

Segmenting Credit Card Users

1. Executive Summary

- **Purpose:** Briefly state why we segmented customers (better marketing, risk management...).
- **Key Findings:** One or two sentences summarizing main insights (e.g., “We identified six distinct customer segments; Cluster 5 represents our highest-value, most loyal buyers; Cluster 1 is low-engagement, cash-only users...”).

2. Objective

- **Business Goal:** What questions are we answering (e.g., “Which customer groups drive revenue?”, “Who needs credit limit increases?”).
- **Analytical Goal:** Unsupervised segmentation using K-Means and GMM; validation via Elbow, Silhouette, t-SNE.

3. Data Preparation

- **Source:** “[CC GENERAL.csv from Kaggle](#)”.
- **Cleaning:** Filled missing `MINIMUM_PAYMENTS` & `CREDIT_LIMIT` with means.
- **Transformations:**
 - Log1p on skewed features
 - Robust scaling to handle outliers

4. Methodology

- **Clustering algorithms tested:**
 - KMeans (k=2-10) → Elbow & Silhouette → chose k=6
 - Gaussian Mixture Model (n_components=6)
- **Validation:**
 - Elbow plot (WCSS)

- Silhouette scores
- t-SNE & PCA for visual separation
- **Comparison:** Side-by-side visual of K-Means vs. GMM.

5. Cluster Profiles

- **Table of Means**

Show [cluster_profiles](#) & [cluster_profiles_gmm](#) (means of each numeric feature + counts).

- **Summary of Findings**

We applied K-Means and GMM to segment credit card customers. GMM performed better, identifying 6 distinct clusters with unique behaviors. The segmentation revealed key differences in spending habits, purchase types, and usage of cash advances.

- **Textual Profiles:**

- **Cluster 0: One-off Buyers with Frequent Cash Advances**

These customers make high one-time purchases but show limited ongoing engagement. They also rely heavily on cash advances, indicating potential liquidity challenges. They are not consistent users of the credit card for regular purchases or installments.

- **Cluster 1: Cash-Dependent Non-Shoppers**

This segment includes individuals who rarely make purchases but frequently use their cards for cash advances. Their credit card behavior suggests either financial distress or misuse of the card purely for liquidity needs. They show minimal transaction activity and are not ideal targets for traditional marketing offers.

- **Cluster 2: Installment-Heavy Moderate Spenders**

Customers in this group exhibit moderate total spending but a clear preference for installment-based purchases. They are consistent in usage but may be price-sensitive or budget-conscious. They make a few one-off or cash advance transactions, indicating financial planning or controlled credit behavior.

- **Cluster 3: Selective High One-Off Spenders**

These customers make large one-off purchases but engage in very few total transactions. They hardly use cash advances or installment options. Their pattern suggests wealthier clients who use the card sporadically for high-value needs. This group may respond well to luxury offers or exclusive events.

- **Cluster 4: All-Round High Spenders**

This cluster reflects customers with high usage across all spending types – one-off, installments, and cash advances. They transact frequently, indicating engagement, but their high reliance on cash advance options may be a red flag for credit risk. This group balances value and volume.

- **Cluster 5: Super Loyal, High-Value Installment Purchasers**

This is the most profitable segment. These customers exhibit high overall spending, particularly in one-off and installment transactions. They also have the highest number of transactions, showing strong loyalty and engagement. Cash advance usage is minimal, indicating stable financial behavior. They are prime candidates for premium loyalty programs and long-term financing offers.

6. Key Visualizations

1. **Average Balance by Cluster**

- *Chart:* barplot of **BALANCE** vs. cluster
- *Insight:* “Cluster 4 has the highest balance → premium users; Cluster 2 lowest → inactive or low-income.”

2. **Average Purchases by Cluster**

- *Insight:* “Cluster 5 highest spenders → target premium offers; Clusters 0 & 1 lowest → reactivation campaigns.”

3. **One-off vs. Installment Breakdown**

- *Insight:* “Cluster 5 strong in both; Clusters 1 & 2 minimal one-offs.”

4. **Average Cash Advance by Cluster**

- *Insight:* “Clusters 0, 1, 4 high cash usage → monitor credit risk; others low.”

5. Purchase Transaction Count by Cluster

- *Insight:* “Cluster 5 most active → ideal cashback rewards; Cluster 1 dormant.”

6. Customer Distribution Pie Chart

- *Insight:* “Clusters 1, 2, 5 form ~70% of base → prioritize these groups.”

7. Installment Purchases by Cluster

- *Insight:* “Cluster 5 prefers installments → promote long-term financing; Clusters 0, 1, 3 limited use.”

7. Business Insights & Recommendations

- **Cluster 0:** “Educate on cost of cash advances; offer purchase incentives.”
- **Cluster 1:** “Launch reactivation offers; loyalty points to increase engagement.”
- **Cluster 2:** “Promote flexible installment plans; budget tools.”
- **Cluster 3:** “Exclusive one-off purchase discounts.”
- **Cluster 4:** “VIP loyalty program; premium credit limits.”
- **Cluster 5:** “Tailored long-term financing; reward frequent usage.”

8. Recommendations

- Offer exclusive deals to Cluster 5 to increase retention.
- Promote installment plans to Clusters 2 and 4.
- Review credit limits for Clusters 0 and 1 to manage risk.
- Run marketing campaigns to re-engage Cluster 1.
- Monitor and update clusters regularly based on behavior changes.

9. Suggested Enhancements or Alternative Approaches

- Integrate demographic data for deeper insights.
- Experiment with other models like DBSCAN or Agglomerative Clustering.
- Apply supervised learning to predict customer segments.
- Use time-based features to capture trends in behavior.