Customer Purchase Behavior Analysis in E-Commerce

Project Overview

This project aims to analyze customer purchase behaviors and churn patterns within a large e-commerce dataset. By investigating key metrics such as transaction history, demographics (age, gender), and payment preferences, the goal is to generate actionable insights for improving customer retention, optimizing sales strategies, and identifying high-value customer segments.

Motivation

Understanding customer behavior is critical for business sustainability in e-commerce. With increasing customer acquisition costs and fierce competition, it becomes vital to retain existing customers. This project seeks to empower data-driven decisions by identifying churn indicators, preferred purchase channels, and behavioral patterns across demographic segments.

Objectives

- Analyze customer transaction behavior over time.
- Segment customers based on gender, age group, and purchasing activity.
- Identify churned vs. retained customer profiles.
- Assess payment method trends by demographic and time.
- Generate actionable recommendations to reduce churn and enhance customer satisfaction.

Dataset Summary

- **Rows**: 250,000 transactions
- **Features**: 13 original features (e.g., Customer ID, Purchase Date, Product Category, Payment Method, Age, Gender, Churn, etc.)
- Cleaned and engineered to include:
    - Year, Month, and Day fields
    - Total returns, total orders, and purchase behavior summary
    - Aggregated gender and age group metrics
    - Payment method breakdown by demographic and time

Methodology

1. **Data Cleaning & Preprocessing**
    - Resolved missing values (Returns)
    - Parsed datetime values and extracted temporal features
    - Dropped redundant columns and ensure data consistency
2. **Feature Engineering**
    - Created a master customer dataset summarizing behavior metrics
    - Generated gender-wise and age-wise aggregations
3. **Exploratory Data Analysis (EDA)**
    - Visualized purchase behavior, churn distribution, and demographic trends
    - Analyzed payment preferences by age, gender, and year

4. **Insight Generation**
    - Interpreted churn patterns and purchase trends across segments
    - Evaluated performance of different payment modes

Tools & Technologies

- **Languages**: Python
- **Libraries**: pandas, matplotlib, seaborn
- **Data Output**: Clean datasets, visualizations, charts