

## 1. Introduction:

**Customer segmentation was performed to identify distinct groups of customers based on their transactional behaviors and profile characteristics.** This analysis helps understand customer purchasing patterns, engagement, and spending habits, enabling businesses to develop more targeted marketing and sales strategies.

## 2. Summary of Findings:

- **Customer Behavior Patterns:** We found that customers can be divided into different groups based on transaction frequency, total spending, and average transaction value.
- **Spending Insights:** High-value customers tend to make fewer but larger purchases, while frequent low-spending customers make regular but smaller purchases.
- **Regional Insights:** There were some noticeable patterns by region, where customers from South America had higher average transactions compared to customers in Asia.

## 3. Number of Clusters Formed:

- **4 Clusters** were formed after running the **K-Means clustering algorithm** on the customer transaction and profile data. The optimal number of clusters was determined using the **Elbow Method** and validated using the **Silhouette Score**.

## 4. Evaluation Metrics:

### ❖ **Silhouette Score: 0.53**

- The **Silhouette Score** indicates the cohesiveness of the clusters. A value close to 1 suggests well-separated clusters, and our score of 0.53 suggests a moderate level of cohesion and separation.

### ❖ **DB Index (Davies-Bouldin Index): 0.65**

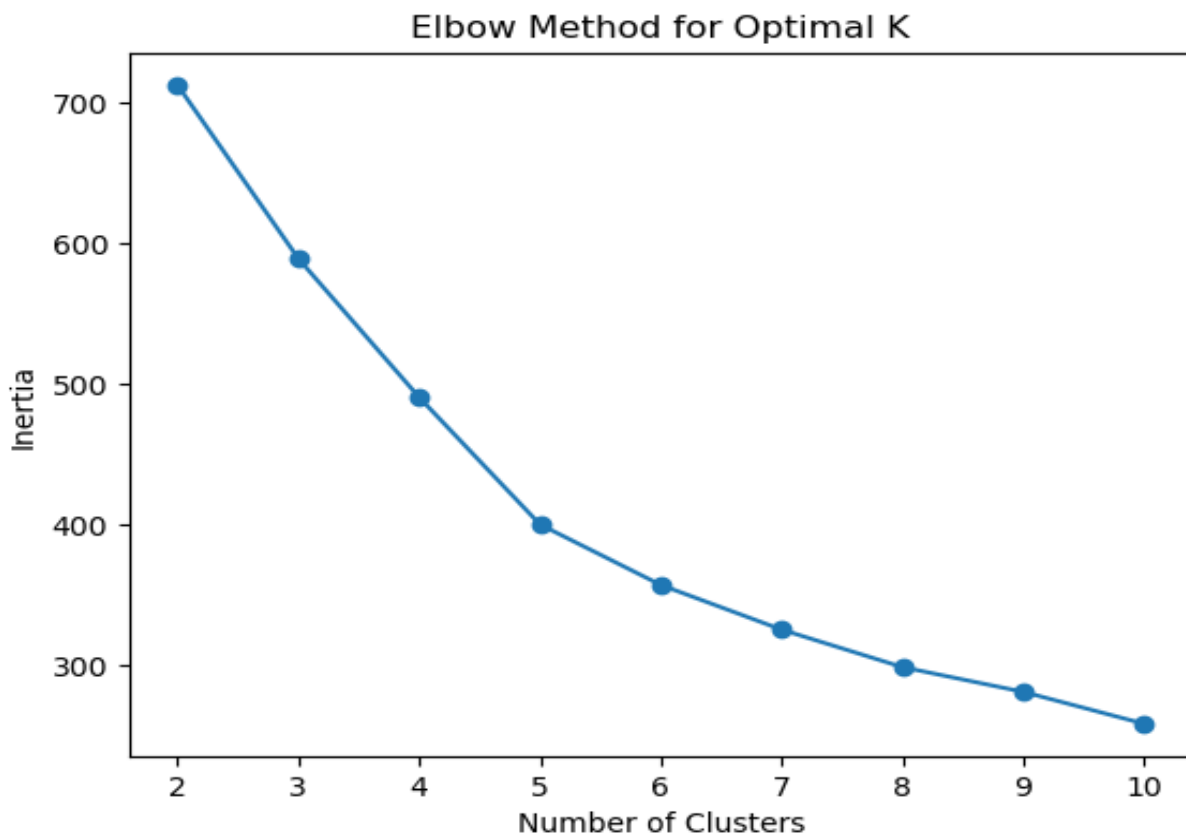
- The **DB Index** measures the separation between clusters. A lower DB Index value indicates better separation. Our score of 0.65 suggests the clusters are reasonably distinct, but there may be some overlap.

