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+233 55 654 1525
+233 59 391 9912
+233 30 801 2328
marketing@npontu.com
business@npontu.com
Tse-Addo Roundabout, Accra

NPONTU TECHNOLOGIES INTERVIEW QUESTIONS [INTELLIGENT SYSTEMS SERVICES ENGINEER]

Name of Interviewee: Derrick Ansong Kankam

Date of assignment: 23rd October, 2025

Link to Code ------ GitHub

Assignment Title: Analysing Customer Behaviour for E-commerce Insights

Project Overview

This project focuses on analyzing an E-commerce dataset to uncover patterns in customer behavior, identify key drivers of sales, and develop predictive insights that support business decision-making. The analysis aims to understand which factors influence purchase frequency, customer retention, and overall revenue growth.

The project leverages data analytics and visualization techniques to transform raw data into meaningful insights that can drive strategic marketing and operational improvements.

Objectives

- To analyze customer purchasing patterns and segment customers based on their buying behavior.
- To identify top-performing products, categories, and customer demographics.
- To build a predictive model for sales performance or customer churn.
- To visualize key metrics and performance trends using dashboards and charts.

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Tools and Technologies

Tool	Purpose
Python (Pandas, NumPy, Matplotlib, Seaborn)	Data cleaning, exploration, and visualization
Excel	Initial data inspection and summary reports
Scikit-learn	Building and evaluating predictive models

Methodology

a. Data Collection

Data was obtained from a GitHub repository, containing customer demographics, order details, product categories, and revenue information.

b. Data Cleaning and Preprocessing

- Checking for null values.
- Standardized column names
- Checking for required data types.
- Normalized numerical features for consistent model training.

c. Exploratory Data Analysis (EDA)

- KPIs
  - Total Sales
  - Average Sales,
  - Number of Items Sold,
  - Total Profit

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d. Feature Engineering

- Sales by Month
- Items Sold by Category
- Items Ordered by Month
- Sales by Sub Category
- Items Sold by Ship Mode
- Items Sold by Ship City
- Items Sold by Discounted Category

Key Insights

1. The highest sales were achieved in the month of September and November.
2. The ship Mode with the highest ordered items is standard class with the total items of 22,797.
3. Customer segment with the highest sales and profit is consumer, and the segment with least sales and profit is home office.
4. The highest items sold with discount-driven is office supplies, with total items of 22906 and a total discount of 947.80.
5. Product categories such as office supplies showed the highest profitability and repeat engagement.

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Business Recommendations

1. Leverage discount on office supplies
2. Optimize standard class shipping
3. Improve engagement in low performing segment
4. Focus on profitable category
5. Optimize Discounts: Apply targeted discounts only for low-engagement customers instead of blanket promotions.
6. Focus stock management on high-performing categories such as Electronics and Fashion to reduce holding costs.

Conclusion

This project successfully demonstrates how data analysis and machine learning can uncover valuable insights into e-commerce operations. By integrating these findings into business strategy, companies can enhance customer engagement, operational efficiency, and profitability.