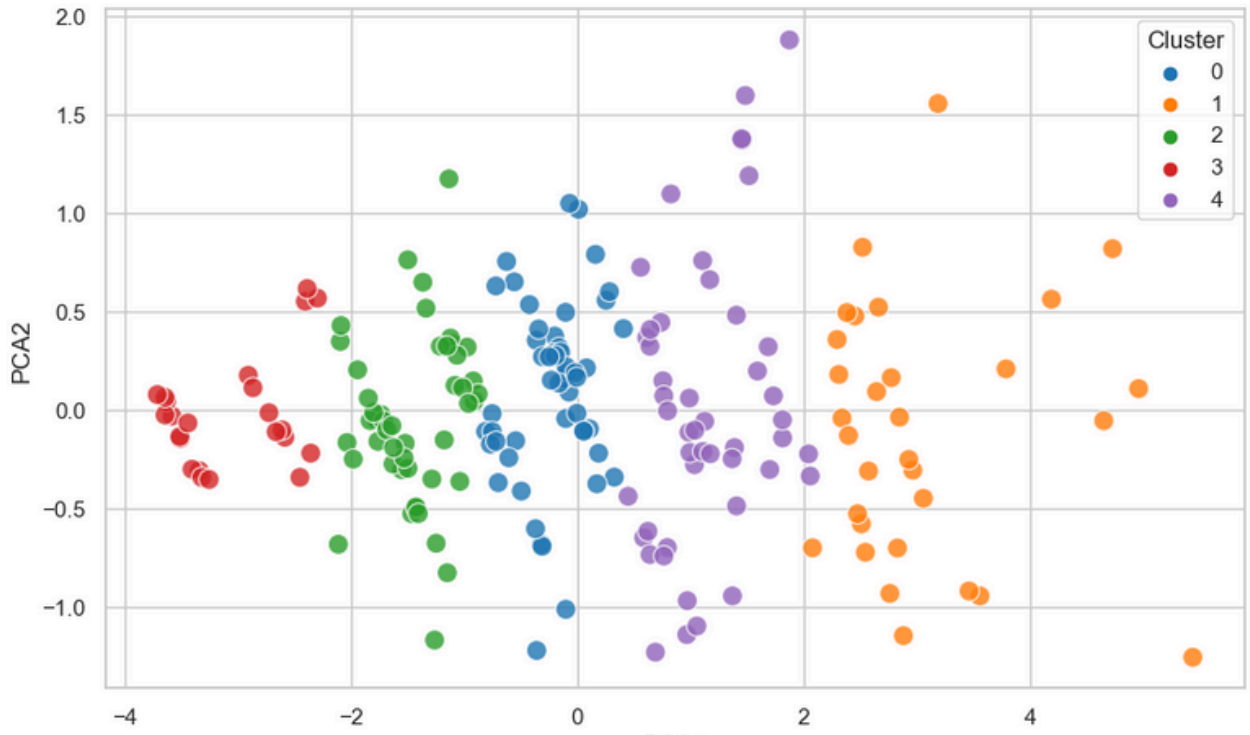
3.2 Clustered Data:

CustomerID	TotalValue	Quantity	TransactionID	ProductID	Cluster
C0001	3354.52	12	5	5	0
C0002	1862.74	10	4	4	2
C0003	2725.38	14	4	4	0
C0004	5354.88	23	8	8	1
C0005	2034.24	7	3	3	2

4. Visualization

The following scatter plot shows the customer clusters after applying Principle Clustering

Analsis for dimensionality reduction:



5.Conclusion:

- Customers were successfully segmented into 5 distinct clusters based on their purchasing behavior and profile attributes.
- The clusters can be used to derive targeted marketing strategies and personalized recommendations for each group.
- The Davies-Bouldin Index of 0.9174 indicates reasonable cluster quality, with distinct boundaries between groups.