Phase-4 : Customer Journey Analysis Using Clustering and Dimensionality Reduction: Enhancing User Experience

1. Introduction:

This report presents an analysis of customer journey data for a clothing e-commerce platform using clustering and dimensionality reduction techniques to segment users and uncover shopping behaviors. Key factors examined include purchase frequency, discount usage, browsing time, and customer spending. Purchase frequency differentiates between one-time and repeat buyers, while discount usage highlights price sensitivity and promotional effectiveness. Browsing time reflects engagement levels, and spending patterns reveal purchasing power and upselling opportunities. Clustering helps identify distinct customer segments, enabling personalized marketing strategies and product recommendations. Dimensionality reduction simplifies complex datasets while preserving essential insights. These techniques allow businesses to enhance user experience, improve customer retention, and optimize targeted promotions. By leveraging data-driven insights, e-commerce platforms can create a seamless and personalized shopping journey, leading to higher engagement and long-term customer loyalty. This approach helps businesses better understand their audience and refine decision-making for improved user satisfaction and sales growth.

2. Key Findings from Cluster Analysis

The cluster analysis reveals critical insights into customer behavior patterns, helping to identify distinct user segments based on spending habits, browsing behavior, discount utilization, retention trends, and past purchases. By analyzing these clusters, businesses can develop targeted strategies to enhance user engagement, optimize marketing campaigns, and improve customer retention. The findings highlight variations in spending levels, purchase decision times, discount dependency, and repeat purchase tendencies, offering a data-driven approach to personalization. These insights help businesses refine their promotional strategies, improve customer segmentation, and enhance overall user experience. The following sections detail the key observations from each graph.

Graph 1: Customer Spending by Cluster


Customer Cluster Distribution

- Spending patterns vary significantly across clusters, with some groups consistently showing high average spending per purchase. This variation helps in identifying premium buyers versus budget-conscious shoppers. Understanding these differences allows businesses to design targeted pricing and marketing strategies.

- Clusters with higher spending levels often have a wider spread, indicating diverse purchasing behaviors within those segments. Some customers may spend consistently, while others make occasional large purchases. This diversity necessitates a flexible marketing approach to cater to different spending habits.

- The presence of outliers suggests that certain users engage in exceptionally high-value purchases, indicating potential premium customers. These high-spending individuals may prefer exclusive offers and personalized services. Identifying them helps in creating VIP customer programs to enhance retention.

- Some clusters exhibit steady spending behavior, while others display occasional spikes, implying different purchasing habits. Steady spenders may follow predictable buying patterns, whereas spike buyers respond to specific triggers. Analyzing these trends helps in crafting personalized engagement strategies.

- Identifying high-spending clusters is crucial for developing premium loyalty programs and personalized recommendations. High-value customers often seek exclusivity, early access, or superior customer service. Offering tailored perks can improve retention and encourage repeat purchases.

Graph 2: Browsing Time vs. Purchase Probability by Cluster


Purchase Amount by Cluster
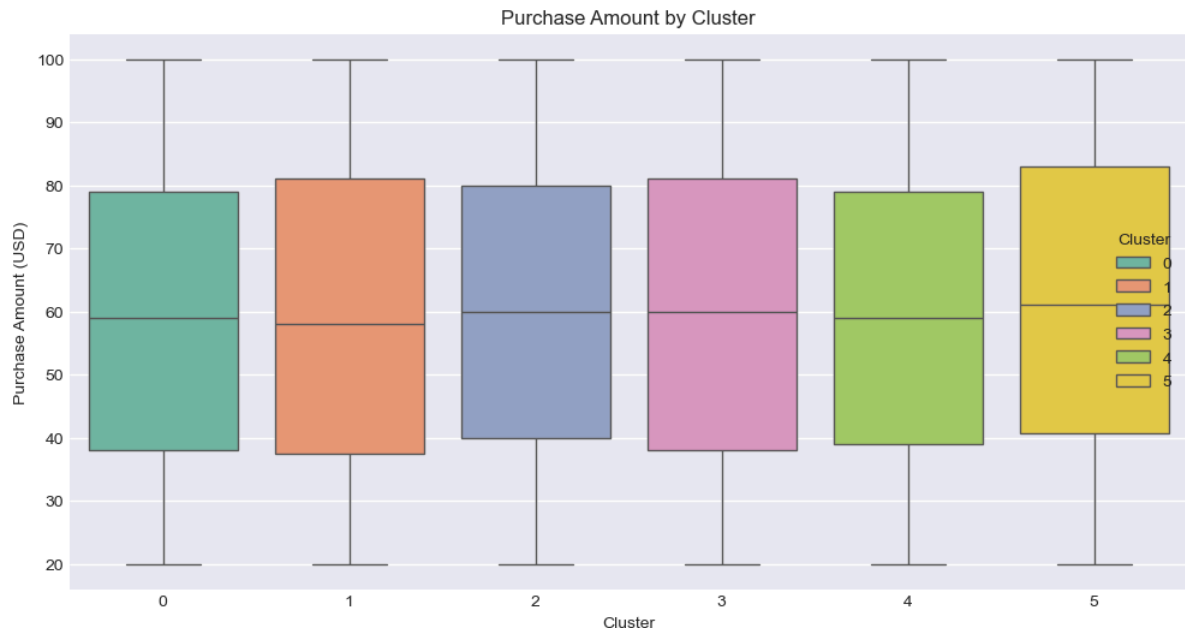
- Certain clusters demonstrate longer browsing times before making a purchase, while others make quicker decisions. Longer browsing suggests deeper engagement and interest in product details. Quick buyers may already have a strong intent to purchase before visiting.

