Project Synopsis

on

"Store Sales Analysis Using Power BI "

Submitted in partial fulfillment of the requirement for the degree of

Bachelors of Engineering

IN

Computer science and Engineering (Data Science)

SEM VI

Tushar Khapre
Siddharth Pawar
Anisha Sant
Harsh Singh

Under the guidance of
Prof. Arti Ochani

Department of Computer Science and Engineering (Data Science)
Lokmanya Tilak College of Engineering
Koparkhairne, Navi Mumbai - 400709
University of Mumbai

2023-2024

CERTIFICATE

This is to certify that Tushar Khapre, Siddharth Pawar, Anisha Sant, Harsh Singh, have delivered seminar for Major Project - II and submitted a report in Lokmanya Tilak College of Engineering, Navi Mumbai for the partial fulfilment of the degree of B.E in " Computer Science Engineering (Data Science)" from University of Mumbai, for the year 2023-24.

Prof. Arti Ochani
(Supervisor)

Dr. Nandini C Nag
(Head of Department)

Dr. Subhash Shinde
(Principal)

Mini Project Approval

This Mini Project entitled "**Pizza Store Sales Aanalysis using Power BI**" by **Tushar Khapre (DSC 156), Siddharth Pawar (DSC 161),Anisha Sant (DSC164), Harsh Singh (DSC167)** is approved for the degree of **Bachelor of Engineering** in **Computer science and Engineering (Data Science).**

Examiners

1 .....
(External Examiner Name Sign)

2 .....
(Internal Examiner Name Sign)

Date:

Place:

ACKNOWLEDGEMENT

We remain immensely obliged to **Prof.Arti Ochani** for guiding us through the idea of this topic, and for her invaluable support and help whenever required in the due course of the project work, which enabled us to complete the project succesfully.

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Name of Candidate	Signature
1.Tushar Khapre	
2.Siddharth Pawar	
3.Anisha Sant	
4.Harsh singh	

ABSTRACT

The Power BI Pizza Store Analysis project examine into sales data from a pizza store using advanced analytics to provide strategic insights. The project integrates Power BI with an AWS RDS-hosted virtual database for a detailed analysis of sales performance, revenue trends, and the creation of key performance indicators (KPIs). Sales data is carefully collected and validated using SQL queries in Microsoft SQL Server Management Studio, ensuring data accuracy. Data visualization and analysis are then conducted using Power BI's tools, showcasing metrics like sales performance, revenue distribution, and geographical sales variations.

KPI are developed to measure the store's performance and progress towards goals, including metrics such as sales growth rate and customer retention rate. The project aims to extract actionable insights from the data, such as top-selling products and peak sales hours, enabling stakeholders to optimize inventory management and tailor marketing strategies. Overall, the project empowers stakeholders to make informed decisions for business growth and profitability based on data-driven insights.

Contents

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List of Abbreviations

RDS . . . . . Relational Database Service

IEEE . . . . . Institute of Electrical and Electronics Engineers

KPI . . . . . Key Performance Indicator

MySQL . . . My Structured Query Language

POS . . . . . Point of Sale

Chapter 1

INTRODUCTION

Power BI is a powerful business intelligence tool developed by Microsoft, designed to help organizations analyze their data and derive meaningful insights.[1] When it comes to analyzing store sales, Power BI offers a robust platform that allows businesses to gather, visualize, and interpret their sales data effectively The process typically begins with data collection, where sales data from various sources such as POS (Point of Sale) systems, online transactions, and other relevant databases are consolidated. Power BI supports connectivity to a wide range of data sources, enabling users to seamlessly import data into the platform. Once the data is imported, Power BI offers a variety of tools for data modeling and transformation. This includes cleaning and shaping the data to ensure consistency and accuracy. Users can create relationships between different datasets, perform calculations, and define measures that are crucial for analyzing store sales performance. One of the key features of Power BI is its intuitive and interactive visualization capabilities.[2] Users can create customizable dashboards and reports that provide a comprehensive overview of store sales metrics such as revenue, profit margins, sales trends, and product performance. These visualizations can range from simple bar charts and line graphs to more complex heatmaps and geographic maps, depending on the specific needs of the business. Moreover, Power BI allows for drill-down and filtering functionalities, enabling users to delve deeper into the data and identify underlying patterns and trends.

1.1 Motivation

The motivation for this project stems from our recognition of the pivotal role data plays in today's business landscape. By harnessing the power of data, we aim to streamline processes, improve operational efficiency, and gain a competitive edge. Through this endeavor, we aspire to transform raw information into actionable insights that drive strategic decision-making, ultimately positioning ourselves as leaders in data-driven innovation and fostering sustainable growth. To streamline processes and improve operational efficiency To gain valuable insights for strategic initiatives To comply with industry standards and regulations To enhance organizational growth and innovation

1.2 Problem Statement

The problem definition for Store Sales Analysis using Power BI revolves around the need for businesses to gain deeper insights into their sales performance and optimize their operations accordingly. In a rapidly evolving market landscape, businesses face challenges in understanding the dynamics of their store sales, including identifying trends, analyzing product performance, and recognizing customer preferences. Without effective analysis and interpretation of sales data, businesses may struggle to make informed decisions, resulting in missed opportunities for growth and efficiency improvements.[3] Therefore, the problem lies in the absence of a comprehensive solution that enables businesses to harness the power of their sales data to drive strategic decision-making. By leveraging Power BI's capabilities for data visualization, analytics, and collaboration, the aim is to address this problem by providing businesses with a robust platform to analyze store sales data, identify key insights, and make data-driven decisions to optimize sales performance and achieve business objectives effectively.

1.3 Objective

- Streamline processes and improve operational efficiency through effective data management
- Enhance competitiveness by leveraging data-driven innovation.
- Position the organization as a leader in utilizing data for growth and optimization.
- Ensure compliance with industry standards and regulations regarding data handling and security.

1.4 Organisation of the Report

The report on Store Sales Analysis Using Power Bi presented here is organized into five chapters. After list of abbreviations, figures and table there comes Chapter 1 which is the introductory part that describes the topic of the report, states the purpose of the report which is followed by motivation for choosing this particular topic. Further this chapter contains problem definition and objectives Chapter 2 is literature survey that summarizes all past research papers based on this model of work which gives brief information of past work and the gaps which were identified in the work. It is followed by our contribute towards this modal of work in the project. Chapter 3 that is proposed system that contains key elements of the report body includes architecture of the project, flow of algorithm how project actually works followed by its process of designing. Also contains the details of hardware and software that has been used. Chapter 4 is followed by implementation part which was executed for making this project successful and last but not the least it also contains result. Chapter 5 is all about the conclusion that helps us to narrow the whole topic down to a simple point and this is further followed by future scope of this project topic. Chapter 6 is references which is the list of sources used in the report. All in IEEE format, this links direct towards the sources and towards the research papers.

Chapter 2

LITERATURE SURVEY

2.1 Survey of Existing System

[2] The research paper et al.examine into the utilization of Power BI for sales analysis purposes. The study offers insights into the application of Power BI tools and techniques to analyze sales data effectively. By accessing the online publication, readers can explore the methodologies, findings, and implications of employing Power BI in sales analysis. This resource serves as a valuable contribution to the field, providing practitioners and researchers with valuable insights into leveraging Power BI for sales analytics.

Raje, Jain, et al. and Chole present a comprehensive exploration of the development and implementation of a Sales Analysis and Prediction Dashboard utilizing Power BI. The authors delve into the design, construction, and functionalities of the dashboard, aiming to provide a robust tool for sales analysis and prediction. [1]Through their research, they contribute to the field of data analytics by leveraging the capabilities of Power BI to enhance decision-making processes in sales management. This work is significant in its application-oriented approach, offering insights into the practical utilization of Power BI for sales analytics in real-world scenarios.

J. Doe et al. Published in the Journal of Data Science, Volume 10, Issue 2, in February 2024, this research article explores the development and application of a Power BI dashboard for data analysis purposes. The study provides insights into the design, implementation, and utilization of Power BI tools and features to analyze data effectively. With a focus on enhancing data-driven decision-making processes, the dashboard offers valuable insights into various data analysis techniques and methodologies.[3] Accessible online, this resource serves as a significant contribution to the field of data science, offering practitioners and researchers valuable insights into leveraging Power BI for comprehensive data analysis. [4]

Chapter 3

PROPOSED SYSTEM

3.1 Introduction

Power BI is a powerful business intelligence tool developed by Microsoft, designed to help organizations analyze their data and derive meaningful insights. When it comes to analyzing store sales, Power BI offers a robust platform that allows businesses to gather, visualize, and interpret their sales data effectively The process typically begins with data collection, where sales data from various sources such as POS (Point of Sale) systems, online transactions, and other relevant databases are consolidated. Power BI supports connectivity to a wide range of data sources, enabling users to seamlessly import data into the platform. Once the data is imported, Power BI offers a variety of tools for data modeling and transformation. This includes cleaning and shaping the data to ensure consistency and accuracy. Users can create relationships between different datasets, perform calculations, and define measures that are crucial for analyzing store sales performance. One of the key features of Power BI is its intuitive and interactive visualization capabilities. Users can create customizable dashboards and reports that provide a comprehensive overview of store sales metrics such as revenue, profit margins, sales trends, and product performance. These visualizations can range from simple bar charts and line graphs to more complex heat maps and geographic maps, depending on the specific needs of the business. Moreover, Power BI allows for drill-down and

filtering functionalities, enabling users to examine deeper into the data and identify underlying patterns and trends. For instance, users can analyze sales data by different dimensions such as time (daily, weekly, monthly), product categories, customer segments, or geographical regions

