Customer Segmentation Report

Overview

This report summarizes the customer segmentation analysis conducted using clustering techniques on the datasets Customers.csv and Transactions.csv. The analysis aims to identify distinct customer segments based on their profile and transaction behaviors.

Data Sources

- **Customers.csv**: Contains customer profile information.
- **Transactions.csv**: Contains transaction details for each customer.

Clustering Methodology

Clustering Algorithm

- **K-Means Clustering** was chosen for this analysis due to its effectiveness in partitioning data into distinct clusters.

Number of Clusters

- The analysis explored cluster numbers ranging from **2 to 10**. The optimal number of clusters was determined based on clustering metrics.

Clustering Metrics

Davies-Bouldin Index (DB Index)

- The DB Index was calculated for each number of clusters to evaluate the clustering quality. A lower DB Index indicates better separation between clusters.

Silhouette Score

- The Silhouette Score was also computed to assess how similar an object is to its own cluster compared to other clusters. A higher score indicates better-defined clusters.

Results

Number of Clusters Formed

- The optimal number of clusters identified was **[insert optimal number here]** based on the analysis of the DB Index and Silhouette Score.

DB Index Value

- The DB Index value for the optimal clustering solution was **[insert DB Index value here]**.

Other Relevant Clustering Metrics

- **Silhouette Score**: **[insert Silhouette Score here]**
- **Inertia**: **[insert Inertia value here]** (if calculated)

Visualizations

Clustering Metrics Visualization

- A line plot was created to visualize the DB Index and Silhouette Score across different cluster numbers, helping to identify the optimal clustering configuration.

Cluster Visualization

- A scatter plot visualizing the clusters was generated using PCA (Principal Component Analysis) to reduce the dimensionality of the feature space. This plot illustrated how customers were grouped into distinct segments.

Conclusion

The customer segmentation analysis successfully identified distinct customer groups based on their profile and transaction behaviors. The findings can be utilized for targeted marketing strategies and personalized customer engagement.