

Summary of Findings

Using KMeans clustering on a dataset of 8,950 credit card users, we segmented customers based on transaction behavior, spending patterns, payment habits, and frequency of card usage. After preprocessing, scaling, and evaluation using the Elbow and Silhouette methods, four distinct customer groups were identified.

Cluster Profiles

Cluster 0: Low Activity Customers

- Low balance, purchases, and credit usage
- Rarely use one-off or installment transactions
- Pay full or minimum payments infrequently

Cluster 1: Revolvers

- High balance and frequent use of credit limit
- Often pay only the minimum amount
- Higher risk profile due to partial repayments

Cluster 2: High Spenders with Full Payments

- High purchases, especially one-off transactions
- High credit limit usage and repayment in full
- Loyal, profitable, low-risk users

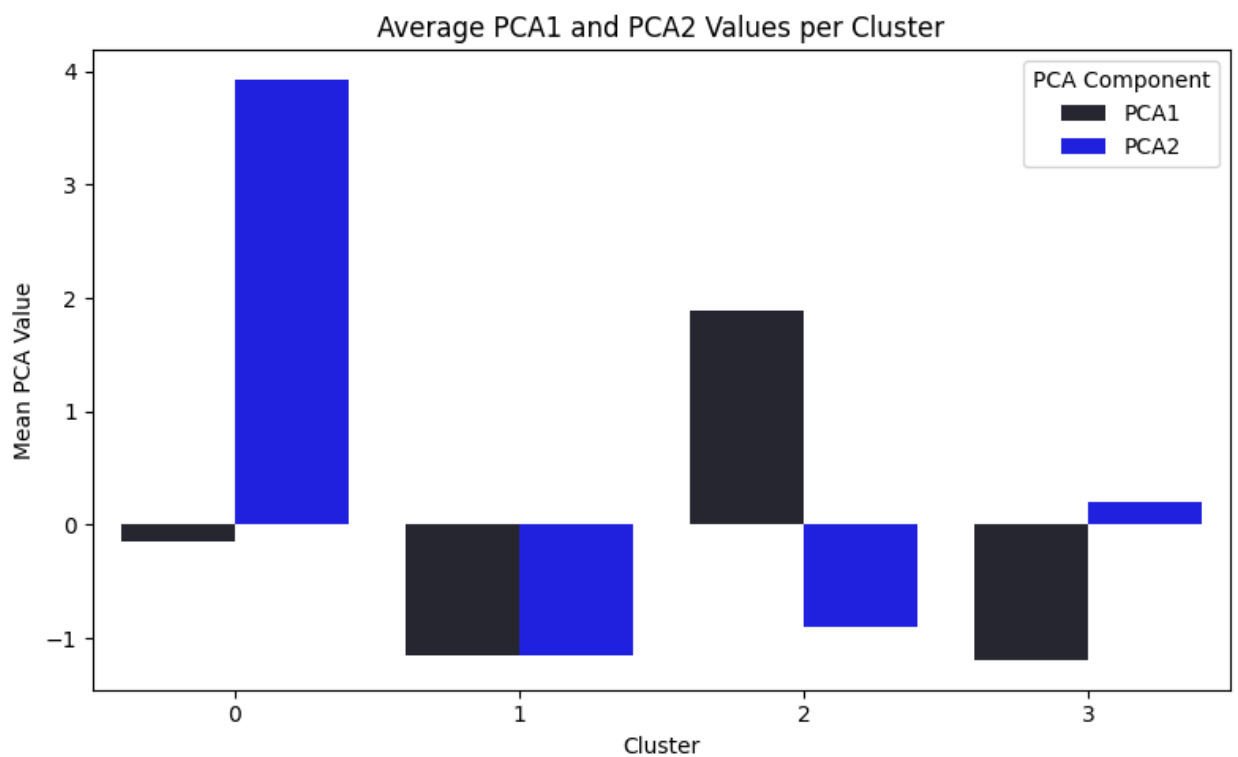
Cluster 3: Cash-Oriented Users

- Frequent use of cash advances
 - Moderate purchase behavior
 - Tend to avoid full payments
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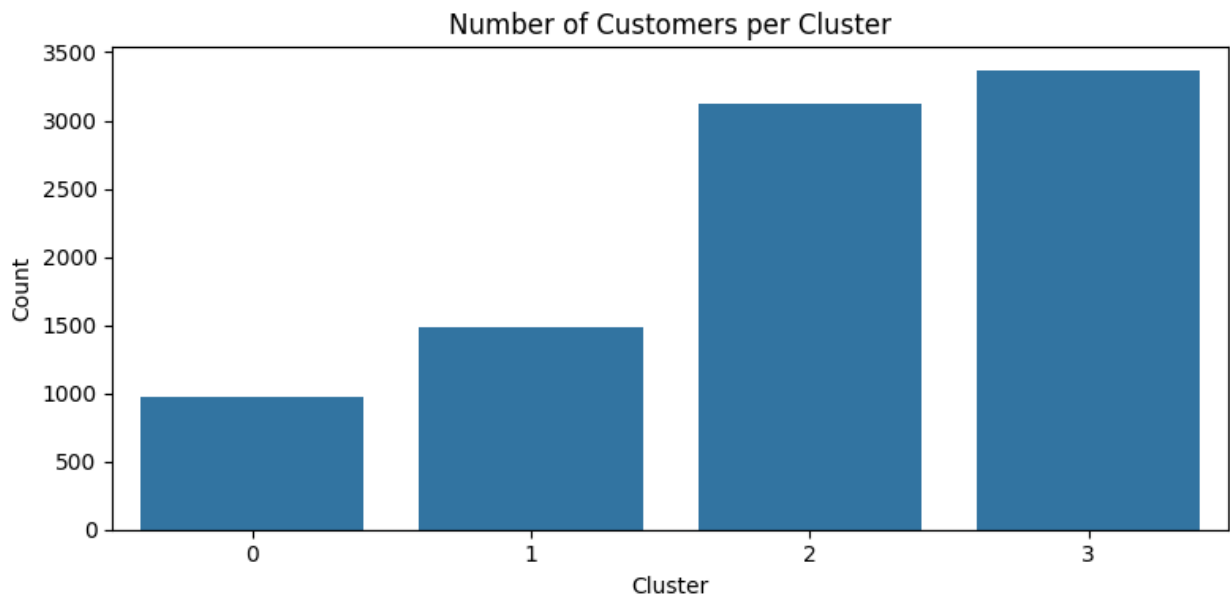
Key Visualizations

- **Elbow Plot:** Helped identify 4 as the optimal number of clusters.
- **Silhouette Score Plot:** Confirmed clustering quality peaks at 4 clusters.
- **Bar Charts:** Illustrated differences in spending, payments, and usage across clusters.
- **PCA-Based Bar Chart:** Visualized average PCA component values per cluster for interpretability.