3.2 Block Diagram

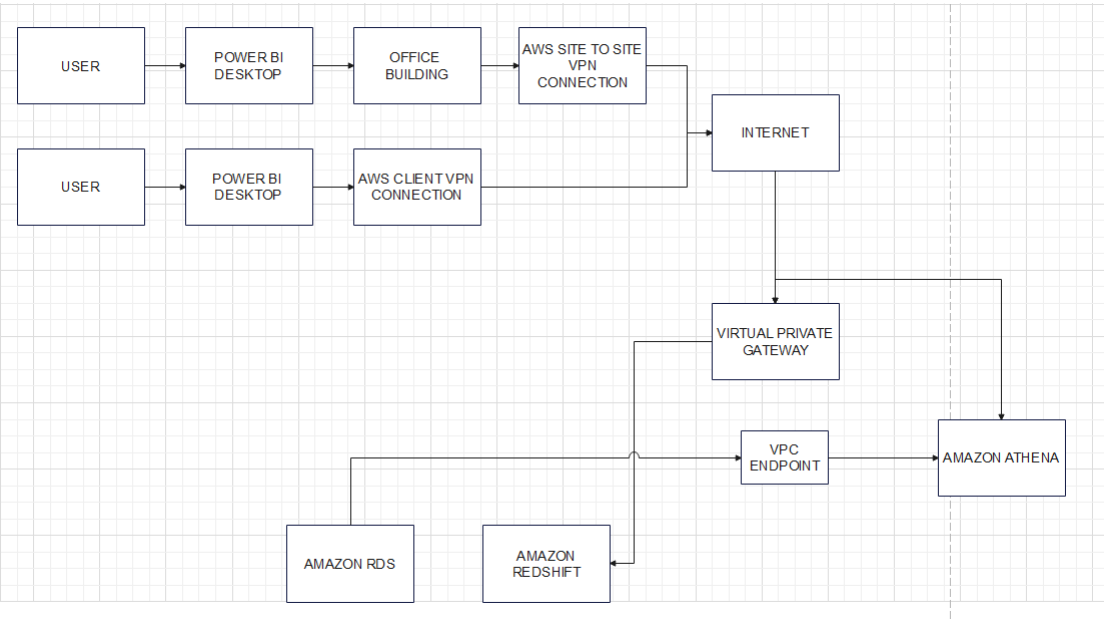

Figure 3.1: Block Diagram of RDS Connection with Power Bi

As shown in figure 3.1, In this architecture, two users utilize Power BI Desktop to analyze data. One user connects via their office building network, while the other connects directly through an AWS Client VPN. The data sources, including Amazon RDS, Amazon Redshift, and Amazon Athena, are accessible via the internet through a combination of Virtual Private Gateway and VPC Endpoint. The data flow from the office network to AWS is secured and facilitated by VPNs and

gateways, ensuring both security and connectivity. This setup enables seamless analysis of data by users while maintaining robust security measures throughout the data transmission process.

Chapter 4

IMPLEMENTATION

4.1 Hardware Requirement

- Computer or server
- At least 8GB of RAM
- Processor – i3 3rd Gen and above
- Ram - Adequate amount of memory
- Memory Space - Adequate amount of memory

4.2 Software Requirement

- Software: Power Bi
- Operation System:64-bit operating system, Windows 10 or higher.
- AWS RDS Service

4.2.1 Dataset

The pizza sales dataset available on Kaggle offers a savory glimpse into consumer preferences and trends within the pizza industry. This dataset provides a comprehensive collection of information, including sales figures, customer demographics, geographical data, and potentially even ingredient preferences. Researchers and analysts can explore correlations between factors such as location, time of year, toppings, and sales volume to uncover valuable insights. Whether examining regional pizza preferences or seasonal variations in consumption, this dataset serves as a delectable resource for understanding the dynamics of the pizza market and informing strategic decision-making for businesses in the food industry. https://www.kaggle.com/datasets/shilongzhuang/pizza-sales

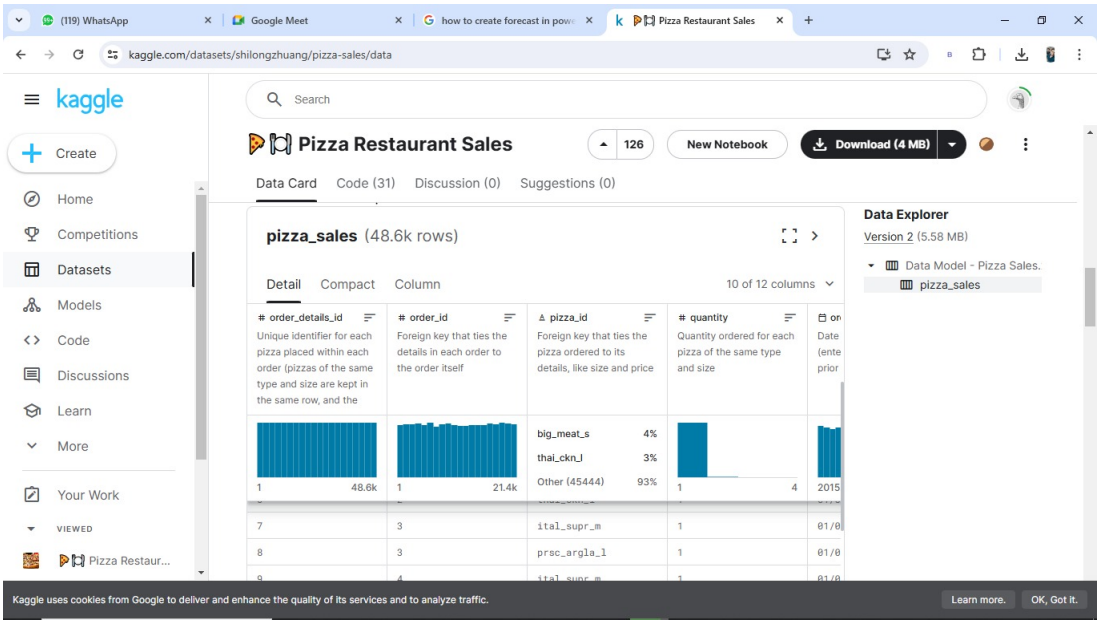

Figure 4.1: Single Store

As shown this fig 4.1 Source: Kaggle [5] Dataset Title: Pizza Restaurant Sales

Content: The dataset includes information about pizza sales, likely from a restaurant. It contains 12 features, including a unique identifier for each order, a unique identifier for each pizza ordered, and the pizza's size and price.