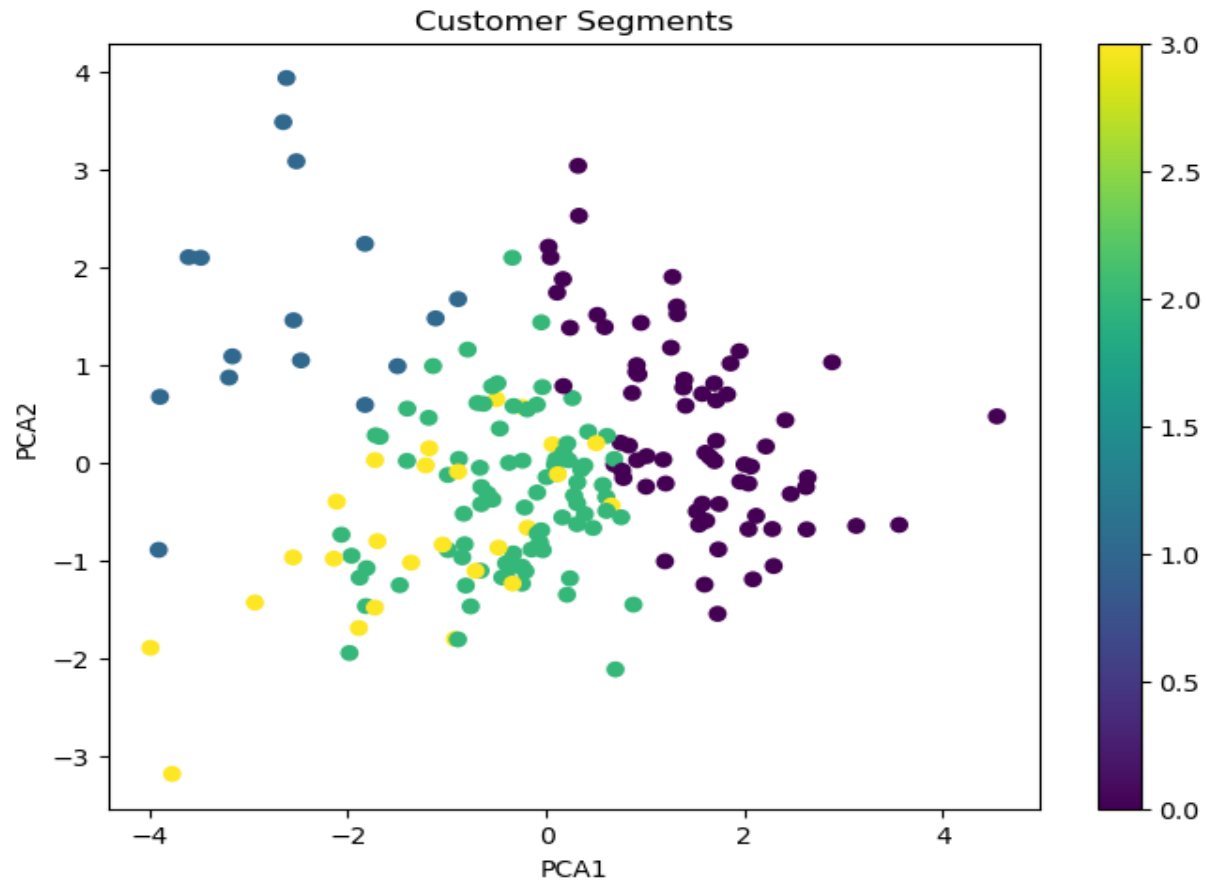
## 5. Insights into Customer Segmentation and Cluster Characteristics:

### ❖ **Cluster 0: High-Value, Infrequent Buyers**

- **These customers make fewer transactions but spend large amounts per transaction.** They represent **premium customers** with higher spending capacity.

- **Business Action:** Target them with exclusive offers, loyalty programs, or high-value product recommendations.
- ❖ **Cluster 1: Frequent, Low-Spending Customers**
  - **Customers in this group make regular purchases but with low average spending.** They may be more price-sensitive.
  - **Business Action:** Engage them with promotional discounts or bundle offers to increase their spending per transaction.
- ❖ **Cluster 2: Balanced Customers**
  - **This group has a moderate frequency of purchases and spending.** They tend to be **average spenders** with steady purchasing behavior.
  - **Business Action:** Offer them personalized campaigns or loyalty rewards to increase both transaction frequency and spend.
- ❖ **Cluster 3: Low Activity, Low Value**
  - **Customers here make fewer purchases and their spending is low.** They may be new or less engaged customers.
  - **Business Action:** Use re-engagement strategies such as targeted emails, discounts, or promotional offers to increase their transaction frequency.





## 6. Conclusion:

**The customer segmentation analysis has identified distinct customer groups with unique behaviors.** These insights allow for more tailored marketing strategies, better targeting of resources, and the potential for improved customer retention. By understanding the segments, businesses can implement strategies to boost loyalty, increase spending, and optimize customer engagement.

## 7. Recommendations:

- **Cluster 0: Engage with personalized high-value offers.**
- **Cluster 1: Target with frequent promotions to boost average transaction value.**
- **Cluster 2: Incentivize with loyalty programs to increase frequency and spending.**

- **Cluster 3: Focus on re-engagement through email campaigns or special discounts.**