Vardaan EDA

Minor Project-I

(ENSI152)

Submitted in partial fulfilment of the requirement of the degree of

BACHELOR OF Computer Application

to

K.R Mangalam University

by

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CERTIFICATE

This is to certify that the Project Synopsis titled **"Vardaan EDA"**, submitted by **Ritul Aryan (2401201130) and Parna Ray (2401201197)** to **K.R Mangalam University, Gurugram, India**, is a **Bonafide record** of project work conducted under my **supervision and guidance**. This project represents dedicated efforts toward the **partial fulfilment of the Bachelor of Computer Application degree in Artificial Intelligence and Data Analysis**.

The work undertaken in this project reflects a **comprehensive approach** toward data exploration and analysis, demonstrating technical proficiency and analytical skills. The students have adhered to academic integrity and research standards while executing this project. Based on their efforts, the project is considered **worthy of evaluation** and meets the required academic criteria.

This certification acknowledges the **diligence and commitment** of the students in contributing to their field of study. Their work is submitted for consideration as part of their academic requirements

OUR CERTIFICATE'S

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ABSTRACT

This project focuses on **Exploratory Data Analysis (EDA)** to analyze Vardaan's sales reports and uncover **seasonal and business trends**. The primary goal is to enhance **inventory management**, optimize **marketing strategies**, and support overall **business growth** by identifying patterns in customer purchasing behavior.

By leveraging **Tableau** for **visualization** and **Python (Google Colab)** for **data preprocessing**, the project ensures that insights are generated efficiently and accurately. Key aspects analyzed include **sales fluctuations, peak demand periods, and consumer preferences**, helping Vardaan make informed decisions about stocking products, adjusting pricing strategies, and improving promotional efforts.

The findings aim to strengthen **sales forecasting models**, enabling proactive inventory adjustments to reduce stock shortages and wastage. Additionally, better customer engagement strategies can be developed by aligning marketing campaigns with actual sales trends. Through data-driven insights, this project empowers Vardaan to improve profitability, streamline operations, and build a more resilient business model.

Keywords: EDA, Business Analytics, Seasonal Trends, Inventory Optimization, Tableau, Python.

INTRODUCTION

*Vardaan, a growing local startup specializing in **sweets, namkeen, snacks, cookies, and pickles**, struggles with predicting **seasonal demand** and understanding **consumer purchasing trends**. These challenges often lead to inventory shortages, excess stock, and ineffective marketing efforts.*
*This project utilizes **data-driven insights** to address these issues, helping Vardaan make more informed decisions about **inventory stocking, demand forecasting, and strategic marketing**. By analyzing **historical sales data**, the project identifies **patterns in customer behavior**, peak buying seasons, and product preferences, allowing for more efficient stock management and targeted promotions.*
*With tools like **Tableau and Python**, the project enables Vardaan to optimize **sales forecasting**, reduce **waste**, and enhance **profitability**. Through these insights, the startup can better align its offerings with consumer demand, ensuring sustained **business growth** and competitive advantage in the market.*
*This data-driven approach empowers Vardaan to scale operations and improve **customer satisfaction** while minimizing financial risks.*

MOTIVATION

Understanding business trends and seasonal purchasing habits is essential for optimizing inventory and marketing strategies. This project seeks to help Vardaan improve profitability through data-driven analysis and predictive insights.

LITERATURE REVIEW

Comparative Evaluation of Previous Research
Past research focuses on big retail analytics, online consumer behavior tracking, and automated inventory management systems. However, few studies specifically address data-driven seasonal forecasting for small businesses, which is the core focus of this project.

GAP ANALYSIS

Traditional business analytics tools often fail to consider seasonal patterns in consumer behavior for small-scale enterprises. This project aims to bridge this gap by tailoring data insights to optimize inventory planning and marketing strategies for Vardaan.