Tags: Food, Data Analytics

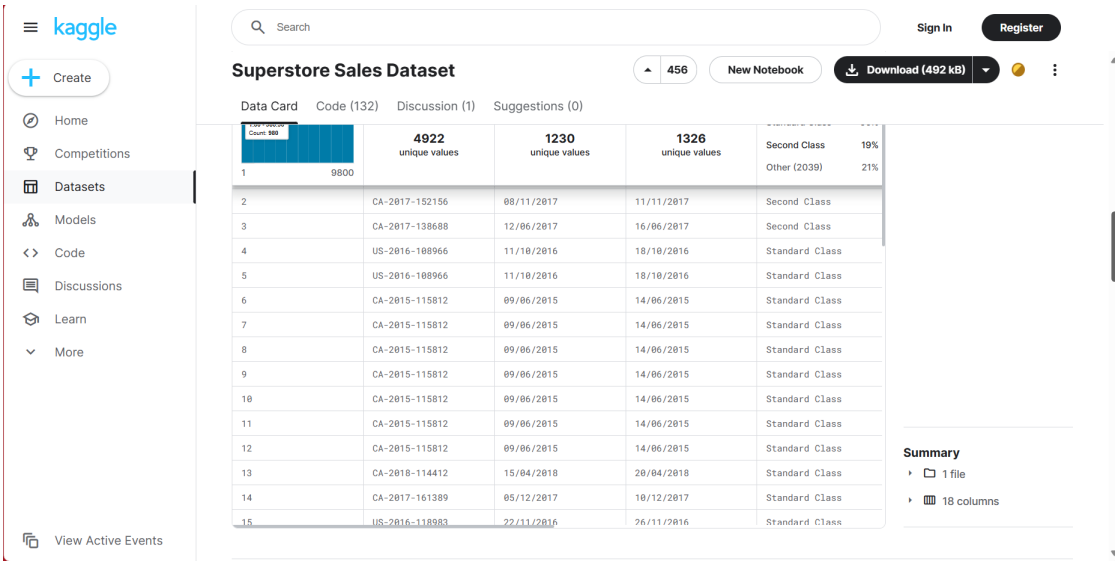

Figure 4.2: All store Dataset

Source: Kaggle [6] Dataset Title: Superstore

Content: The dataset includes information about orders placed at a superstore, likely from multiple stores across a certain time period. It includes details such as customer name, product details, and shipping address.

Updates: The update frequency is not specified.

License: Other (specified in description)

File Format: Excel XLSX (.xlsx) containing two sheets: "Orders" and "Returns"

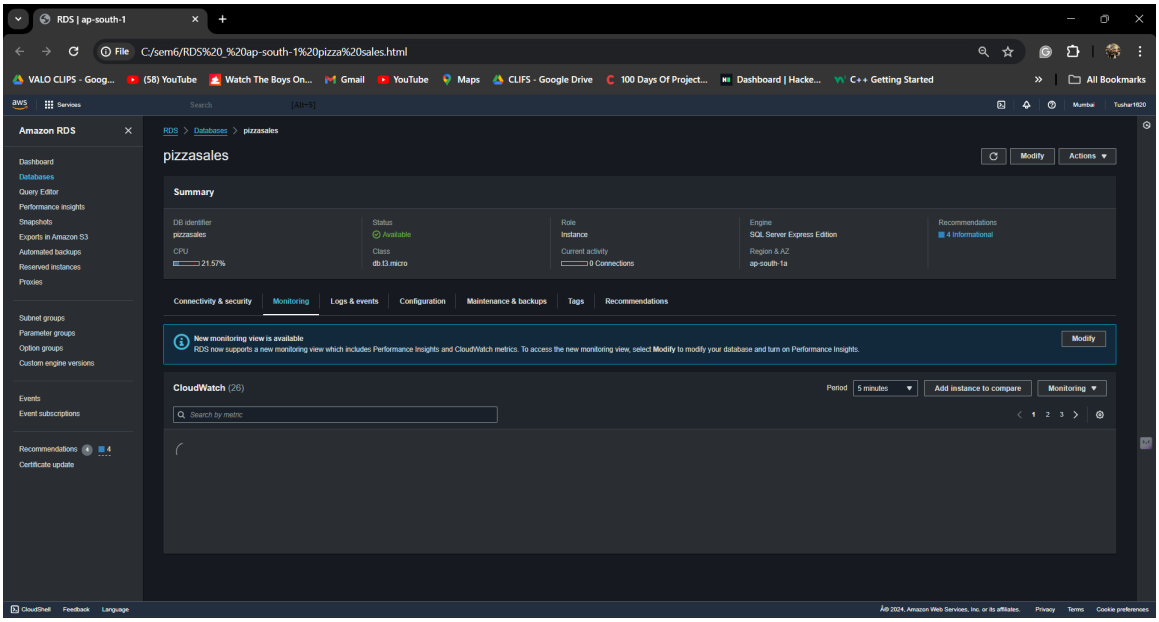

Figure 4.3: RDS Database

In this technical setup, an Amazon RDS (Relational Database Service) instance named "pizza sales" has been provisioned to host the database containing sales data. MySQL Workbench is utilized as the client application to establish a connection with the RDS instance, allowing users to execute SQL queries and retrieve desired data from the database. The integration of MySQL Workbench with the RDS instance facilitates efficient data retrieval and manipulation for analysis purposes. Subsequently, the fetched data is connected to Power BI, a powerful business intelligence tool, for visualization and reporting. Power BI enables users to create interactive dashboards and visual representations of the database insights obtained from MySQL Workbench, providing stakeholders with actionable insights into pizza sales trends, customer behaviors, and business performance metrics. This end-to-end process streamlines data analysis and visualization, empowering decision-makers to make informed strategic decisions based on comprehensive data-driven insights derived from the pizza sales database.

Chapter 5

RESULTS AND DISCUSSION

5.1 Results

In this section, The analysis conducted on store sales data through Power BI reveals insightful findings crucial for strategic decision-making. Through interactive visualizations and comprehensive data exploration, we have gained a deep understanding of sales trends, customer behavior, and performance metrics across all store locations. Key insights include the identification of top-performing stores, analysis of product popularity, assessment of sales fluctuations over time, and correlation between promotional activities and revenue generation. Additionally, the analysis uncovers actionable insights to optimize inventory management, enhance customer satisfaction, and drive revenue growth. These results serve as a foundation for informed decision-making and strategic planning to further elevate the performance and profitability of our store operations.

