

INDUSTRY INTERNSHIP REPORT

*Submitted in
partial fulfillment of requirement for the award of degree of*

**Bachelor of Technology
in
Data Science**

by
Ms. Manali C. Singru

Industry Guide
Mrs. Nimisha Upadhyay

at
Indiba Business Solutions

Institute Guide
Prof. Rohit Thakur
Assistant Professor



Department of Data Science
G H Raisoni Institute of Engineering and Technology, Nagpur
(An Autonomous Institute Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur)
Accredited by NAAC with A+ Grade

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Declaration

We, hereby declare that the Industry Internship report “Data-Driven Sales Forecasting and Analysis on ERPNext Software” submitted herein has been carried out by us in INDIBA BUSINESS SOLUTIONS towards partial fulfillment of requirement for the award of Degree of Bachelor of Technology in Data Science. The work is original and has not been submitted earlier as a whole or in part for the award of any degree / diploma at this or any other Institution / University.

We also hereby assign to G H Rasoni Institute of Engineering and Technology, Nagpur all rights under copyright that may exist in and to the above work and any revised or expanded derivatives works based on the work as mentioned. Other work copied from references, manuals etc. are disclaimed.



Name of student	Mobile No	Mail ID	Signature
Ms. Manali C. Singru	9011192675	manalisingru@gmail.com	

Place:

Date:

Certificate

The Industry Internship Report entitled as “**Data-Driven Sales Forecasting and Analysis on ERPNext Software**” carried out under our supervision in **Indiba Business Solutions** for the award of Degree of Bachelor of Technology in Data Science. The work submitted is comprehensive, complete and fit for evaluation.

Mrs. Nimisha Upadhyay
Industry Guide
Functional Consultant
Indiba Business Solutions

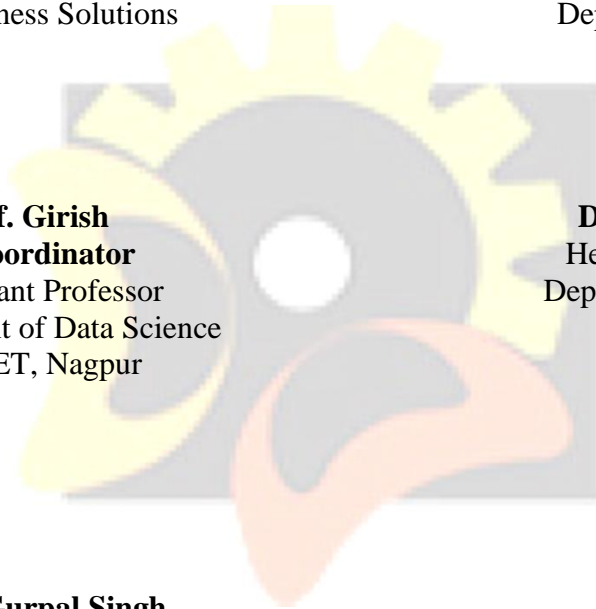
Prof. Rohit Thakur
Institute Guide
Assistant Professor
Department of Data Science
GHRIET, Nagpur

Prof. Girish
III Coordinator
Assistant Professor
Department of Data Science
GHRIET, Nagpur

Dr. Maduri Tayal
Head of Department
Department of Data Science
GHRIET, Nagpur

Mr. Gurpal Singh
Dean, III Cell
GHRIET, Nagpur

Dr. Vivek Kapur
Director
GHRIET, Nagpur





Certificate

This is to certify that **MS. MANALI SINGRU** student of Data Science from G H Raisoni Institute of Engineering and Technology, Nagpur has completed her internship successfully from 15/12/2023 to 15/06/2024. During this period she have shown good interest in the assignment/work given to her and worked hard. During her tenure of internship, she was hard-working and focused on activities assigned to her.