PROBLEM STATEMENT

Vardaan faces significant inventory management challenges due to unpredictable seasonal demand, resulting in frequent stock shortages, unnecessary wastage, and inefficient marketing strategies. These issues not only impact profitability but also weaken customer trust and operational efficiency. Without a clear understanding of demand fluctuations, the business struggles to maintain optimal stock levels, leading to missed sales opportunities or excess inventory that goes unsold.

This project aims to tackle these challenges through **Exploratory Data Analysis (EDA)**, a systematic approach to uncovering patterns, trends, and correlations within the company's inventory and sales data. By leveraging historical sales records, market trends, and seasonal variations, EDA will help Vardaan gain actionable insights into demand forecasting, stocking strategies, and marketing optimization. Identifying peak sales periods, customer

preferences, and product performance will enable smarter purchasing decisions, reducing losses caused by overstocking or understocking.

Additionally, the findings from EDA can refine promotional campaigns, ensuring marketing efforts are aligned with actual demand trends rather than arbitrary assumptions. With data-driven decision-making, Vardaan can create a more efficient supply chain, optimize inventory levels, and maximize revenue. Ultimately, this project will empower the business with predictive capabilities, allowing it to respond proactively to seasonal shifts, minimize financial losses, and strengthen its market position through strategic inventory management.

OBJECTIVES

The objectives of this project are:

- Analyze historical sales data of Vardaan's products to identify trends.
- Determine seasonal consumer preferences and high-demand products.
- Provide data-driven insights for marketing optimization.
- Improve inventory management strategies to reduce stock issues.
- Enhance digital marketing approaches using predictive analytics.

TOOLS & PLATFORMS USED

- **Python (Google Colab)** – Data preprocessing & analysis.
- **Tableau** – Visualization & trend identification.
- **Excel** – Initial dataset handling.

METHODOLOGY

Data Collection

The dataset for this analysis was extracted from Vardaan's sales records, covering transactions across various seasonal cycles.

Data Preprocessing

Steps performed in Google Colab:

Cleaning missing values

Handling duplicates & outliers

Normalizing data for better interpretation

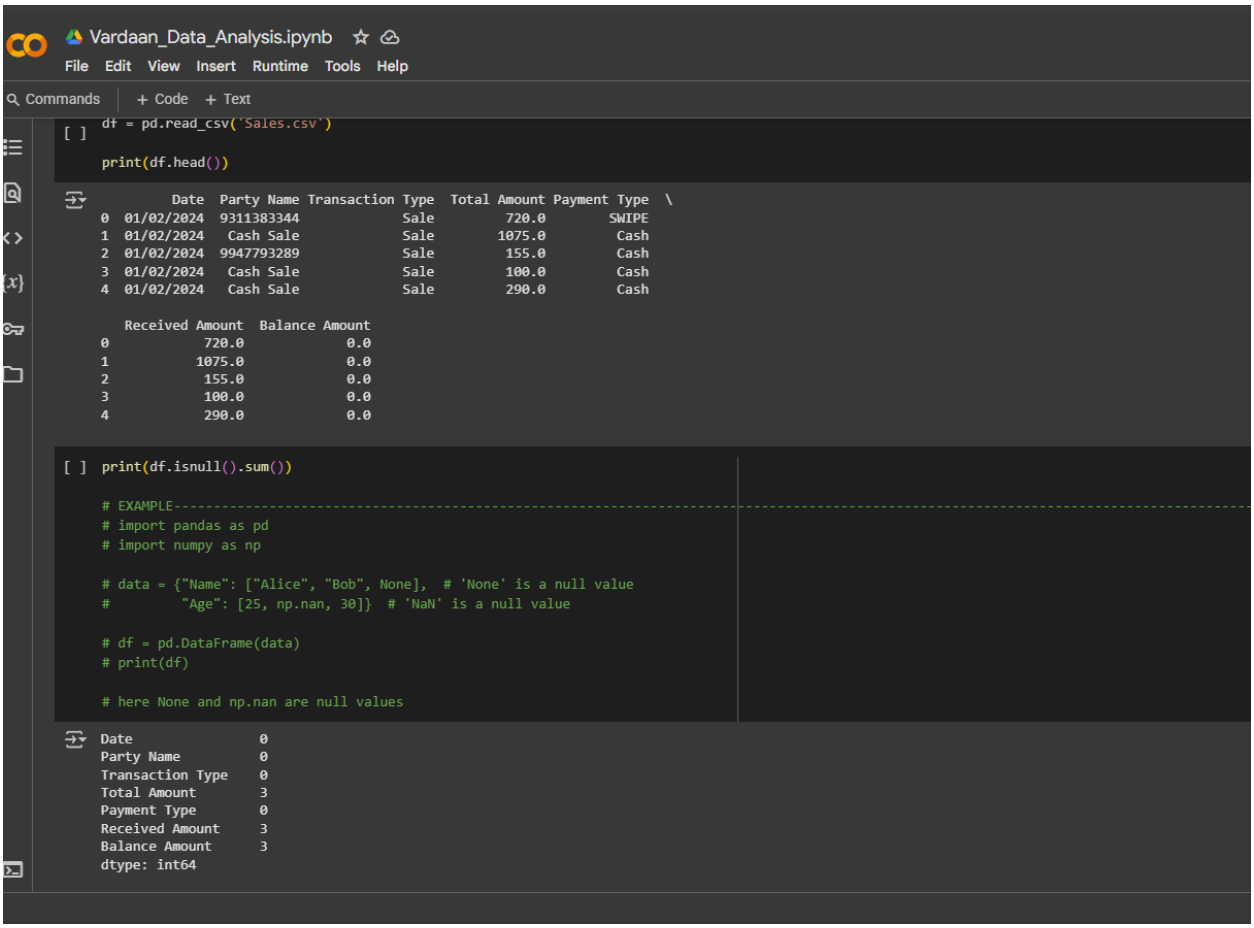
Analysis & Visualization

Using Tableau, seasonal trends in product sales were visually represented to identify demand patterns.

Model Validation & Testing

The findings were cross-checked with business owners to ensure relevance and applicability.

OUR WORK


Vardaan_Data_Analysis.ipynb
File Edit View Insert Runtime Tools Help
Commands + Code + Text
[ ] df = pd.read_csv('Sales.csv')
print(df.head())
Date Party Name Transaction Type Total Amount Payment Type \
0 01/02/2024 9311383344 Sale 720.0 SWIPE
1 01/02/2024 Cash Sale Sale 1075.0 Cash
2 01/02/2024 9947793289 Sale 155.0 Cash
3 01/02/2024 Cash Sale Sale 100.0 Cash
4 01/02/2024 Cash Sale Sale 290.0 Cash
Received Amount Balance Amount
0 720.0 0.0
1 1075.0 0.0
2 155.0 0.0
3 100.0 0.0
4 290.0 0.0
[ ] print(df.isnull().sum())
EXAMPLE
import pandas as pd
import numpy as np
data = {"Name": ["Alice", "Bob", None], # 'None' is a null value
"Age": [25, np.nan, 30]} # 'NaN' is a null value
df = pd.DataFrame(data)
print(df)
here None and np.nan are null values
Date 0
Party Name 0
Transaction Type 0
Total Amount 3
Payment Type 0
Received Amount 3
Balance Amount 3
dtype: int64