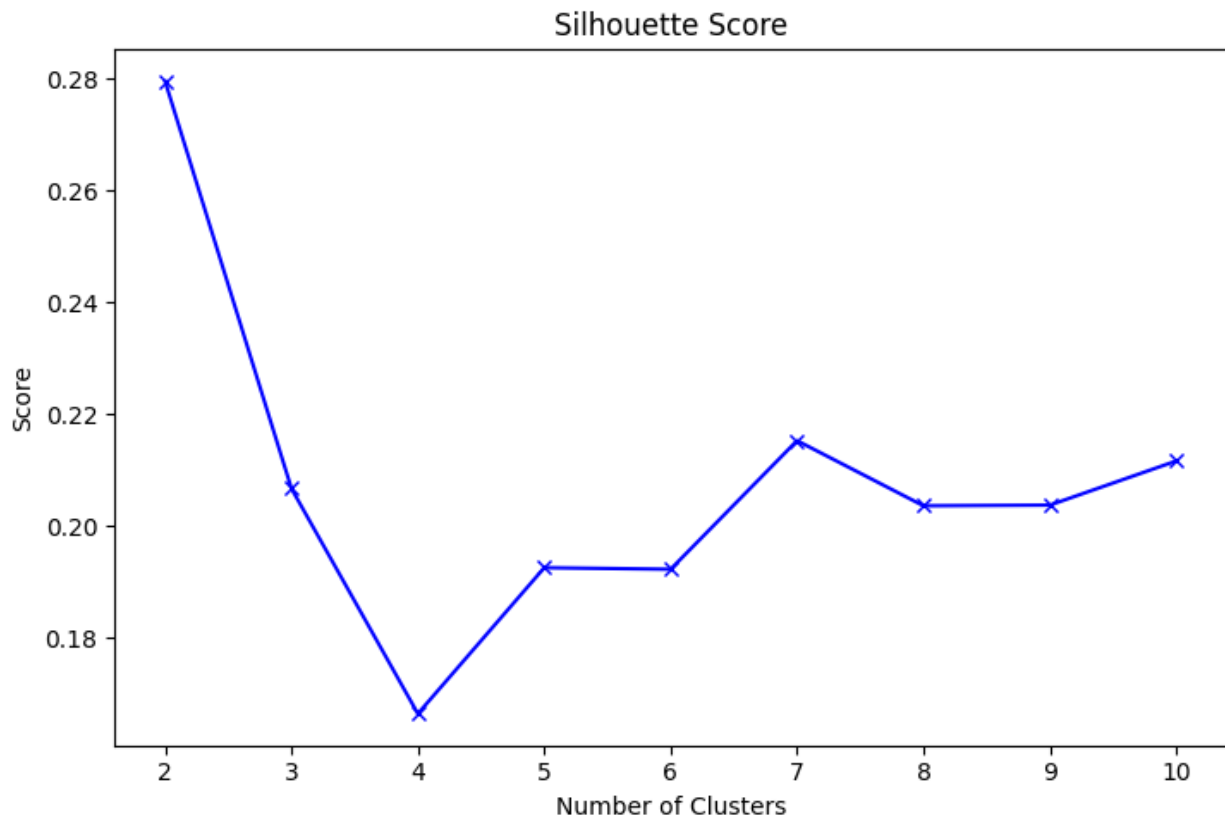
Average PCA's



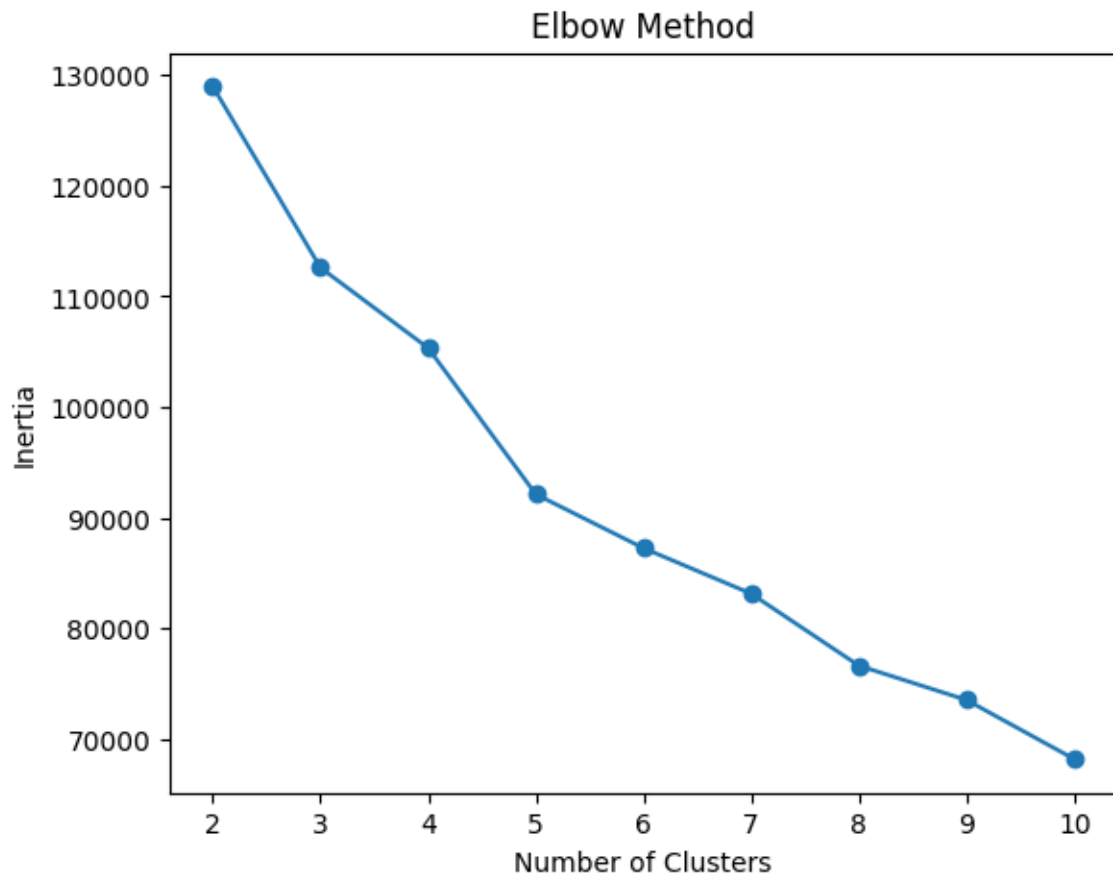
Cluster per number of customers



The silhouette score.



Elbow Method visualization



Business Insights & Recommendations

Cluster 0:

- Educated to increase engagement.
- Promote reward programs to encourage card use.

Cluster 1:

- Provide payment restructuring or financial coaching.
- Monitor closely to reduce credit risk.

Cluster 2:

- Reward loyalty with premium benefits.
- Offer personalized promotions or credit limit upgrades.

Cluster 3:

- Introduce safer short-term loan alternatives.
- Alert users about high-interest implications of cash advances.

Explanation of Customer Segmentation Results

Customer segmentation was achieved using the KMeans clustering algorithm on scaled and imputed transactional features. The optimal number of clusters was selected using the Elbow and Silhouette methods, ensuring meaningful separation between groups.

