Explorative Data Analysis for E-commerce Buisness

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PROBLEM STATEMENT

The e-commerce industry generates vast amounts of data daily, encompassing sales transactions, customer interactions, inventory movements, and web traffic.

Despite the availability of this data, many e-commerce businesses struggle to harness its full potential due to challenges in data integration, analysis, and visualization. This leads to suboptimal decision-making, inefficient operations, and missed opportunities for growth and customer engagement.

Project Description

The e-commerce industry generates vast amounts of data from various sources, including sales transactions, customer interactions, inventory levels, and web analytics. This project aims to utilize Power BI to integrate, analyze, and visualize this data, transforming it into actionable insights that can drive strategic decisions, optimize operations, and enhance customer satisfaction. By developing a comprehensive data analysis and visualization solution, the project seeks to address key business challenges and provide a clear view of performance metrics.

The project will involve connecting to multiple data sources such as SQL databases, CRM systems, inventory management platforms, and web analytics tools. Using Power Query Editor, the data will be cleaned and transformed to ensure accuracy and consistency. A robust data model will be developed, establishing relationships between different datasets and creating calculated columns and measures using DAX (Data Analysis Expressions). This will enable detailed analysis of sales trends, customer behavior, inventory management, and web traffic patterns.

Interactive dashboards will be designed to present the analyzed data in an easily understandable and visually appealing manner. These dashboards will include various visual elements like bar charts, line graphs, pie charts, and maps, and will feature slicers, filters, and drill-through capabilities to enhance user interactivity. The dashboards will be published to the Power BI Service, allowing stakeholders to access real-time insights and collaborate effectively. Continuous monitoring and feedback collection will ensure the dashboards remain relevant and valuable, driving data-driven decision-making across the e-commerce business.

Objectives

❑ **Sales Analysis**
- Track sales performance over time
- Identify best-selling products and seasonal trends

❑ **Customer Insights**
- Segment customers based on purchasing behavior and demographics
- Analyze customer lifetime value and retention rates

❑ **Inventory Management**
- Monitor inventory levels and stock movements
- Identify slow-moving products and forecast demand

❑ **Web Traffic and Conversion**
- Analyze website traffic patterns and user behavior
- Improve conversion rates through better understanding of user interactions

❑ **Operational Efficiency**
- Develop interactive dashboards to monitor key performance indicators (KPIs)
- Enable real-time performance monitoring and data-driven decision-making

Methodology

- **Requirements Gathering**

Conduct meetings with stakeholders to understand their needs and goals. Define the scope, deliverables, and timeline for the project

- **Data Preparation**

Identify data sources and establish connections. Clean and transform data using Power Query Editor to ensure quality and consistency

- **Data Modeling**

Design the data model, establishing relationships and creating necessary measures and calculated columns using DAX .Optimize the model for performance and scalability

- **Visualization Design**

Develop wireframes and design mockups for dashboards and reports. Create interactive visuals using Power BI's visualization tools

- **Implementation and Testing**

Build and configure dashboards with slicers, filters, and drill-through functionality. Test dashboards with sample data and refine based on feedback

- **Deployment and Sharing**

Publish reports to Power BI Service. Configure data refresh schedules and set up user access and permissions

- **Monitoring and Maintenance**

Set up monitoring for data refresh failures and performance issues. Collect user feedback and make iterative improvements to dashboards

WHO ARE THE END USERS?

- **Executive Management**

•Use high-level dashboards to monitor overall business performance and strategic KPIs

- **Sales and Marketing Teams**

•Analyze sales trends, customer segments, and campaign performance to optimize strategies

- **Inventory Managers**

•Track inventory levels and movements to ensure efficient stock management and reduce costs

- **Customer Support Teams**

•Gain insights into customer behavior and satisfaction to improve service quality

- **Web Analytics Teams**

•Monitor website traffic and user behavior to enhance user experience and increase conversions

Technology Used

❑**Power BI Desktop**
Used for data preparation, modeling, and visualization. Allows for creating interactive reports and dashboards. Features Power Query Editor for data cleaning and transformation. Supports DAX (Data Analysis Expressions) for creating measures and calculated columns.

