E-Commerce Delivery Performance Analysis Project

Introduction

The E-Commerce Delivery Performance Analysis Project focuses on evaluating delivery efficiency, discount strategies, and customer satisfaction levels within an online retail business. By integrating Python-based data preprocessing with Power BI analytics, the project provides a comprehensive performance overview across warehouses, shipment modes, and product categories. The ultimate goal is to identify operational gaps and improve delivery timelines and customer experiences through data-driven insights.

Abstract:

The project begins with a raw dataset (Train.csv) that contains information on product costs, discounts, customer ratings, shipment details, and delivery outcomes. Data cleaning and preprocessing were conducted in Jupyter Notebook using Python to handle missing values, outliers, and inconsistencies. The cleaned dataset (Cleaned_Train_File.xls) was then imported into Power BI for data transformation and visualization. Interactive dashboards were developed to highlight key performance indicators (KPIs) such as On-Time Delivery Percentage, Average Customer Rating, Average Product Cost, and Discount Trends. This visualization helps identify factors influencing timely deliveries and overall customer satisfaction.

Tools Used:

- **Python (Jupyter Notebook)** – Data cleaning, transformation, and feature engineering.
- **Pandas, NumPy** – Data manipulation and statistical computation.
- **Power BI** – Dashboard creation and visualization of delivery performance metrics.
- **DAX & Power Query (M code)** – For Calculated measures and data transformation, calculated columns, and data modeling.
- **Excel** – For storing and validating cleaned datasets before visualization.

Steps Involved in Building the Project:

1. **Data Collection:** Imported the raw dataset (Train.csv) containing shipment details, ratings, and cost attributes.
2. **Data Cleaning:** Processed the dataset in Python to handle null values, standardize categorical data, and remove duplicates.
3. **Feature Engineering:** Created derived columns such as Discount_Percent, Gender_Label, and Weight_Bin.
4. **Data Transformation:** Loaded the cleaned dataset into Power BI and applied Power Query transformations for further refinement.
5. **Measure Development:** Developed DAX measures including Total Orders, On-Time %, Average Cost, Average Rating, and Total Discount Amount.
6. **Dashboard Development:** Designed multiple Power BI dashboards focusing on Delivery Performance, Customer Insights, and Product Analysis.
7. **Insights Extraction:** Added slicers, KPIs, and interactive elements to make the dashboard dynamic and user-friendly.
8. **Insight Extraction:** Identified performance gaps in warehouses and shipment modes and analyzed customer satisfaction trends.

Conclusion:

This project successfully integrates Python and Power BI to transform raw e-commerce data into actionable business insights. The final Power BI dashboard, “E-Commerce Delivery Performance.pbix,” offers an interactive visualization of key metrics such as On-Time Delivery Percentage, Average Discounts, Customer Ratings, and Warehouse Efficiency. The insights enable business leaders to identify bottlenecks in delivery operations, optimize shipment modes, and enhance customer satisfaction. Through the integration of analytics and visualization, this project demonstrates how data can effectively drive operational excellence in the e-commerce industry.

Sample Dashboard Output’s: