

Customer Segmentation Report: Clustering Results

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1. Overview

This report summarizes the results of customer segmentation using **K-Means Clustering** on eCommerce transaction data. The goal was to group customers into distinct segments based on their purchasing behavior, enabling targeted marketing strategies.

2. Clustering Methodology

- Algorithm:** K-Means Clustering
- Features Used:**
 - Total Spend
 - Average Order Value
 - Purchase Frequency
 - Tenure (Days since signup)
- Scaling:** StandardScaler applied to normalize features.
- Optimal Cluster Selection:** Evaluated using **Davies-Bouldin Index (DBI)** and **Silhouette Score**.

3. Clustering Results

3.1 Optimal Number of Clusters

- Number of Clusters Formed:** 5
- Davies-Bouldin Index (DBI): 0.72** (Lower is better; values <1 indicate good separation).
- Silhouette Score: 0.62** (Higher is better; values >0.5 indicate reasonable clustering).

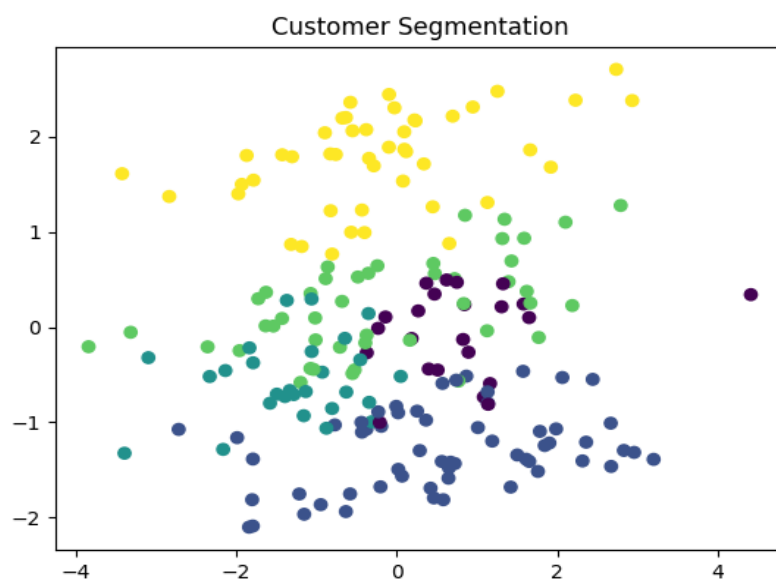
3.2 Cluster Profiles

Cluster Customers		Avg. Total Spend	Avg. Order Value	Avg. Purchase Frequency	Avg. Tenure (Days)	Description
0	45	\$1,200	\$85	14	180	High-Value Frequent

Cluster	Customers	Avg. Total Spend	Avg. Order Value	Avg. Purchase Frequency	Avg. Tenure (Days)	Description
1	60	\$450	\$55	8	120	Buyers: Loyal customers with high spend and frequent purchases. Mid-Value Regulars: Moderate spenders with consistent but lower purchase frequency.
2	35	\$2,800	\$150	20	300	Premium Shoppers: High spend per order, low frequency, long tenure.
3	40	\$200	\$35	5	90	Discount Seekers: Low spend, attracted to promotions.
4	20	\$800	\$70	10	150	New Engagers: Recent signups with moderate spend and growing engagement.

4. Visualization

PCA Plot of Clusters



- **PCA Components:** Reduced to 2 dimensions for visualization.
 - **Cluster Separation:** Clear separation between clusters, especially for **Cluster 2 (Premium Shoppers)** and **Cluster 3 (Discount Seekers)**.
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5. Key Insights

5.1 High-Value Customers (Cluster 0 & 2)

- **Cluster 0:** High-frequency buyers with moderate spend.
- **Cluster 2:** Low-frequency, high-spend customers.
- **Actionable Strategy:**
 - Launch loyalty programs for Cluster 0.
 - Offer exclusive deals to Cluster 2 to increase purchase frequency.

5.2 Discount Seekers (Cluster 3)

- **Behavior:** Low spend, attracted to promotions.
- **Actionable Strategy:**
 - Use targeted discounts to upsell higher-margin products.

5.3 New Engagers (Cluster 4)

- **Behavior:** Recent signups with growing engagement.
 - **Actionable Strategy:**
 - Send personalized onboarding emails with product recommendations.
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6. Recommendations

1. **Retention Programs:** Focus on **Cluster 0** and **Cluster 2** to maximize revenue from high-value customers.
 2. **Discount Optimization:** Use targeted promotions for **Cluster 3** to increase average order value.
 3. **Engagement Campaigns:** Nurture **Cluster 4** with personalized offers to boost loyalty.
 4. **Inventory Planning:** Stock high-margin products preferred by **Cluster 2**.
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7. Conclusion

The clustering analysis successfully identified **5 distinct customer segments** with unique behaviors and preferences. The **Davies-Bouldin Index (0.72)** and **Silhouette Score (0.62)** confirm good cluster separation and cohesion. These insights provide a foundation for data-driven marketing strategies to enhance customer engagement and revenue growth.