❑**Power BI Service**
Enables publishing, sharing, and collaboration on Power BI reports and dashboards. Facilitates scheduled data refreshes to keep reports up-to-date. Provides secure access to reports and dashboards for stakeholders. Supports data alerts and notifications for real-time monitoring.

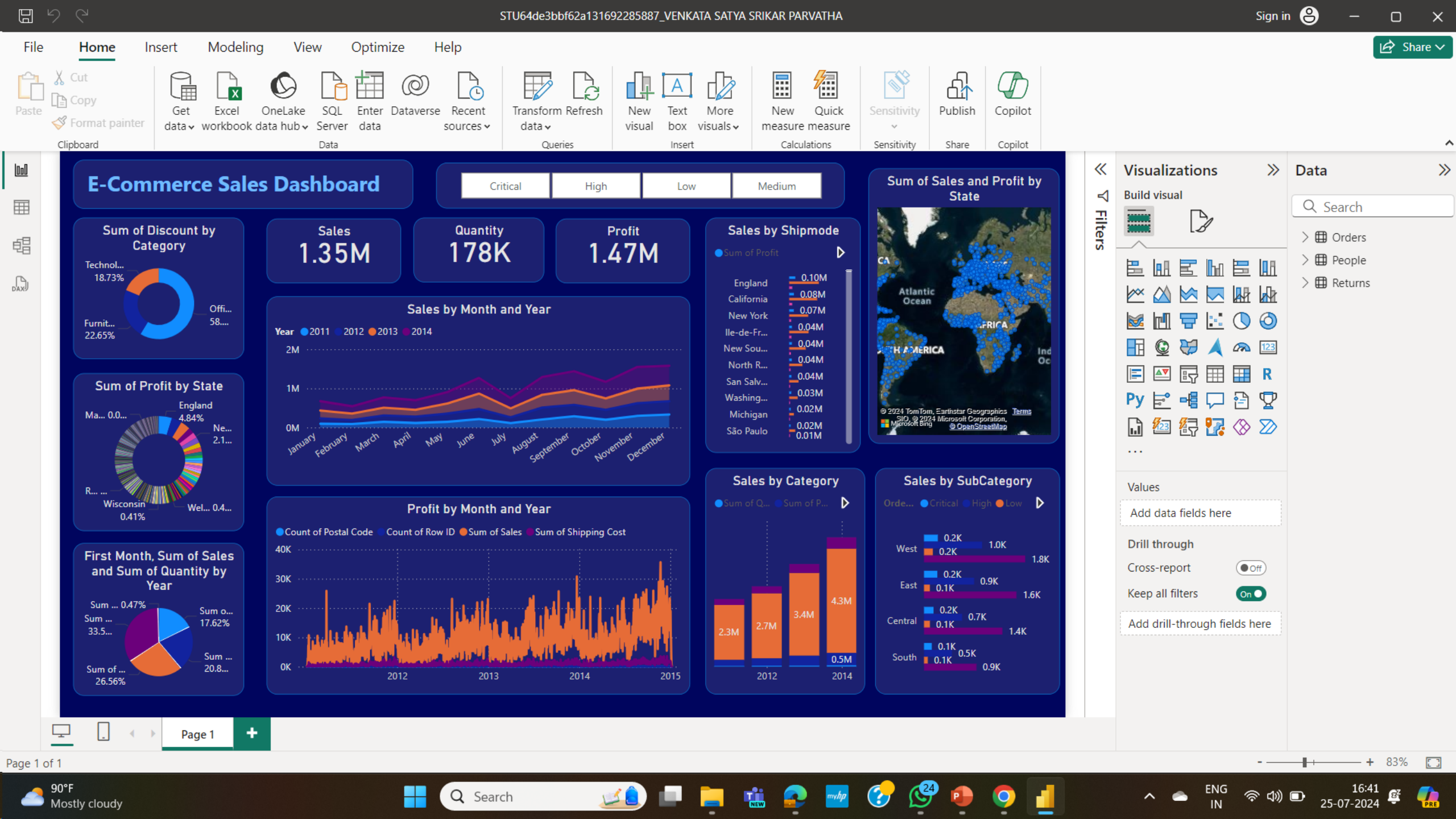
❑**DAX (Data Analysis Expressions)**
Used for defining custom calculations and aggregations in Power BI. Enables creation of complex measures and calculated columns. Enhances data analysis capabilities within Power BI by allowing sophisticated data manipulations.