- A strong correlation exists between browsing time and purchase probability, where higher engagement generally leads to more purchases. Customers who explore extensively are often more likely to convert. Businesses can leverage this insight by guiding engaged users toward completing transactions.

- Some clusters show prolonged browsing without conversion, indicating the need for personalized interventions such as product recommendations or urgency-driven promotions. Personalized nudges can help hesitant users make confident purchase decisions. Limited-time discounts may also encourage faster conversions.

- Quick decision-makers may respond better to time-sensitive offers, while extended browsers may need trust-building elements like reviews or comparisons. Flash sales and countdown timers can incentivize immediate purchases. Detailed product descriptions and user testimonials can reassure hesitant buyers.

- Businesses can enhance customer experience by optimizing the UI/UX for clusters that require more browsing before purchasing. Simplified navigation, better search filters, and clear product information can improve engagement. A seamless shopping experience helps retain users and increase conversions.

Graph 3: Discount & Promo Code Usage by Cluster


Subscription Rate by Cluster
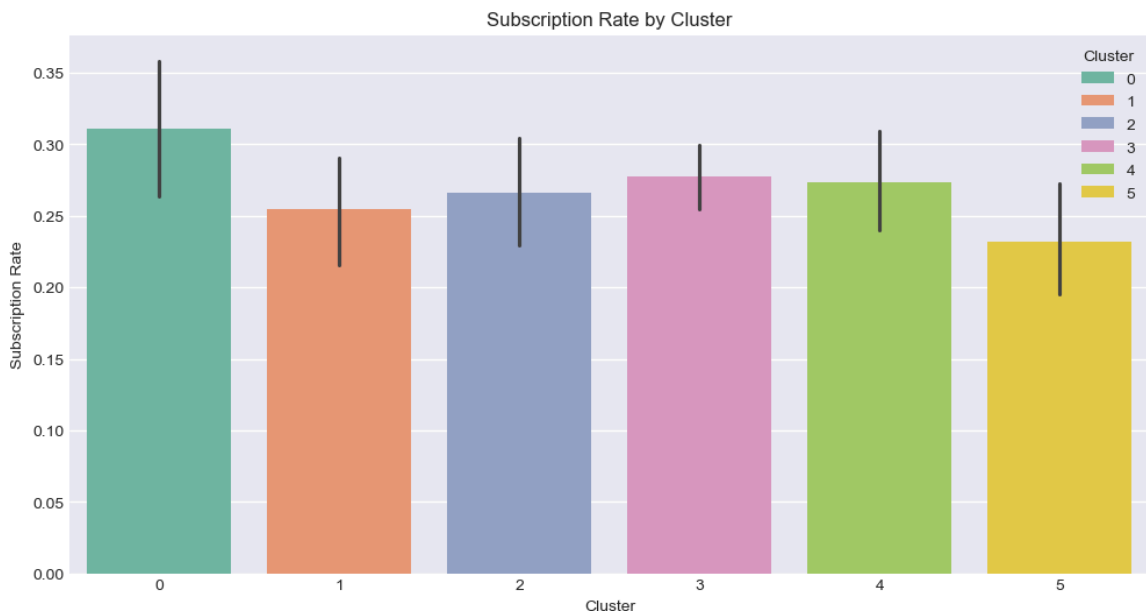
- The usage of discounts and promo codes is relatively consistent across clusters, with around 40-45% of users utilizing them. This suggests a steady demand for price reductions among customers. Businesses should maintain well-balanced discounting strategies for sustained engagement.

- Some clusters exhibit a stronger dependency on discounts, indicating a higher price sensitivity. These customers may delay purchases until promotions are available. Businesses can introduce targeted discounts to encourage timely transactions within these segments.

