# Customer Purchase Behavior Analysis – Summary Report

## Objective

The goal of this project was to analyze e-commerce transaction data to uncover key customer purchasing patterns and generate insights for business decision-making. The dataset included online retail transactions from a UK-based store.

## Tools & Technologies Used

- Python: Data manipulation and analysis using pandas, matplotlib, and seaborn  
- SQL: Querying data using pandasql  
- Jupyter/Google Colab: Environment for interactive coding and visualization

## Data Preparation

- Loaded a real-world dataset containing invoice-level transaction records.  
- Cleaned the data by:  
 • Removing missing values  
 • Filtering out canceled orders and negative quantities  
 • Creating new variables like TotalPrice = Quantity × UnitPrice  
 • Converting timestamps to proper datetime format

## Key Analyses & SQL Insights

- Identified top 5 countries by total revenue using SQL queries.  
- Ranked top 10 selling products based on overall sales.  
- Analyzed weekly revenue trends by resampling and plotting time series data.  
- Discovered that a small number of high-frequency customers contributed significantly to total revenue (Pareto Principle).

## Visualizations Created

- Weekly sales trend (line chart)  
- Top 10 products by revenue (bar chart)  
- Revenue distribution by country  
- Invoice volume over time

## Customer Segmentation (RFM Analysis)

- Implemented Recency, Frequency, and Monetary (RFM) segmentation to profile customer value.  
- Customers were segmented into tiers (e.g., high-value vs. low-engagement) to help design retention strategies.

## Key Findings

- Most revenue came from repeat customers in the UK.  
- A few product categories accounted for the majority of sales.  
- Recency and frequency patterns suggested opportunities for targeted re-engagement campaigns.

## Outcome

This project demonstrates practical skills in data wrangling, SQL analytics, visualization, and customer profiling. It provides a foundation for real-world business intelligence applications, especially in e-commerce and marketing analytics.