❑**Power Query Editor**
Integral part of Power BI Desktop for data extraction, transformation, and loading (ETL). Provides a user-friendly interface for cleaning and shaping data. Supports advanced data transformation techniques, such as merging and appending queries, pivoting, and unpivoting data.

❑**SQL**
Utilized for querying and extracting data from relational databases. Essential for integrating data from various sources such as sales databases, CRM systems, and inventory management systems. Allows for complex data retrieval and manipulation to prepare data for analysis in Power BI.

❑**Web Analytics Tools (e.g., Google Analytics)**
Source of web traffic and user behavior data. Provides insights into website performance, user interactions, and conversion rates. Data from these tools can be integrated into Power BI for comprehensive analysis.

RESULTS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Sign in
File
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Format painter
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Excel workbook
OneLake data hub
SQL Server
Enter data
Dataverse
Recent sources
Data
Transform data
Refresh
Queries
New visual
Text box
More visuals
Insert
New measure
Quick measure
Calculations
Sensitivity
Sensitivity
Publish
Share
Copilot
Copilot
E-Commerce Sales Dashboard
Critical
High
Low
Medium
Sum of Discount by Category
Technol... 18.73%
Furnit... 22.65%
Offi... 58....
Sales
1.35M
Quantity
178K
Profit
1.47M
Sales by Shipmode
Sum of Profit
England 0.10M
California 0.08M
New York 0.07M
Ile-de-Fr... 0.04M
New Sou... 0.04M
North R... 0.04M
San Salv... 0.04M
Washing... 0.03M
Michigan 0.02M
São Paulo 0.02M 0.01M
Sum of Sales and Profit by State
Atlantic Ocean
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Microsoft Bing
Sum of Profit by State
Ma... 0.0...
England 4.84%
Ne... 2.1...
R... ...
Wisconsin 0.41%
Wel... 0.4...
Sales by Month and Year
Year 2011 2012 2013 2014
2M
1M
0M
January February March April May June July August September October November December