- Targeted discounting strategies can be implemented, offering standard deals to price-sensitive clusters and exclusive perks to premium customers. Price-sensitive users benefit from regular price drops, while premium users prefer personalized benefits. This approach ensures optimal engagement across different customer segments.

- High-value customers may respond better to membership-based rewards rather than direct price reductions. Loyalty programs with exclusive perks can enhance long-term retention. Personalized benefits strengthen brand loyalty among high-spending users.

- Seasonal and event-based discounts should be tailored to clusters that show increased engagement during specific periods. Certain customers are more active during sales events. Timing promotions correctly ensures maximum conversions from engaged buyers.

Graph 4: Customer Retention and Repeat Purchases

Discount & Promo Code Usage by Cluster
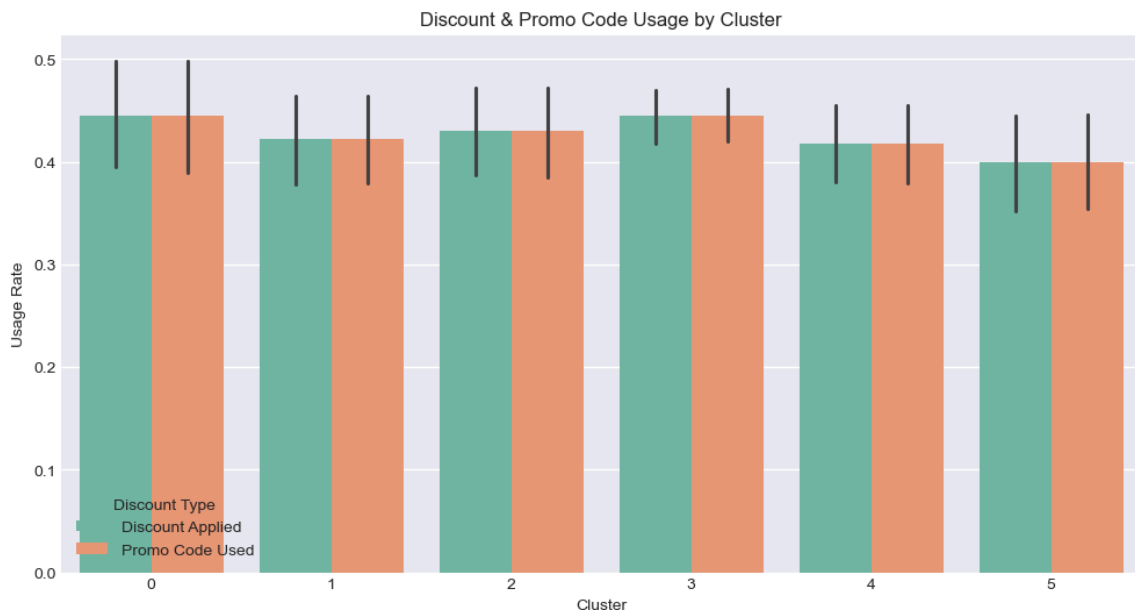
- Certain clusters display a strong likelihood of making repeat purchases, while others show lower retention rates. High-retention clusters contribute significantly to long-term revenue. Businesses should prioritize strategies that maximize customer lifetime value.

- Some customer segments exhibit increased repeat purchases after availing discounts, emphasizing the role of promotions in customer retention. Discount-driven loyalty suggests a need for structured rewards. Proper incentive management ensures repeat business without over-reliance on price cuts.

- Businesses can refine their loyalty programs by analyzing the characteristics of high-retention clusters. Identifying patterns in repeat purchases helps in personalizing retention strategies. Loyalty programs should align with customer behaviors for maximum effectiveness.

- Retention-focused strategies, such as exclusive offers or early access sales, can be designed for returning customers. Priority deals create a sense of exclusivity among loyal buyers. This approach strengthens brand attachment and encourages repeat purchases.

- Identifying low-retention clusters allows for targeted re-engagement strategies, such as personalized email campaigns or incentives. Customized outreach increases the likelihood of bringing inactive customers back. Effective communication enhances retention and overall engagement.