Student have worked during the internship period **“Data-Driven Sales Forecasting and Analysis on ERPNext Software”** under the guidance of Mrs. Nimisha Upadhyay (Functional Consultant).

Regards,

Signature- Asim Nilose

Date: 22-05-2024

Designation- CEO

Name of HR Head-Shweta

Industry / Organization Name - Indiba Business Solutions

Address- 402 p5, Pentagon, Cybercity, Magarpatta City, Pune, Maharashtra
411028

Indiba Business Solutions

www.ibsl-it.com

HO- NV-IBSL 501, Pentagon 1, Cybercity, Magarpatta City, Pune, MH India 411028

accounts@indibasolutions.com | +91-902801327



Cost of Industrial Solution Certificate

This is to certify that **MS. MANALI SINGRU AND MR. SHUBHAM MOWADE** students of Data Science from G H Raison Institute of Engineering and Technology, Nagpur has completed their internship successfully from 15-12-2023 to 15-06-2024. During this period, they have shown good interest in the assignments/works given to them and worked hard.

Students have worked during the internship period on the project **“Data-Driven Sales Forecasting and Analysis on ERPNext Software”** under the guidance of Mrs. Nimisha Upadhyay (Functional Consultant).

The industry has spent Rs NIL amount on her ideas/industry problem, which she have successfully implemented.

Regards,

Signature- Asim Nilose

Date: 22-05-2024

Designation- CEO

Name of HR Head-Shweta

Industry / Organization Name - Indiba Business Solutions

Address- 402 p5 Pentagon, Cybercity, Magarpatta City, Pune, Maharashtra 411028

Indiba Business Solutions

www.ibsl-it.com

HO- NV-IBSL 501, Pentagon 1, Cybercity, Magarpatta City, Pune, MH India 411028

accounts@indibasolutions.com | +91-9028013279



Savings to Industry Certificate

This is to certify that **MS. MANALI SINGRU AND MR. SHUBHAM MOWADE** students of Data Science from G H Ralsoni Institute of Engineering and Technology, Nagpur has completed their internship successfully from 15-12-2023 to 15-06-2024. During this period, they have shown good interest in the assignments/works given to them and worked hard.

Students have worked during the internship period on the project “**Data-Driven Sales Forecasting and Analysis on ERPNext Software**” under the guidance of Mrs. Nimisha Upadhyay (Functional Consultant).

Project work submitted by them has the potential to save costs up to Rs NIL Lakh/year. Also, they were entitled to a stipend of Rs. NIL/- per month along with canteen, transportation & accommodation facilities.

Regards,

Signature- Asim Nilose

Date: 22-05-2024

Designation- CEO

Name of HR Head-Shweta

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Address- 402 p5 Pentagon, Cybercity, Magarpatta City, Pune, Maharashtra 411028

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ACKNOWLEDGEMENT

The success and culmination of this internship were made possible through the invaluable guidance and assistance extended by numerous individuals, and we consider ourselves truly privileged to have their unwavering support throughout the internship.

Our sincere gratitude goes to our industry guide, **Mr. Asim Nilose, CEO**, Indiba Business Solutions for their exceptional support and guidance.

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Furthermore, we express our gratitude to **Dr. Madhuri Tayal, Head of the Department**, Data Science at G H Rasoni Institute of Engineering and Technology, Nagpur, for her cooperation and granting permission for the internship (training) in the Indiba Business Solutions, Pune.

We express my gratitude to **Prof. Gurpal Singh, Dean, III Cell**, G H Rasoni Institute of Engineering and Technology, Nagpur for his continuous support and belief in the importance of practical experiences.

We are thankful to **Dr. Vivek Kapur, Director** of G H Rasoni Institute of Engineering and Technology, Nagpur, for his support during internship. We are deeply grateful for his vision and commitment to fostering a conducive learning environment for students.

We are thankful to supporting staff of the Data Science department for their constant encouragement, support, and guidance, pivotal in the successful completion of our internship work.

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List of Symbols & Abbreviation

Abbreviations

ERP - Enterprise Resource Planning

EDA - Exploratory Data Analysis

ABSTRACT

In the modern business landscape, accurate sales forecasting is a cornerstone of effective strategic planning, inventory management, and resource allocation. Traditional forecasting methods often struggle to capture the complex, non-linear patterns inherent in sales data, leading to suboptimal business decisions and financial performance. This project addresses these challenges by integrating advanced machine learning techniques with ERPNext, an open-source ERP system, to develop a robust sales forecasting solution.

This integration allows business users to access up-to-date sales forecasts and insights through an intuitive interface, enhancing their decision-making processes. The Streamlit dashboard employs Pandas for data manipulation, and Altair/Plotly for data visualization, providing a comprehensive view of sales trends, forecast accuracy, and potential future sales performance.

The project results indicate a significant improvement in forecast accuracy compared to traditional methods, highlighting the potential of combining machine learning with ERP systems to drive better business outcomes. By offering a scalable and flexible solution, this project paves the way for further innovations in sales forecasting and business analytics, demonstrating the transformative impact of data science and machine learning in the enterprise resource planning domain.

CHAPTER - 1

INTRODUCTION TO COMPANY

1.1 About the Organization



Fig 1.1 Company Logo

Indiba Business Solutions is a dynamic and innovative company that specializes in providing comprehensive business solutions to organizations of all sizes and industries. With a focus on efficiency, productivity, and growth, Indiba Business Solutions offers a wide range of services and technologies tailored to meet the unique needs and challenges faced by modern businesses.

At Indiba Business Solutions, team of experienced professionals works closely with clients to gain a deep understanding of their operations, processes, and pain points. This collaborative approach allows us to design and implement tailored solutions that drive tangible results and deliver long-term value.

Their suite of services includes enterprise resource planning (ERP) implementation and optimization, business process automation, supply chain management, customer relationship management (CRM), e-commerce solutions, and more. We leverage the latest technologies and industry best practices to deliver cutting-edge solutions that empower businesses to streamline their operations, enhance productivity, and gain a competitive edge in the market.

With a proven track record of successful implementations and satisfied clients, Indiba Business Solutions has established itself as a trusted partner in the business solutions landscape. We have worked with organizations across various industries, including manufacturing, retail, healthcare, and professional services, helping them overcome challenges, achieve operational excellence, and drive sustainable growth.

Whether you are a small start-up or a large enterprise, Indiba Business Solutions has the knowledge, experience, and passion to transform your business. We are dedicated to unlocking your organization's full potential, enabling you to thrive in an ever-evolving business landscape. Partner with Indiba Business Solutions and experience the power of tailored solutions that drive success and growth.

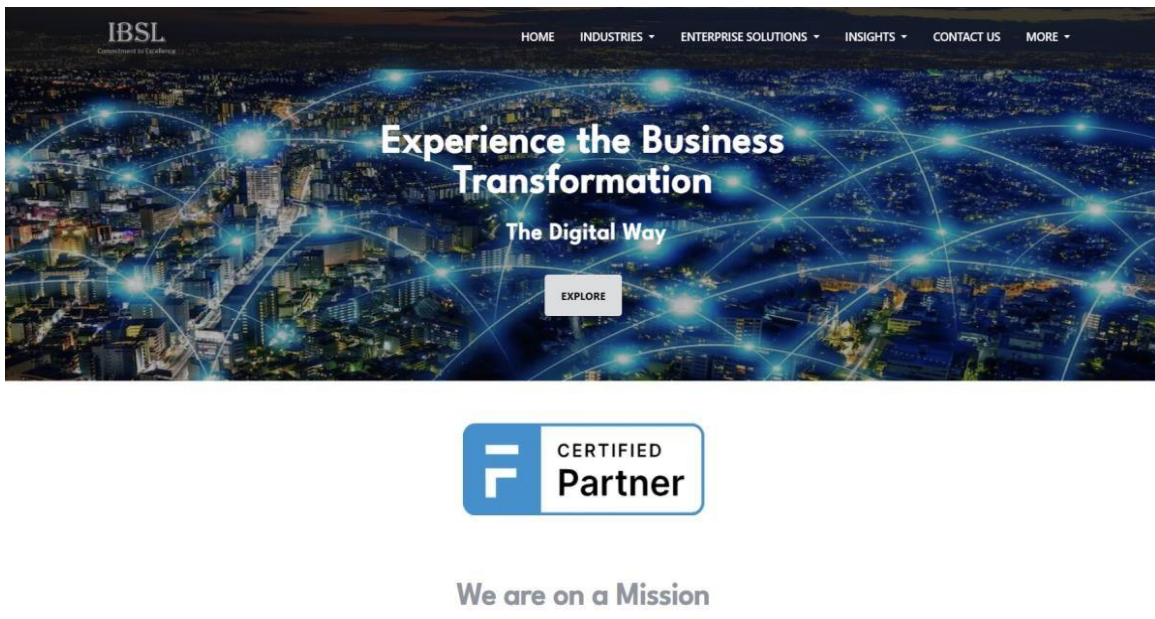


Fig 1.2 Company site

1.2 Historical Background

Indiba Business Solutions has a rich and storied history that dates back to its founding in 2008. The company was established by visionary entrepreneurs who recognized the growing need for comprehensive business solutions in an increasingly competitive and digital world.

From its humble beginnings, Indiba Business Solutions quickly gained recognition for its expertise in enterprise resource planning (ERP) systems. The company's early focus was on assisting businesses in implementing and optimizing ERP solutions to streamline their operations and improve efficiency. This foundational expertise laid the groundwork for Indiba's future growth and expansion.

As the business landscape continued to evolve, Indiba Business Solutions adapted and diversified its service offerings to meet the changing needs of its clients. The company expanded its portfolio to include business process automation, supply chain management, customer relationship management (CRM), and other cutting-edge technologies and solutions.

Over the years, Indiba Business Solutions has built a reputation for delivering innovative and customized solutions that drive measurable results. The company has successfully served clients across a wide range of industries, including manufacturing, retail, healthcare, and professional services, helping them overcome challenges and achieve their strategic objectives.

Today, Indiba Business Solutions stands as a leading provider of end-to-end business solutions, with a strong focus on digital transformation and enabling businesses to thrive in the modern era. The company continues to evolve and innovate, staying at the forefront of technological advancements and industry best practices to deliver the highest level of value to its clients.

With a rich history of success, a commitment to excellence, and a forward-thinking approach, Indiba Business Solutions is well-positioned to continue its growth trajectory and remain a trusted partner for organizations seeking comprehensive and tailored business solutions.

1.3 Location

Indiba Business Solutions (IBSL) is headquartered in Pune, at P5, 402, Cybercity, Magarpatta, Pune, Maharashtra 411028, India.

1.4 Operational Structure

The operational structure of Indiba Business Solutions is designed to effectively deliver comprehensive business solutions to organizations of all sizes and industries. The company's operational structure encompasses various components, including:

Leadership Team:

- CEO: Provides strategic direction and oversees overall operations.
- Executive Management: Senior leaders responsible for different functional areas, such as operations, sales, finance, and technology.

Departments and Functions:

- Account Managers: Engage with clients, understand their requirements, and propose suitable business solutions.
- Business Development Executives: Identify new business opportunities and develop relationships with potential clients.

Project Management:

- Project Managers: Plan and manage projects, ensuring successful execution, resource allocation, and timely delivery.
- Project Coordinators: Assist project managers in coordinating tasks, monitoring progress, and managing project documentation.

Operations:

- Operations Managers: Oversee day-to-day operations, including resource management, process optimization, and quality control.
- Operations Analysts: Analyze operational data, identify areas for improvement, and implement efficiency-enhancing measures.

