



# Customer Shopping Behavior Analysis

An End-to-End Data Analytics Project

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PYTHON (PANDAS)

POSTGRESQL

SQL

INTERACTIVE DASHBOARD

## Project Overview

# Uncovering Customer Insights

This project analyzes customer shopping behavior from raw data to actionable insights.

1

### How do customers shop?

Understanding purchasing patterns.

2

### Who spends more?

Identifying high-value segments.

3

### Do discounts increase revenue?

Evaluating promotional effectiveness.

# Project Goals

Key questions driving our analysis:



## **Understand Customer Purchasing Behavior**

Deep dive into habits and preferences.



## **Identify High-Value Customer Segments**

Focus on profitable customer groups.



## **Measure Impact of Discounts & Subscriptions**

Quantify promotional effectiveness.



## **Analyze Product Performance & Satisfaction**

Evaluate product success and customer feedback.



## **Present Interactive Insights**

Dashboard for easy decision-making.

# Dataset Understanding

A comprehensive view of customer interactions.

## Customer Demographics

Age, Gender

## Shipping Type

Standard, Express, etc.

## Purchase Behavior

Amount, Frequency

## Customer Review Ratings

Feedback on products

## Product Details

Category, Item Purchased

## Previous Purchase History

Loyalty indicators

## Discount & Promotion

Usage data

## Combined Data

For behavioral and financial insights.



# Data Preparation & Feature Engineering (Python)

Transforming raw data into meaningful insights.

## Initial Exploration

Structure, missing values, summary statistics.

## Data Standardization

Lowercase column names, underscore spaces, clear labeling.

## Handling Missing Values

Median imputation for review ratings within categories.

## Feature Engineering

Age group segmentation, numeric purchase frequency, discount optimization.



# Database Integration (PostgreSQL)

Storing and managing data for efficient analysis.

**Database:**  
**customer\_behavior**

Structured environment for our data.

**Table:** **customer**

Cleaned and prepared data loaded here.

## Benefits

- Fast querying for rapid insights.
- Advanced SQL capabilities (CTEs, window functions).
- Seamless dashboard integration.

# Business Questions & SQL Insights

Answering critical business questions with data-driven queries.



## Q1: Male vs. Female Revenue

Target gender-based marketing strategies.



## Q2: Discount User Spending

Identify high-value customers even with discounts.



## Q3: Product Satisfaction

Based on average review ratings.



## Q4: Shipping Type & Spending

Compare average purchase for Standard vs. Express.



## Q5: Subscriber Spending

Evaluate financial value of subscription programs.



## Q6: Product Discount Dependency

Optimize discount strategies for specific products.

# Advanced SQL Insights

Deeper analysis into customer behavior and product performance.



## Q7: Customer Segmentation by Loyalty

New, Returning, Loyal.  
Understand lifecycle and retention.



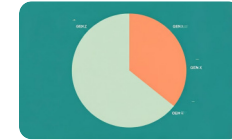
## Q8: Top 3 Best-Selling Products

Identifies category leaders  
using window functions.



## Q9: Repeat Buyers & Subscriptions

Connects customer loyalty  
with subscription behavior.



## Q10: Age Group Revenue Contribution

Revenue share and  
percentage contribution by  
age group.



# Key Insights & Business Impact

Transforming data into strategic actions.

## 🌟 Key Observations:

- Certain age groups drive significant revenue.
- Subscribers generally spend more.
- Loyal customers generate strong revenue.
- Discounts drive volume, not always value.
- Express shipping correlates with higher spending.

## 📈 Business Impact:

- Improve targeted marketing campaigns.
- Optimize discount strategies.
- Enhance customer retention programs.
- Identify high-performing products.
- Make data-driven pricing & shipping decisions.

This project demonstrates a complete data analytics workflow, showcasing strong analytical, technical, and business-thinking skills.