E-commerce Data Analysis Project

Student Details

Name: Neeraj Maurya

Course: B.Tech 4th Year

College: JMS Institute of Technology (JMSIT)

Project Summary

This is an e-commerce data analysis project that analyzes sales data from a superstore dataset. The project focuses on understanding sales patterns, trends, and category-wise performance through data visualization and analysis.

Key Features:

- Monthly sales trend analysis
- Category-wise sales distribution
- Interactive data visualizations using Plotly
- Time-based analysis of sales data

Technologies Used:

- Python
- Pandas (data manipulation)
- Plotly (data visualization)
- Jupyter Notebook

Future Scope

1. Customer Segmentation: Analyze customer behavior and create customer segments based on purchasing patterns
2. Profitability Analysis: Deep dive into profit margins by category, region, and customer segment
3. Inventory Optimization: Identify fast-moving vs slow-moving products to optimize inventory

4. Regional Analysis: Expand geographical analysis to understand regional performance
5. Seasonal Trend Analysis: Identify seasonal patterns and prepare for peak seasons
6. Customer Lifetime Value: Calculate CLV to focus on high-value customers
7. Predictive Analytics: Implement machine learning models to forecast future sales
8. Discount Impact Analysis: Study how discounts affect sales volume and profitability
9. Shipping Performance: Analyze shipping modes and their impact on customer satisfaction
10. Product Recommendation: Build a recommendation system based on purchasing patterns

Code Explanation

1. Environment Setup

```
python

!pip install plotly
```

- Installs Plotly library for interactive visualizations

2. Library Imports

```
python
import pandas as pd  # Data cleaning and manipulation
import plotly.express as px  # Data visualization
import plotly.graph_objects as go  # Advanced and customized graphs
import plotly.io as pio  # Graph templates customization
import plotly.colors as colors

pio.templates.default = "plotly_white"  # Set default theme
```

3. Data Loading and Exploration

```
python

data = pd.read_csv("Sample - Superstore.csv", encoding='latin-1')
```

```
data.head()  # Display first 5 rows
data.describe()  # Statistical summary

data.info()  # Data types and structure information
```

4. Data Preprocessing

```
python

# Convert date columns to datetime format
data['Order Date'] = pd.to_datetime(data['Order Date'])
data['Ship Date'] = pd.to_datetime(data['Ship Date'])


# Extract time-based features
data['Order Month'] = data['Order Date'].dt.month
data['Order Year'] = data['Order Date'].dt.year

data['Order Day of Week'] = data['Order Date'].dt.dayofweek
```

5. Monthly Sales Analysis

```
python

# Group sales by month
sales_by_month = data.groupby('Order Month')['Sales'].sum().reset_index()

# Create line chart for monthly sales trend
fig = px.line(sales_by_month,
              x='Order Month',
              y='Sales',
              title='Monthly Sales Analysis')

fig.show()
```

6. Category-wise Sales Analysis

```
python

# Group sales by category
sales_by_category = data.groupby('Category')['Sales'].sum().reset_index()
```

```
# Create pie chart for category distribution
fig = px.pie(sales_by_category,
             values='Sales',
             names='Category',
             title='Sales Analysis by Category')

fig.show()
```

Key Insights from the Code

1. Data Structure: The dataset contains 9,994 entries with 21 columns including order details, customer information, product categories, and financial metrics.
2. Sales Metrics: Key metrics analyzed include Sales, Quantity, Discount, and Profit.
3. Time-based Analysis: The code extracts temporal features to analyze trends over time.
4. Interactive Visualizations: Uses Plotly to create interactive charts that allow users to hover over data points for detailed information.
5. Business Intelligence: The analysis helps identify:
    - Monthly sales patterns and seasonality
    - Performance across different product categories
    - Potential areas for business optimization

Certification

This is to certify that the above project titled “Face, Eye & Smile Detection System” has been completed by Neeraj Maurya, a student of B.Tech 4th Year at JMS Institute of Technology (JMSIT) .

Submitted To:

Department of Computer Science & Engineering
JMS Institute of Technology, Ghaziabad

Signature

Project Guide / Faculty

Date: _____