Finance and Accounting:

- Chief Financial Officer (CFO): Provides financial leadership and strategic guidance.
- Financial Analysts: Perform financial analysis, forecasting, and budgeting.
- Accountants: Manage financial transactions, invoicing, and financial reporting.

Technology and Solutions:

Chief Technology Officer (CTO): Sets the technology strategy and oversees the implementation of technology solutions.

IT Specialists: Develop and maintain IT infrastructure, manage software applications, and provide technical support.

Solutions Architects: Design and customize business solutions to meet client requirements.

Human Resources:

- HR Managers: Oversee recruitment, talent management, employee engagement, and performance evaluation.
- HR Specialists: Handle day-to-day HR activities, such as onboarding, training, and employee relations.
- Marketing and Communications:
 - Marketing Managers: Develop marketing strategies, execute campaigns, and manage branding.
 - Content Writers: Create engaging content for marketing materials, website, and social media.
 - Communications Specialists: Manage internal and external communication channels, including PR activities.

Support Functions:

- Administrative and Support: Assist with administrative tasks, including scheduling, documentation, and office management.
- Facilities Management: Oversee facility maintenance, security, and infrastructure needs.
- Procurement: Manage vendor relationships, negotiate contracts, and oversee purchasing activities.

Collaboration and Communication:

- Cross-functional Teams: Collaborate on projects and initiatives involving multiple departments to ensure seamless coordination.
- Communication Channels: Utilize communication tools, such as email, chat platforms, and video conferencing, for effective communication and information sharing.

The operational structure of Indiba Business Solutions is designed to optimize efficiency, productivity, and growth. It enables the company to provide tailored business solutions to meet the unique needs and challenges faced by modern organizations.

1.5 Vision and Mission of Company

Vision:

Our vision at Indiba Business Solutions is to be a trusted and influential leader in providing comprehensive business solutions that empower organizations to thrive in the digital age. We envision a business landscape where every organization has the tools, knowledge, and support they need to optimize their operations, drive sustainable growth, and achieve their strategic objectives. By leveraging the latest technologies, industry expertise, and a customer-centric approach, we aim to be at the forefront of innovation, delivering transformative solutions that make a tangible impact on our clients' success.

Mission:

Our mission at Indiba Business Solutions is to partner with organizations of all sizes and industries, enabling them to unlock their full potential through tailored and integrated business solutions. We are dedicated to understanding the unique needs and challenges of our clients, and we strive to provide customized services and technologies that address their specific requirements. By fostering long-term partnerships, delivering exceptional value, and staying ahead of industry trends, we aim to empower businesses to optimize their processes, enhance productivity, and drive sustainable growth. Our mission is rooted in a commitment to excellence, innovation, and delivering measurable results that exceed our clients' expectations.

CHAPTER - 2

INTRODUCTION OF PROJECT

2.1 Introduction

In today's fast-paced and highly competitive business environment, having accurate and timely insights into sales performance is crucial for making informed strategic decisions. Sales forecasting and analysis play a pivotal role in helping businesses predict future sales trends, manage inventory, optimize supply chains, and improve overall financial planning. Despite the availability of sophisticated ERP systems like ERPNext, many organizations still struggle with fragmented data, outdated analysis methods, and limited interactivity in their reporting tools.

ERPNext is an open-source Enterprise Resource Planning (ERP) software that provides comprehensive solutions for various business processes, including sales, inventory, accounting, and human resources. It offers a unified platform for managing and integrating these processes, thereby enabling organizations to streamline their operations and enhance productivity. However, the standard reporting and forecasting tools in ERPNext may not fully meet the needs of businesses looking for advanced data-driven insights and interactive analytics.