Profit by Month and Year
Count of Postal Code Count of Row ID Sum of Sales Sum of Shipping Cost
40K
30K
20K
10K
0K
2012 2013 2014 2015
Sales by Category
Sum of Q... Sum of P...
2.3M 2.7M 3.4M 4.3M 0.5M
2012 2014
Sales by SubCategory
Orde... Critical High Low
West 0.2K 0.2K 1.0K 1.8K
East 0.2K 0.1K 0.9K 1.6K
Central 0.2K 0.1K 0.7K 1.4K
South 0.1K 0.1K 0.5K 0.9K
First Month, Sum of Sales and Sum of Quantity by Year
Sum ... 0.47%
Sum ... 33.5...
Sum o... 17.62%
Sum ... 20.8...
Sum of ... 26.56%
Filters
Visualizations
Build visual
Values
Add data fields here
Drill through
Cross-report Off
Keep all filters On
Add drill-through fields here
Data
Search
Orders
People
Returns
Page 1
Page 1 of 1
83%
90°F Mostly cloudy
Search
ENG IN
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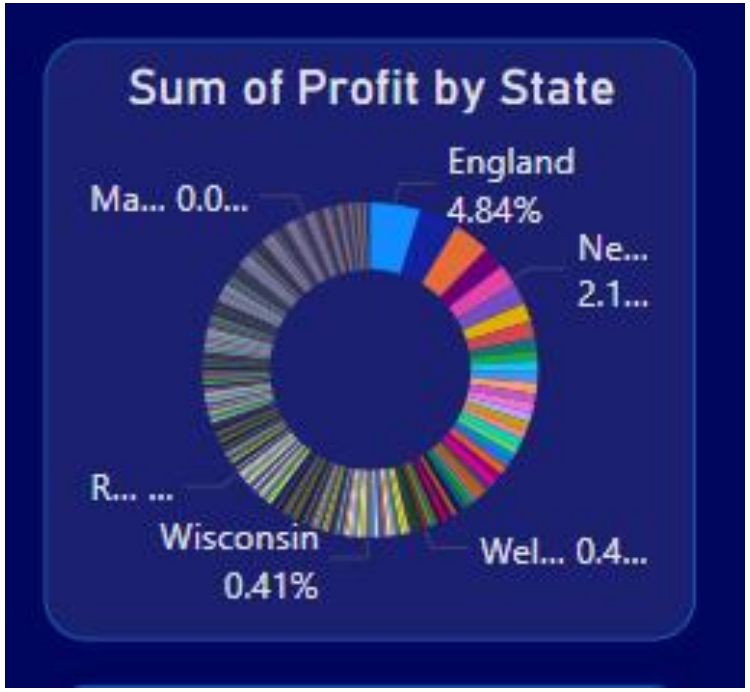
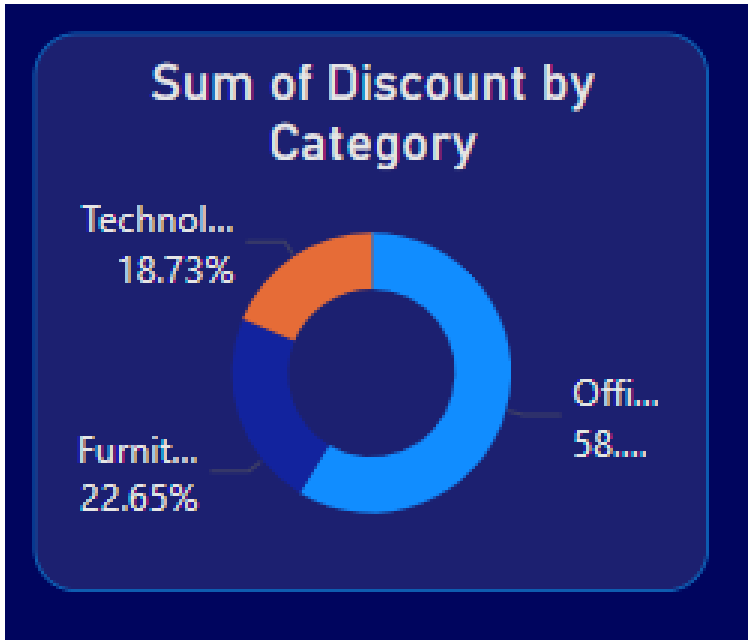
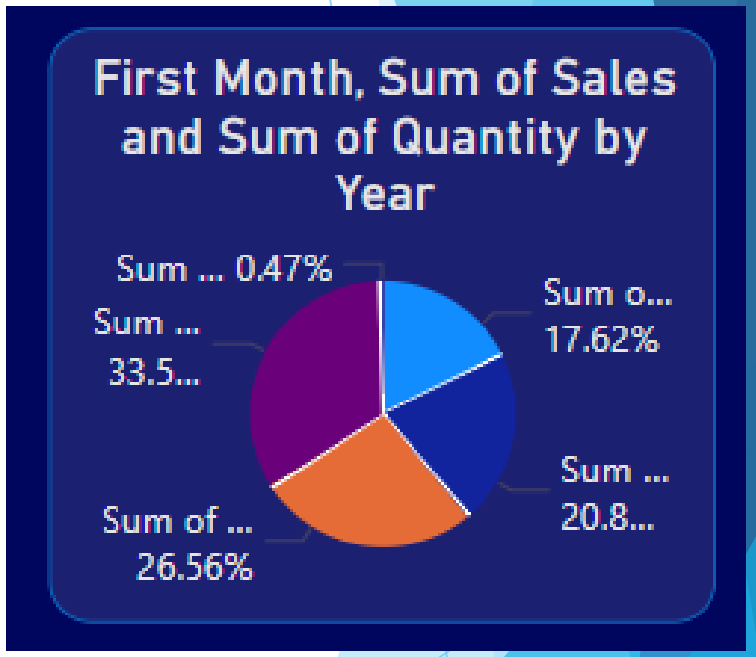
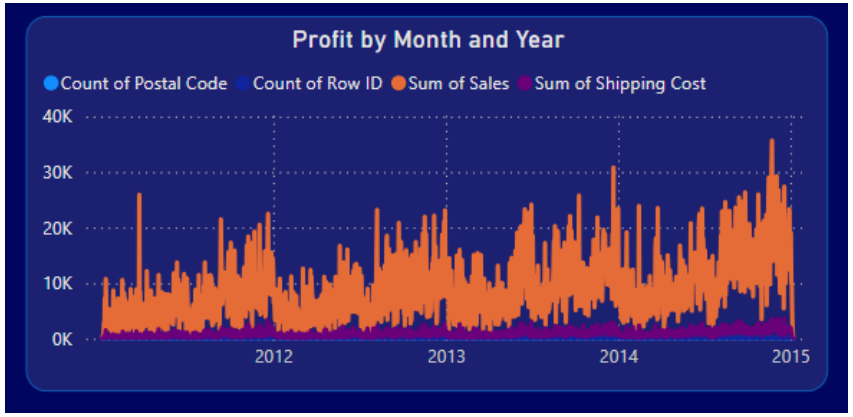
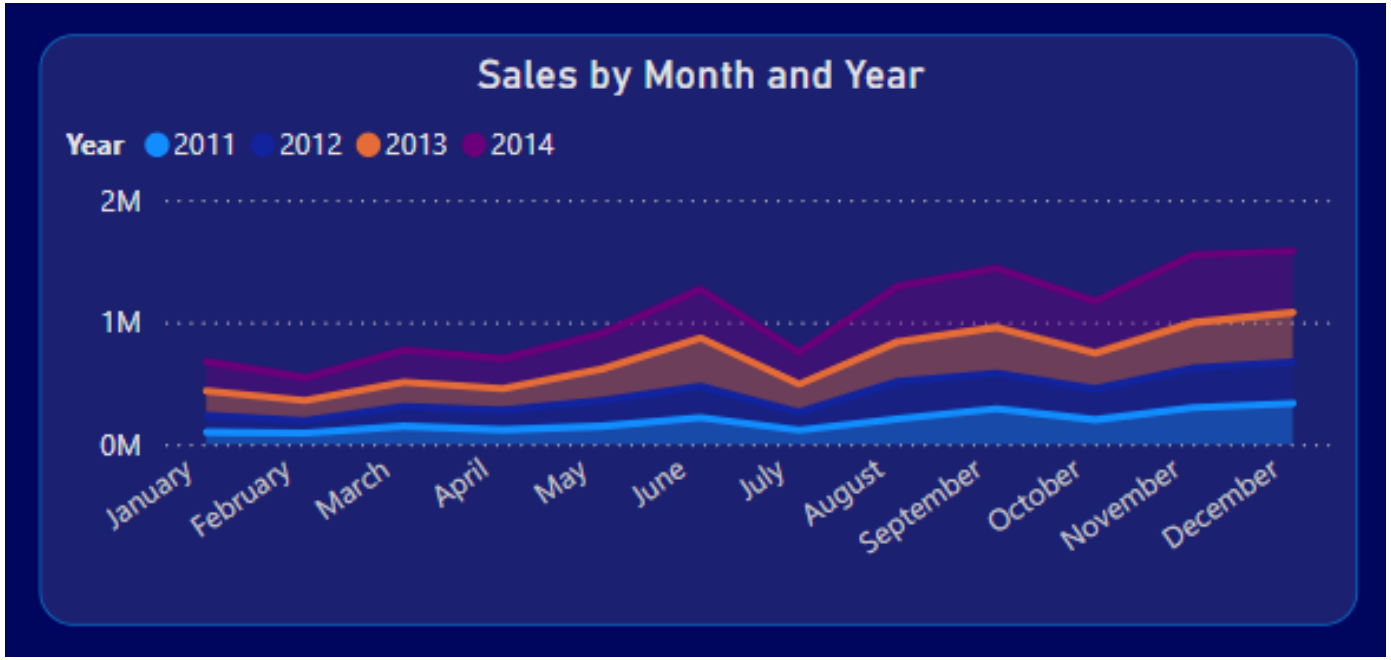
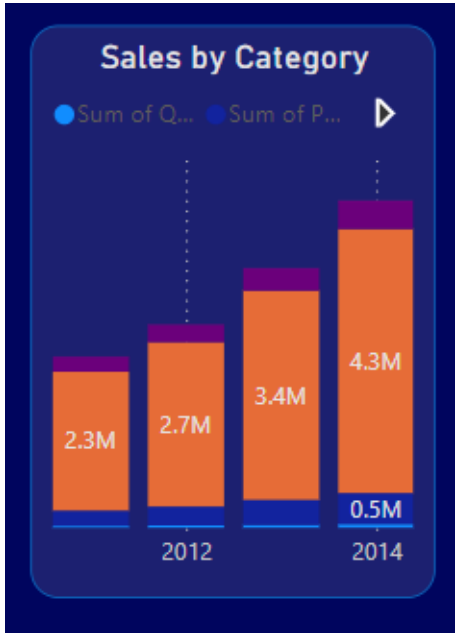