Vardaan_Data_Analysis.ipynb

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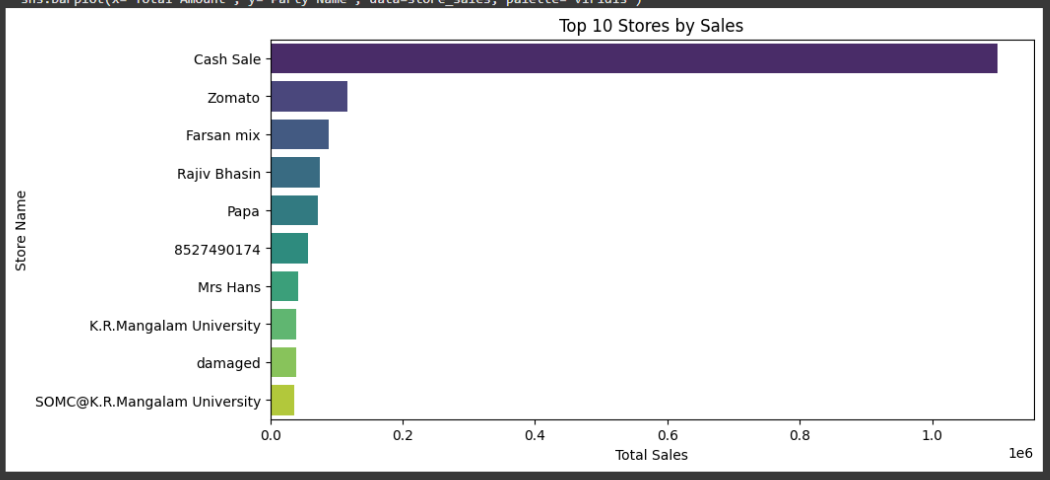
```
[ ]  # Plot the bar chart
     plt.figure(figsize=(10, 5))
     sns.barplot(x="Total Amount", y="Party Name", data=store_sales, palette="viridis")
     plt.title("Top 10 Stores by Sales")
     plt.xlabel("Total Sales")
     plt.ylabel("Store Name")
     plt.show()
```

```
<ipython-input-9-8ba5ba24e335>:8: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `y` variable to `hue` and set `legend=False` for the s

  sns.barplot(x="Total Amount", y="Party Name", data=store_sales, palette="viridis")
```



VardaanEDA.ipynb

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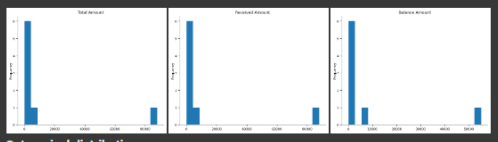
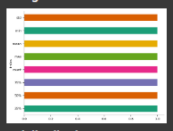
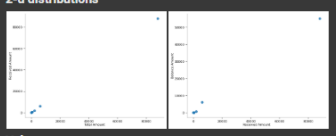
Distributions



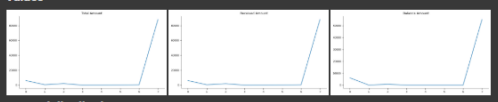
Categorical distributions



2-d distributions



Values



Faceted distributions

```
<string>:5: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `y` variable to `hue` and set `legend=False` for the same effect.
```

EXPERIMENTAL SETUP & RESULTS

Key Findings

- Festive months (Oct-Dec) see peak demand for sweets & snacks.
- Pickles & namkeen exhibit steady sales across monsoon months.
- Certain months show stock shortages due to poor demand forecasting.
- Optimized inventory stocking based on demand cycles improves profitability.

DISCUSSION

Marketing Insights

- **Social media promotions during peak seasons** drive higher engagement.

- **Dynamic pricing strategies** help retain customers during off-peak months.

Inventory Recommendations

- Adjusting stock levels before peak seasons ensures availability.

CONCLUSION & FUTURE WORK

Conclusion

This project successfully analyzes seasonal trends and business patterns for Vardaan using EDA techniques. The insights generated will help improve inventory management and marketing strategies, ultimately leading to better profitability and operational efficiency.

Future Work

Potential enhancements include:

- Advanced machine learning models for more accurate demand forecasting.

- Integration of predictive analytics into Vardaan’s digital sales platform.

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Patel, S. (2019). Impact of Seasonality on Small-Scale Businesses. Economic Trends Journal.