



Customer Lifetime Value, Cohort & Funnel Analysis (Python)



Project Overview

This project focuses on understanding customer behavior and business performance by combining **Customer Lifetime Value (CLV)** analysis, **cohort-based retention analysis**, and **funnel conversion analysis**.

The objective is to identify high-value customers, analyze retention trends over time, and detect conversion drop-offs across the customer journey, enabling data-driven marketing, retention, and growth strategies.



Objectives

- ❖ Estimate Customer Lifetime Value (CLV)
 - ❖ Segment customers based on value contribution
 - ❖ Analyze customer retention using cohort analysis
 - ❖ Identify funnel drop-offs and conversion rates
 - ❖ Deliver actionable datasets for business stakeholders
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Tools & Technologies

- ❖ **Language:** Python
 - ❖ **Environment:** Google Colab (Cloud-based Jupyter Notebook)
 - ❖ **Libraries Used:**
 - pandas
 - numpy
 - matplotlib
 - seaborn
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Dataset

- ❖ **Type:** Synthetic but realistic customer transaction dataset
- ❖ **Nature:** Raw and uncleaned (real-world inspired)
- ❖ **Dataset Characteristics**
 - Multiple customer interactions
 - Missing signup dates
 - Negative revenue values (refunds)
 - One-time and repeat customers
 - Multiple acquisition channels
 - Funnel-stage level events

The dataset was intentionally designed to mimic **real production data** that requires business-rule-based cleaning.



Data Cleaning & Assumptions

Key assumptions applied:

- ➔ Missing signup dates replaced with first observed order date
- ➔ Negative revenue treated as refunds and excluded from CLV
- ➔ CLV calculated using only purchase-related events
- ➔ Customer lifetime defined as time between first and last purchase

These assumptions were explicitly documented before cleaning to ensure transparency and reproducibility.



Customer Lifetime Value (CLV) Analysis

- ❖ CLV distribution is highly right-skewed
 - ❖ A small percentage of customers generate most of the revenue
 - ❖ Customers were segmented into Low, Mid, High, and VIP value groups
 - ❖ Purchase frequency showed a stronger relationship with CLV than customer lifespan
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Cohort Analysis (Customer Retention)

- ❖ Customers were grouped into monthly signup cohorts

- ❖ Retention rates were tracked over time
- ❖ Significant churn occurs after the first month
- ❖ Strong early retention is closely linked to higher lifetime value

A cohort heatmap was used to visualize retention decay patterns across time.

▼ Funnel Analysis (Conversion & Drop-offs)

- ❖ Funnel stages analyzed: Visit → Signup → Purchase → Repeat Purchase
 - ❖ Major drop-offs observed in early funnel stages
 - ❖ Repeat purchase conversion was relatively low
 - ❖ Channel-wise funnel analysis revealed differences in acquisition quality
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🧠 Advanced Insights

- ★ Signup cohorts with higher early retention consistently generated higher CLV
 - ★ Customers reaching repeat purchase stages contributed significantly more revenue
 - ★ High-volume acquisition channels were not always high-value channels
 - ★ Early lifecycle engagement has a compounding impact on long-term revenue
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📦 Business Deliverables

The project generated multiple **business-ready datasets**:

- ★ **High-value customers list** for marketing and loyalty teams
- ★ **Retention-risk customers list** for churn prevention
- ★ **Channel-level CLV performance summary** for strategy teams
- ★ **Funnel conversion summary** for product and UX optimization

All deliverables were exported as CSV files for immediate stakeholder use.

📌 Conclusion

This project demonstrates how combining CLV, cohort retention, and funnel analysis provides a holistic view of customer behavior and business performance. By translating raw transactional

data into actionable insights and deliverables, the analysis supports informed decision-making across marketing, retention, and growth initiatives.

Future Enhancements

- ★ Predictive CLV modeling
 - ★ Survival analysis for churn prediction
 - ★ Channel ROI optimization
 - ★ Integration with marketing automation tools
 - ★ Interactive dashboards (Power BI / Tableau)
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Execution Environment

The entire project was developed and executed using **Google Colab**, ensuring cloud-based accessibility and reproducibility.

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