Graph 5: Previous Purchases by Cluster

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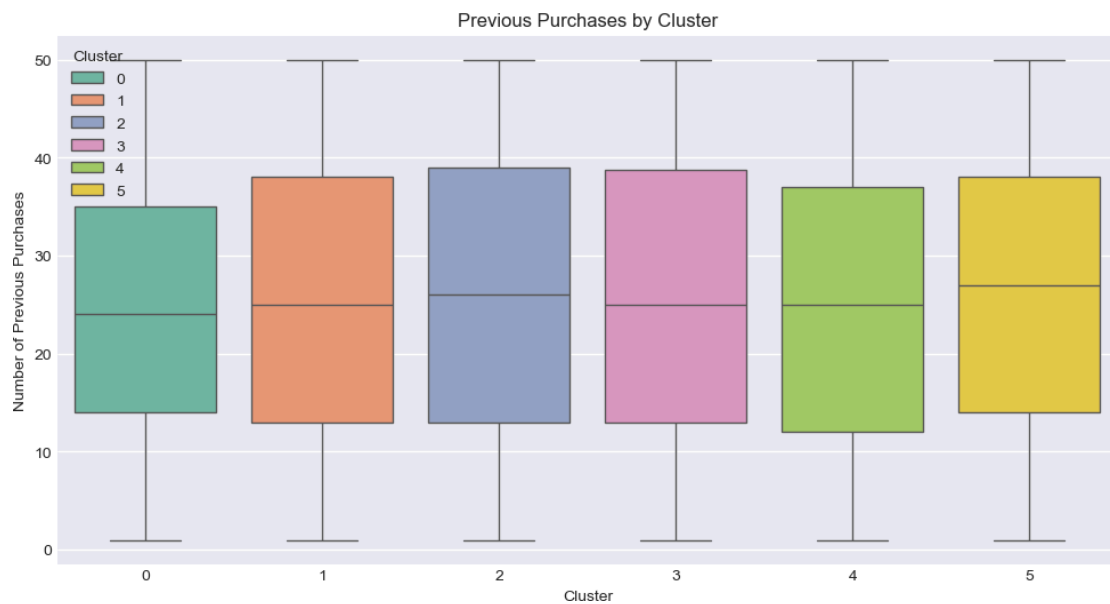
- The distribution of previous purchases varies, with some clusters exhibiting higher median purchase counts. Frequent buyers contribute significantly to revenue growth. Analyzing these patterns helps in segmenting high-value customers for targeted marketing.

- Clusters with frequent past purchases tend to have a wider spread, indicating that repeat customers are crucial revenue drivers. Some users shop regularly, while others buy in bulk occasionally. Businesses should cater to both customer types with appropriate engagement strategies.

- Understanding past purchase behavior helps in segmenting customers based on loyalty and lifetime value. Loyal customers should receive personalized rewards. High-value segmentation ensures efficient resource allocation for marketing and retention.

- Engagement campaigns, such as personalized recommendations or exclusive previews, can encourage less active customers to make repeat purchases. Targeted communication can reignite interest among inactive buyers. Personalized engagement increases conversion rates and customer lifetime value.

- Clusters with lower past purchase counts may require targeted incentives to increase engagement. Offering exclusive discounts or loyalty perks can drive conversions. This approach ensures that low-activity users remain engaged with the platform.

2. Business Recommendations

- **Personalized Discounts:** Offer exclusive deals to high-value customers while providing time-limited discounts to low-engagement users. This ensures relevant incentives for different segments, boosting conversions. A balanced discount strategy maintains profitability while driving customer retention.

- **Browsing Behavior Optimization:** Reduce friction for long-browsing users by introducing real-time recommendations and urgency-driven promotions. Enhancing UI/UX and providing trust-building elements like reviews can improve conversions. Optimized navigation ensures a seamless and efficient shopping experience.

- **Retention Strategy:** Implement loyalty programs with tiered rewards to encourage repeat purchases and long-term engagement. Identify key retention drivers such as preferred discounts or product categories. Strengthening customer relationships enhances brand loyalty and lifetime value.

- **A/B Testing:** Conduct experiments on different clusters to test personalized recommendations and discount effectiveness. Analyzing response patterns helps refine marketing efforts for better engagement. Data-driven optimizations lead to higher conversion rates and improved sales performance.

- **Customer Engagement Campaigns:** Use targeted emails and push notifications to re- engage low-retention clusters with personalized offers. Cart abandonment reminders and exclusive deals can drive repeat visits. Strategic engagement fosters long-term customer satisfaction and loyalty.

3. Conclusion

The insights derived from clustering and dimensionality reduction serve as a powerful tool for enhancing user experience and optimizing business strategies. By understanding customer segmentation, e-commerce businesses can create targeted marketing campaigns, improve retention rates, and maximize revenue. These data-driven approaches allow businesses to cater to different user behaviors, ensuring personalized experiences that drive engagement. Implementing these insights requires continuous experimentation, testing various strategies, and refining them based on real-world performance metrics. By adapting to evolving customer preferences, businesses can enhance their competitive advantage, build long-term customer relationships, and create a more efficient and profitable e-commerce ecosystem.

Project Demo Video Link:

https://vimeo.com/1059309349/8e29991e65?share=copy

Git Hub Repository Link:

https://github.com/Karthik2048/-Customer-Journey-Analysis-Using-Clustering-and-Dimensionality-Reduction-Enhancing-User-Experience-.git