Each customer was assigned to a cluster based on their usage behavior, such as spending patterns, frequency of purchases, use of cash advances, and repayment tendencies. These behavioral similarities allowed us to define four distinct customer segments.

Principal Component Analysis (PCA) was used to reduce the high-dimensional feature space into two components for visual analysis, aiding in the interpretation of the spatial separation between clusters.

This segmentation enables the business to target each group more effectively by understanding their unique needs and risks, thereby improving marketing personalization, risk management, and customer retention strategies.

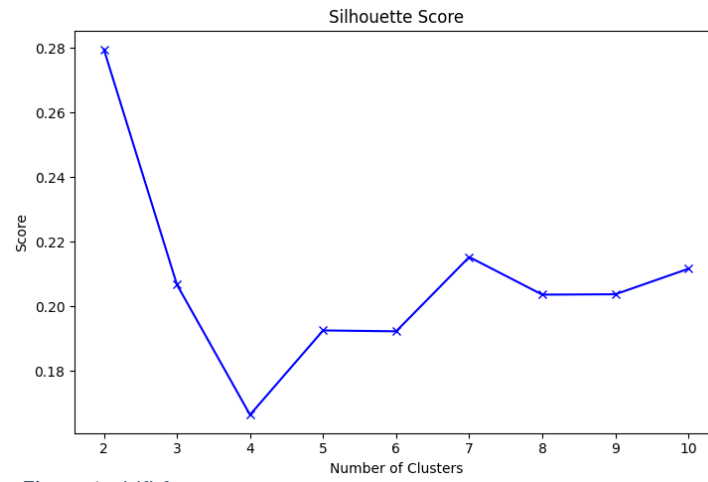


Figure 1: ddfhf