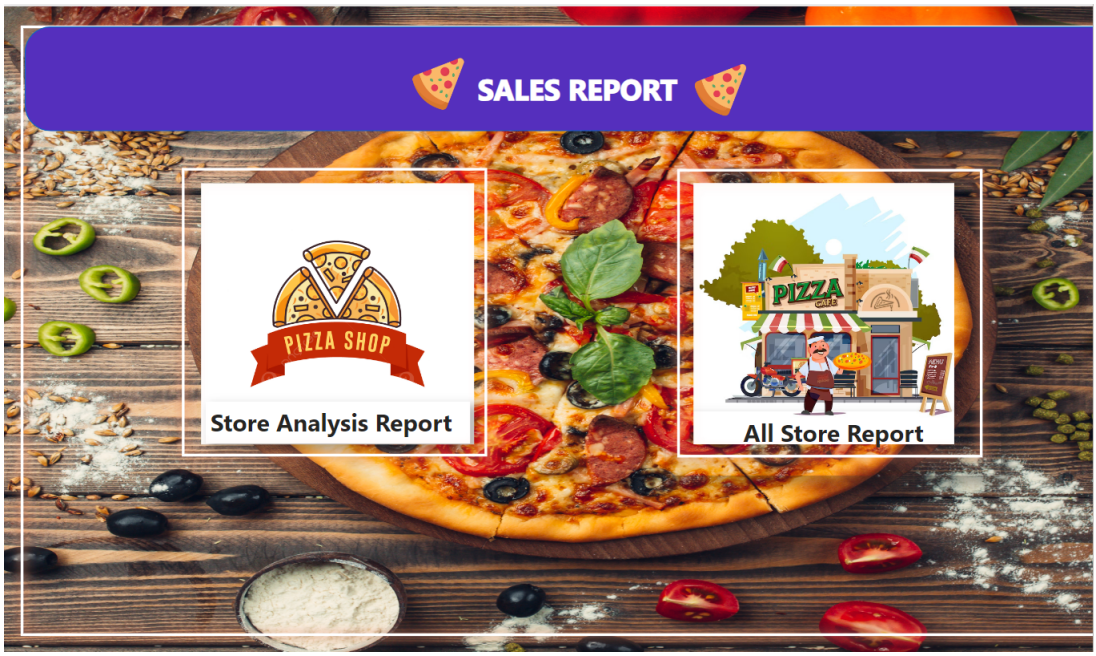

Figure 5.1: Sales Report

As shown in figure 5.1 the Store Analysis Report provides detailed store-specific performance data, while the All Store Report offers a consolidated view across all stores. Together, they cater to the needs of stakeholders like pizza shop owners, delivery personnel, and customers, facilitating informed decisions and strategic planning.

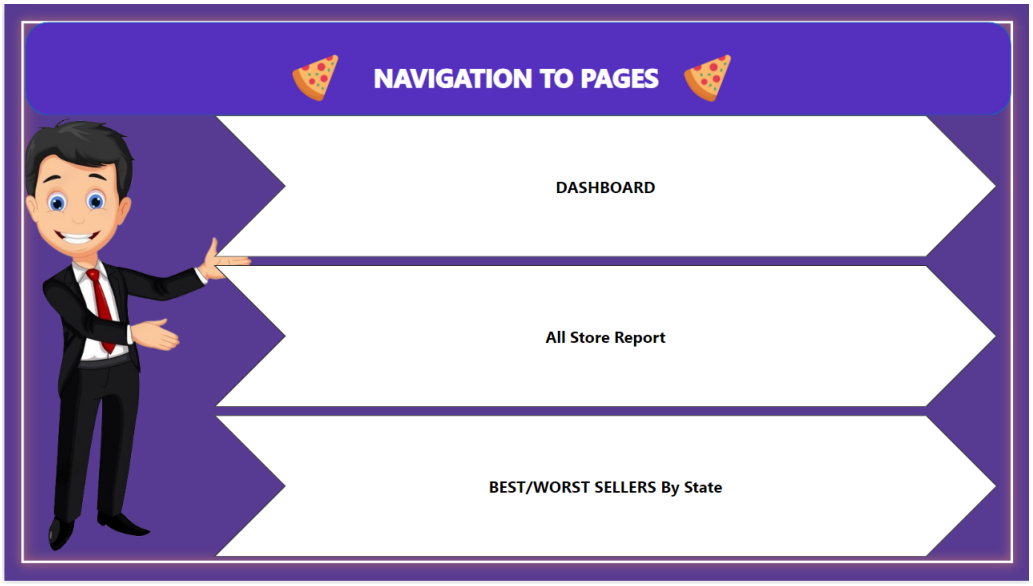

Figure 5.2: Navigation Page

The Navigation to Pages serves as a central hub for accessing various sections within the Power BI project. The "BEST/WORST SELLERS By State" segment scrutinizes sales data to pinpoint top-performing and underperforming items classified by state. Conversely, the "All Store Report" provides a comprehensive overview of performance across all store locations, facilitating comprehension of overall business trends. Refer to Figure 5.2 for illustration.

