Customer Segmentation Report

1. Number of Clusters Formed

Using the **Elbow Method**, I determined that the optimal number of clusters for segmentation is **4**. This was validated by observing the point where the inertia curve starts to flatten.

2. Clustering Metrics

Davies-Bouldin Index

- The **DB Index** obtained is **0.609**, which indicates that the clusters are well-separated with minimal overlap.

Silhouette Score

- The **Silhouette Score** obtained is **0.639**, which indicates a moderately strong cluster formation

3. Cluster Summary

Cluster	Total_Spending	Purchase_Count	Unique_Products	Cluster
0	0.311517	0.425455	0.462000	0.0
1	0.348312	0.468413	0.496610	1.0
2	0.310212	0.482213	0.526087	2.0
3	0.316609	0.440404	0.462222	3.0

Observations

- **Cluster 1** has the highest spending and purchase count, indicating **high-value customers**.
- **Cluster 2** has the highest number of unique products purchased, suggesting customers with diverse buying preferences.
- **Cluster 0 and 3** show moderate spending and purchase behavior.

4. Visual Representation

I visualized the customer clusters using:

- **3D PCA Plot** for better cluster separation.

5. Business Insights and Recommendations

1. **Cluster 1 (High-Value Customers)**
    - Offer **loyalty programs** or **exclusive discounts** to retain them.
    - Personalized recommendations based on past purchase behavior.

2. **Cluster 2 (Diverse Buyers)**
    - Recommend bundled products or cross-category promotions.
    - Engage with targeted advertisements.
3. **Cluster 0 and 3 (Moderate Spenders)**
    - Implement **re-engagement strategies** such as email marketing.
    - Provide **discounted subscription models** to boost spending.

6. Conclusion

The clustering analysis successfully segmented customers based on their spending, purchase count, and product diversity. The identified clusters provide valuable insights into customer behavior, enabling data-driven marketing and business strategies.