

# Clustering Analysis Report

## 1. Overview :

- The clustering analysis was conducted on the eCommerce Transactions dataset to identify distinct customer segments.
- The dataset included features like transaction history, product preferences, and regional data, enabling a comprehensive analysis.
- The primary objective was to gain insights into customer behavior for personalized marketing and improved resource allocation.

## 2. Key Insights from Clustering

- Optimal Number of Clusters: 3

Using the Elbow Method and Davies-Bouldin Index, three clusters were identified as optimal.

- Cluster Characteristics:
  - Cluster 0: High-value customers with significant transaction volumes.
  - Cluster 1: Moderate-value customers with steady purchase behavior.
  - Cluster 2: Low-value customers with infrequent activity.
- Metrics:
  - Silhouette Score: 0.3137 (moderate cluster separation with slight overlap).
  - Davies-Bouldin Index: 1.1989 (indicating reasonably distinct clusters).

## 3. Visualizations:

- The clustering results were visualized using several plots:

1. Elbow Method Plot: Highlighted an 'elbow' at 3 clusters.
2. Cluster Scatter Plot: Showed customer distribution across clusters based on key features.
3. Pairwise Feature Plot: Illustrated cluster separation using combinations of features like Total Spend and Transaction Count.

### **Recommendations:**

1. Prioritize high-value customers (Cluster 0) by offering loyalty programs and personalized incentives.
2. Encourage moderate-value customers (Cluster 1) to increase spending through targeted campaigns.
3. Investigate the needs of low-value customers (Cluster 2) and devise strategies for engagement or reactivation.
4. Monitor cluster metrics periodically to ensure segmentation remains effective.