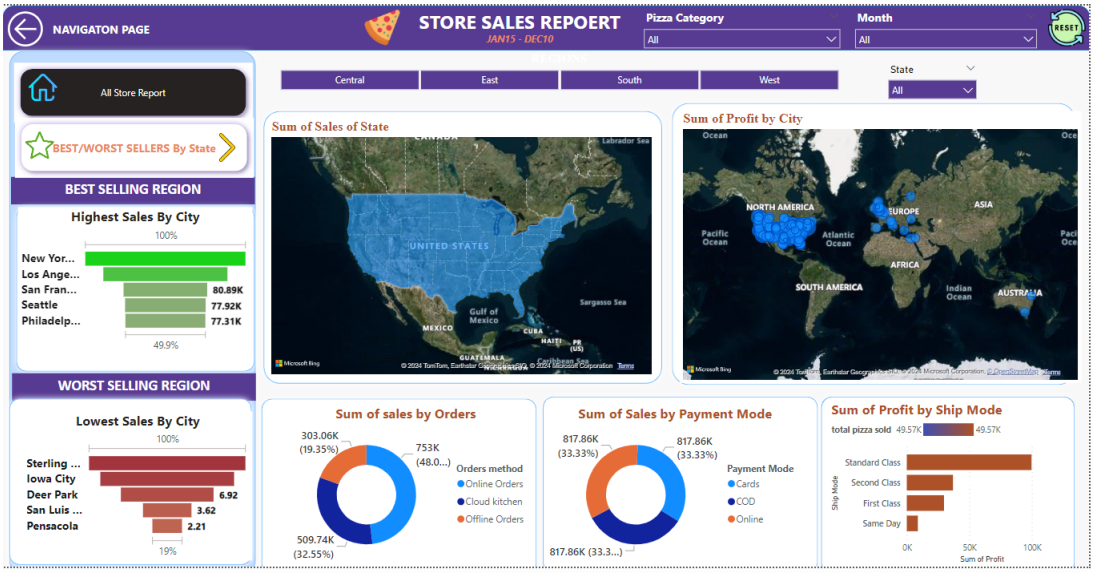

Figure 5.3: Store Sales Report

According to Figure 5.3, the Store Sales Report delivers an exhaustive analysis of sales data, showcasing the best and worst-selling regions, payment and shipping breakdowns, and profit analysis categorized by ship mode. New York emerges as the frontrunner in sales volume, with Sterling falling behind. The report encompasses detailed city sales data and provides insights into online orders and payment preferences, furnishing strategic guidance for optimizing business performance and enriching the customer experience.

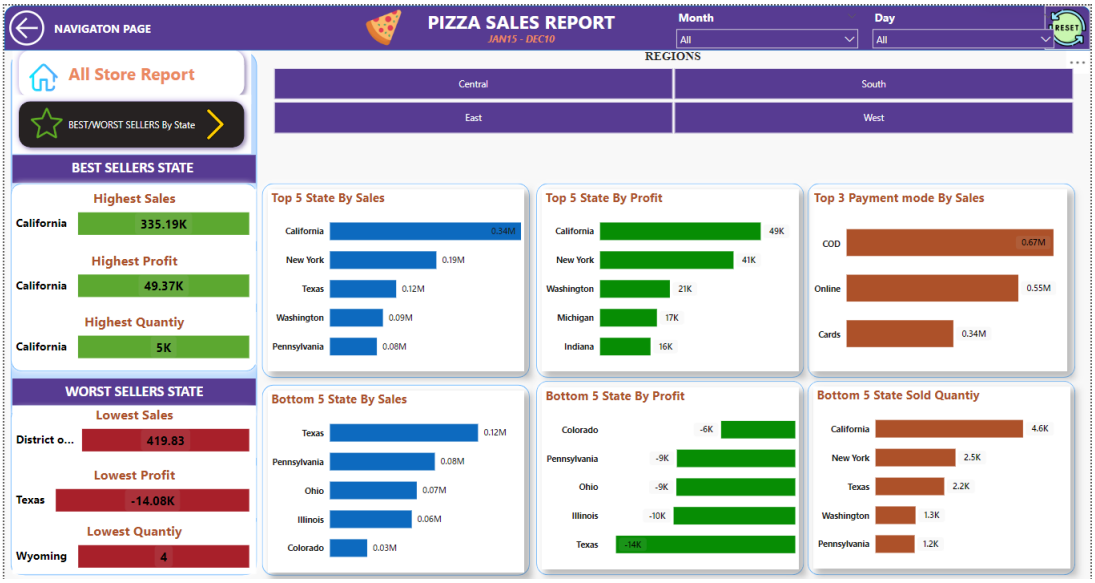

Figure 5.4: Best worst by state

In Figure 5.4, the Store Sales Report offers an extensive analysis of sales data, presenting insights into the best and worst-selling regions, payment methods, and shipping breakdowns. New York emerges as the leader in sales volume, while Sterling trails behind. The Profit Analysis by Ship Mode section identifies opportunities for optimizing shipping strategies, with the Standard class yielding the highest profit and Same-day shipping generating minimal earnings. Detailed City Sales Data underscores the dominance of New York City and the modest figures of Pensacola, facilitating strategic planning. The majority of orders are placed online, with credit cards being the preferred payment option, underscoring the importance of a data-driven approach in enhancing the customer experience.