Sum of Profit by State
England
4.84%
Ma... 0.0...
Ne...
2.1...
R... ...
Wisconsin
0.41%
Wel... 0.4...


Sum of Discount by Category
Technol...
18.73%
Offi...
58....
Furnit...
22.65%


First Month, Sum of Sales and Sum of Quantity by Year
Sum ... 0.47%
Sum o...
17.62%
Sum ...
33.5...
Sum ...
20.8...
Sum of ...
26.56%


Profit by Month and Year
Count of Postal Code
Count of Row ID
Sum of Sales
Sum of Shipping Cost
40K
30K
20K
10K
0K
2012
2013
2014
2015


Sales by Month and Year
Year
2011
2012
2013
2014
2M
1M
0M
January
February
March
April
May
June
July
August
September
October
November
December


Sales by Category
Sum of Q...
Sum of P...
2.3M
2.7M
3.4M
4.3M
0.5M
2012
2014


Sales
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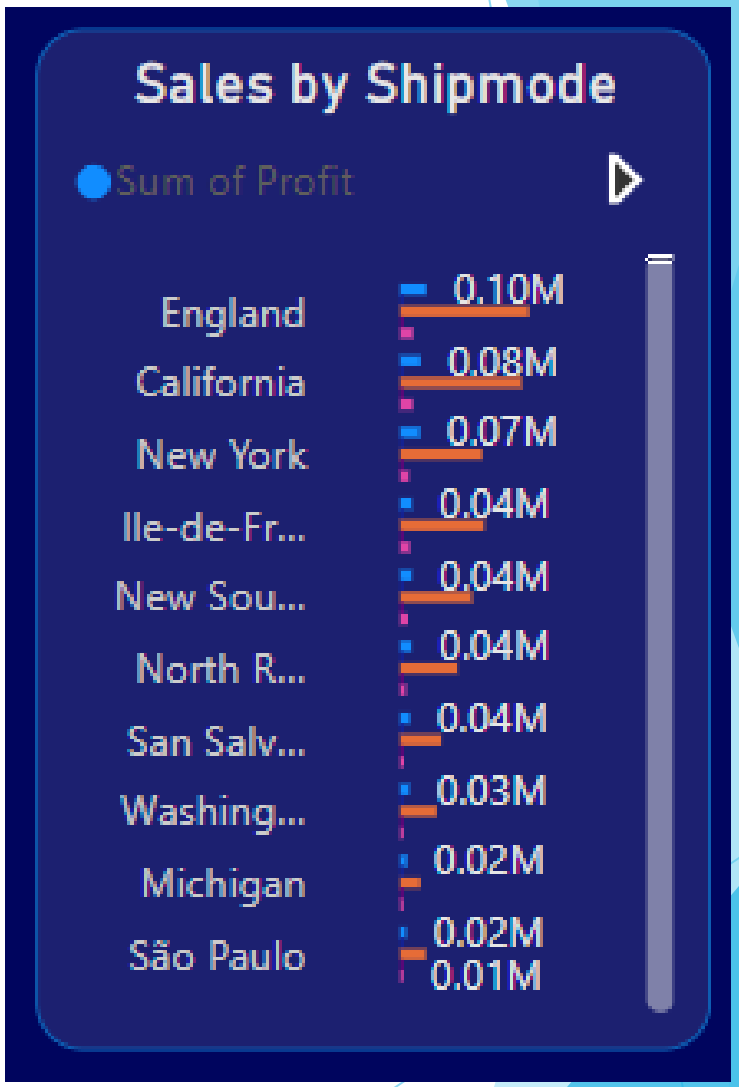
Sales by Shipmode
Sum of Profit
England
California
New York
Ile-de-Fr...
New Sou...
North R...
San Salv...
Washing...
Michigan
São Paulo
0.10M
0.08M
0.07M
0.04M
0.04M
0.04M
0.04M
0.03M
0.02M
0.02M
0.01M


Sum of Sales and Profit by State
Atlantic Ocean
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Microsoft Bing

Project File & Data Sets

Git Hub -

- VenkataSatyaSrikarParvatha/VOIS (github.com)
- https://github.com/VenkataSatyaSrikarParvatha/VOIS/blob/main/STU64de3bbf62a131692285887_VENKATA%20SATYA%20SRIKAR%20PARVATHA.pbix

→ Visit the link by - ctrl + click

→ It contains a reference data set taken

→ A Power BI Executed, for the reference of execution

References

Zebra BI - **How to Create an E-commerce Sales Report in Power BI**

