E-Commerce Funnel & Marketing ROI Analysis

Objective

To simulate and analyze an end-to-end e-commerce funnel and evaluate the effectiveness of multiple marketing channels in converting users. This project aims to uncover behavioral patterns across sessions, devices, and regions, and to provide data-driven recommendations to optimize campaign performance and reduce user drop-off.

Key Metrics Tracked

1. Funnel Drop-Off Rate : Percentage of sessions lost between each stage of the funnel (e.g., from "add_to_cart" to "checkout").
2. Conversion Rate : The proportion of user sessions that resulted in a successful purchase.
3. Customer Acquisition Cost (CAC) : The total marketing cost divided by the number of purchasing users, calculated separately for each channel.
4. Return on Investment (ROI) :The profit generated relative to the cost spent on marketing campaigns, expressed as a percentage.
5. Device & Location Conversion : Analysis of user behavior and conversion efficiency segmented by device type (mobile vs. desktop) and by city/location.

Key Findings

- Major Drop-Off Identified: The largest user drop-off occurred between add_to_cart and checkout, indicating potential friction in the checkout process.
- Email Outperformed All Channels:
  - Highest ROI: ~32,000%
  - Lowest CAC: ~₹13
  This suggests that Email is the most cost-effective and profitable acquisition channel.
- Device-Based Conversion:
  - Mobile sessions outnumbered desktop, but had a slightly lower conversion rate.
  This indicates room for UX improvement on mobile devices.
- High-Converting Cities:
  - Bangalore and Delhi showed higher conversion rates than other locations.
  These cities represent valuable target markets.
- Instagram's Paradox:
  - Generated high traffic volume but delivered relatively lower ROI.
  This suggests poor targeting or user drop-off early in the funnel.

Business Recommendations

1. Scale Up Email Campaigns: Increase investment in email marketing — it yields high returns at low cost.
2. Optimize Checkout Process: Conduct UX testing and simplify steps between cart and checkout to reduce abandonment.
3. Improve Mobile User Experience: Mobile users represent a large portion of sessions but convert less — prioritize mobile UI/UX enhancements.
4. Target High-Performing Cities: Launch location-specific promotions in Bangalore and Delhi where conversions are strongest.
5. Reassess Instagram Strategy: Consider A/B testing creative content and refining audience targeting to improve Instagram ROI.

Project Deliverables

- Cleaned & enriched session-level dataset
- Conversion analysis by funnel stage, channel, device, and location
- KPI dashboards: ROI, CAC, conversion rates
- Five business-focused visualizations
- GitHub-hosted project with full documentation
- One-page professional business report

Tools & Technologies

Python (Pandas, NumPy, Seaborn, Matplotlib)
Jupyter Notebook
Markdown + GitHub for documentation

This report simulates the kind of business impact analysis a junior data analyst or marketing analyst would be expected to deliver in a real-world setting.