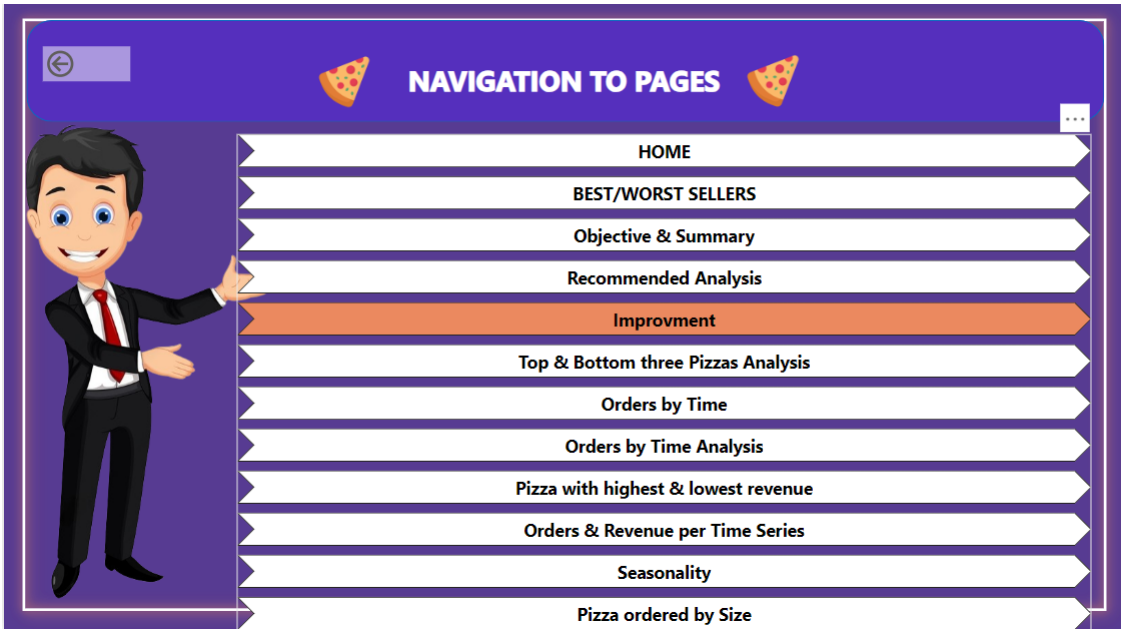

Figure 5.5: Navigation page of Single Store Report

"Navigation to Pages" functions as the central hub for accessing various sections within the Power BI project. The "Store Sales Report" provides a consolidated view of performance across all store locations, serving as a valuable resource for comprehending overall business trends. This is depicted in Figure 5.5.

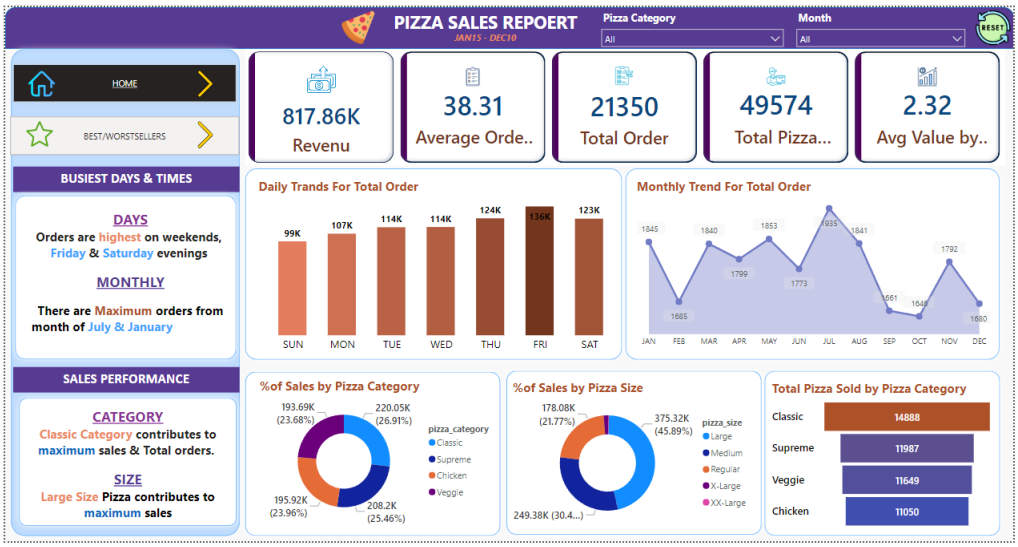

Figure 5.6: Pizza Sale

As shown in figure 5.6, the Pizza Sales Report Project in Power BI employs a range of visual tools to enhance data comprehension. KPI Cards swiftly deliver key insights on critical metrics like total sales and average order value, offering immediate understanding. Bar Charts enable easy comparison of sales across various areas through clear bar representations. Pie Charts provide a visual breakdown of sales by distinct product types, offering insights into the composition of overall sales. Line Graphs allow for tracking sales trends over time, highlighting fluctuations on a monthly basis and providing valuable insights into sales performance trends. Together, these visualizations streamline data interpretation, empowering stakeholders to make informed decisions and identify areas for improvement within the pizza sales domain.