How to Create an E-commerce Sales Report in Power BI - Zebra BI

databox.com - 9 Best Ecommerce Reports to Boost Online Sales (Sourced from 30+ Pros)

9 Best Ecommerce Reports to Boost Online Sales (Sourced from 30+ Pros) | Databox

analyticsinsight.net - **E-Commerce Analytics with Power BI: A Guide**

E-Commerce Analytics with Power BI: A Guide (analyticsinsight.net)

Conclusion

The successful implementation of a comprehensive data analysis and visualization solution using Power BI will significantly enhance the decision-making capabilities of the e-commerce business. By integrating data from multiple sources and transforming it into meaningful insights, the project will address key challenges in sales analysis, customer insights, inventory management, and web traffic analysis.

Interactive dashboards will provide stakeholders with real-time, actionable insights, enabling them to make informed decisions, optimize operations, and improve customer satisfaction. The use of advanced technologies such as Power BI Desktop, Power BI Service, DAX, Power Query Editor, SQL, and web analytics tools ensures that the data is accurate, consistent, and effectively presented.

Ultimately, this project will empower the e-commerce business to leverage its data assets fully, driving growth and maintaining a competitive edge in the market. The continuous monitoring and iterative improvements will ensure that the solution remains relevant and valuable, adapting to the evolving needs of the business.

Thank you