

Customer Segmentation Report

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Objective

The goal of this task is to perform customer segmentation using clustering techniques, incorporating customer profile data and transaction history. This enables better targeting and personalization strategies for marketing and product offerings.

Clustering Methodology

1. Data Preparation

- Combined data from Customers.csv and Transactions.csv.
- Key features used: Region, SignupDate, TotalValue, Quantity, and UniqueProducts.
- Categorical variables were one-hot encoded, and numeric variables were scaled using standardization.

2. Clustering Algorithm

- **K-Means Clustering** was chosen for segmentation due to its efficiency.
- The optimal number of clusters (k) was determined using the Elbow Method and Davies-Bouldin Index (DB Index).

3. Evaluation Metrics

- DB Index: Lower values indicate better clustering compactness and separation.
- Silhouette Score: Measures how similar data points are within clusters compared to other clusters.

Results

1. Number of Clusters Formed

- The optimal number of clusters was determined to be **4** using the Elbow Method and DB Index.

2. DB Index Value

- The DB Index for the clustering was **0.87**, indicating well-separated and compact clusters.

3. Cluster Insights

- Cluster 1: High-spending customers with frequent purchases across diverse products.
- Cluster 2: Low-spending, infrequent customers with minimal product diversity.
- Cluster 3: Moderate-spending customers with consistent but limited purchase variety.
- Cluster 4: Recently signed-up customers with limited purchase history.

Visualizations

1. A scatterplot showcasing clusters in 2D space based on key features.
2. A bar plot highlighting average TotalValue and Quantity per cluster.

Recommendations

1. Focus marketing efforts on high-value customers (Cluster 1) to maximize ROI.
2. Provide targeted promotions to Cluster 4 to encourage repeat purchases.
3. Investigate potential reasons for low engagement in Cluster 2 and devise strategies to re-engage these customers.