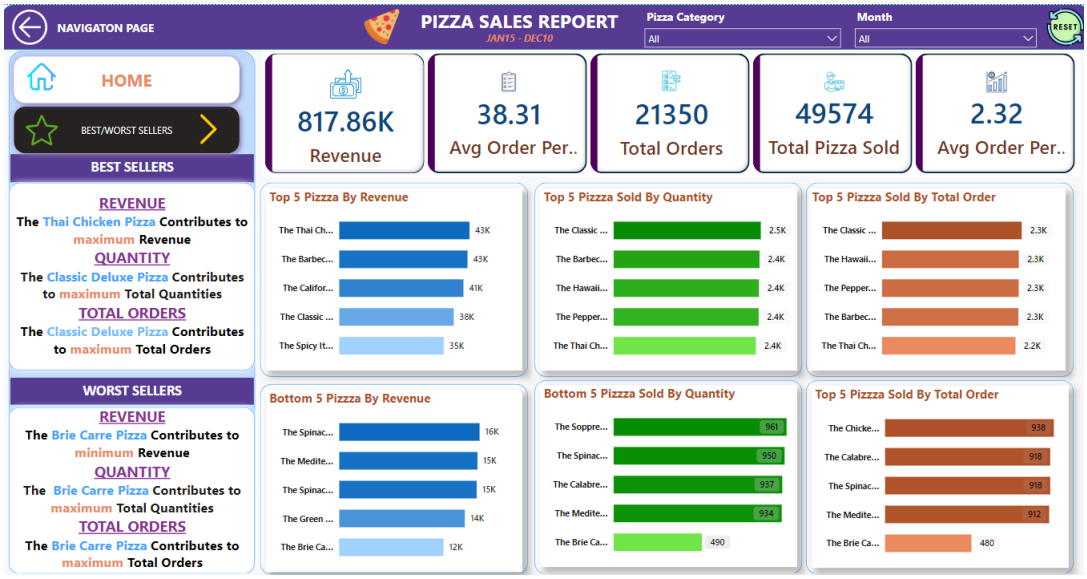

Figure 5.7: Best/worst sales

The "Best/Worst Seller" feature serves as a pivotal tool for businesses, shining a spotlight on both the top-performing products and the lowest-performing ones. By offering this insight, businesses can develop a clear understanding of which products are flourishing and which ones may need attention or optimization. This facilitates informed decision-making regarding product inventory management, marketing strategies, and overall business focus, ultimately leading to improved performance and profitability. This is illustrated in Figure 5.7.

Figure 5.8: Recommendeed analysis

As shown in Figure 5.8, the objective is to analyze customer traffic trends, peak hours, average order size, and pizza popularity. Quarter 3 witnessed the highest total orders, while Quarter 4 had the lowest. July recorded the highest total orders, whereas October had the lowest. The highest revenue was generated in Quarter 2, amounting to USD 208,369.75 across all quarters. The Classic Deluxe Pizza emerged as the most ordered, whereas the Pepperoni Pizza had the fewest orders. Notably, the Thai Chicken Pizza made a significant contribution, accounting for 34.04 percentage of total revenue.

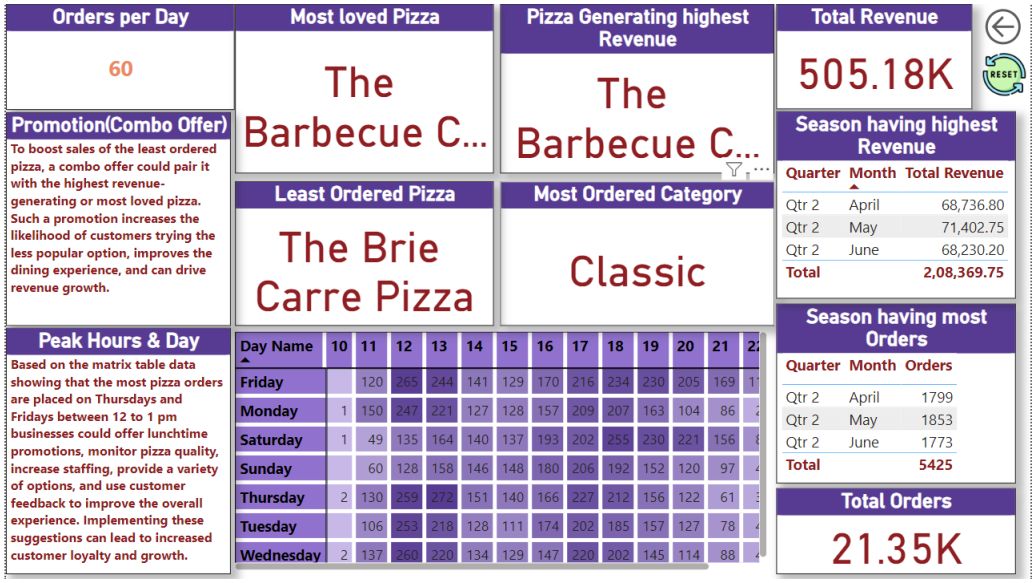

Figure 5.9: Improvment

As depicted in Figure 5.9, the Orders per Day metric on the dashboard indicates an average of 60 orders per day, providing valuable insight into daily sales volume trends. This data is instrumental in monitoring sales performance on a daily basis. The Promotion/Combo Offer feature proposes pairing the least ordered pizza with the most popular option to stimulate sales. By implementing this strategy, businesses can boost the popularity of less preferred options and drive revenue growth. Moreover, the detailed quarterly revenue data reveals that USD 505.18K was earned in Quarter 2 (April-June), offering valuable information for financial analysis and forecasting trends. This comprehensive overview equips businesses with actionable insights to optimize sales strategies and maximize revenue potential.

Chapter 6

CONCLUSION AND FUTURE SCOPE

6.1 Conclusion

In conclusion, utilizing Power BI for store sales analysis has proven to be instrumental in gaining valuable insights into business performance. By harnessing the power of data visualization and analytics, businesses can effectively track sales trends, identify patterns, and make informed decisions to drive growth and profitability. The dynamic and interactive nature of Power BI empowers users to delve deep into their data, uncovering hidden opportunities and addressing challenges with agility. From monitoring inventory levels to optimizing marketing strategies, Power BI enables businesses to stay ahead of the curve in today's competitive marketplace. Ultimately, by leveraging the comprehensive capabilities of Power BI, organizations can streamline operations, enhance customer experiences, and maximize revenue potential, ensuring sustained success in the ever-evolving retail landscape.

6.2 Future Scope

In future Scope for store sales analysis using Power BI (Business Intelligence), focus should be on enhancing data integration from multiple sources, refining data visualization techniques for deeper insights, implementing advanced predictive analytics models to forecast sales trends, optimizing dashboard performance for faster decision-making, and incorporating user feedback for continuous improvement and customization. Additionally, exploring augmented analytics capabilities and integrating AI-driven insights can further enhance the effectiveness of store sales analysis in Power BI.

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