This project aims to bridge this gap by leveraging the capabilities of modern data analytics and visualization tools to create an enhanced sales forecasting and analysis dashboard. By extracting sales data from ERPNext and using powerful Python libraries such as pandas for data wrangling, Altair and Plotly for data visualization, and Streamlit for building an interactive dashboard, we aim to provide a comprehensive solution that addresses the limitations of existing methodologies.

The project involves several key steps, starting with data extraction from ERPNext. This involves connecting to the ERPNext API to fetch relevant sales data such as sales orders, invoices, and customer details. The extracted data is then cleaned, preprocessed, and transformed using pandas, ensuring that it is in a suitable format for analysis. This step includes handling missing values, normalizing data formats, and aggregating data at various levels.

Once the data is prepared, the next step is to perform sales analysis using descriptive statistics and exploratory data analysis techniques.

This helps in identifying key trends, patterns, and seasonality in the sales data. Metrics such as monthly sales totals, year-over-year growth, and customer segmentation are calculated to provide deeper insights into sales performance.

By achieving these goals, the project aims to provide a robust and scalable solution for sales forecasting and analysis that leverages the power of ERPNext and modern data analytics tools. This will enable businesses to move beyond traditional methods, gain deeper insights into their sales data, and make more informed decisions that drive growth and efficiency.

The significance of this project extends beyond just sales forecasting and analysis. It demonstrates the potential of integrating ERP systems with advanced data analytics and visualization tools to create more powerful and user-friendly business intelligence solutions. This approach can be applied to various other domains within an organization, such as inventory management, financial analysis, and customer relationship management, thereby enhancing overall operational efficiency and decision-making capabilities.

2.2 Existing Technology

Sales forecasting has been a critical area of research and application in business intelligence and data science. Various methodologies have been developed over the years, ranging from traditional statistical approaches to modern machine learning techniques. This literature review explores the existing technologies and methodologies used in sales forecasting, highlighting their strengths and limitations.

Sales forecasting and analysis have traditionally relied on a mix of manual methods, statistical techniques, and early-generation business intelligence tools. One common traditional approach is Time Series Analysis, which includes methods like Moving Averages, Exponential Smoothing, and ARIMA (Auto-Regressive Integrated Moving Average). These techniques predict sales based on historical data trends and are effective for simple, linear patterns but often fall short in handling complex, non-linear patterns and seasonality.

Traditional ERP systems like SAP, Oracle ERP, and Microsoft Dynamics offer built-in sales forecasting tools that typically use historical sales data and basic forecasting algorithms. Although these integrated solutions are convenient, they can be limited in customization and flexibility, often requiring significant manual adjustments to tailor forecasts to specific business needs. On the other hand, modern data analytics and business intelligence (BI) tools have significantly advanced the field of sales forecasting and analysis. Data warehousing solutions such as Amazon Redshift, Google BigQuery, and Microsoft Azure SQL Data Warehouse enable organizations to consolidate data from multiple sources into a centralized repository. These solutions, combined with Extract, Transform, Load (ETL) processes, ensure data consistency and quality.

Advanced BI tools like Tableau, Power BI, and Qlik Sense provide powerful data visualization and interactive dashboard capabilities. These platforms allow users to create detailed and dynamic visualizations, drill down into data, and generate insights. However, they can be complex to set up and require specialized skills to fully leverage their capabilities. In recent years, machine learning and AI-based approaches have become increasingly popular for sales forecasting.

Predictive analytics models, including Decision Trees, Random Forests, and Neural Networks, can analyze large datasets, identify patterns, and make accurate predictions. Despite their accuracy, these models require extensive data preprocessing, significant computational resources, and expertise in machine learning. AI-driven forecasting platforms like IBM Watson and Google AI offer sophisticated solutions that leverage deep learning and other advanced techniques to automate the forecasting process and provide highly accurate predictions. However, these platforms come with high costs and complexity.

Open-source tools and custom solutions also play a significant role in modern sales forecasting and analysis. Python has emerged as a powerful tool for data analytics and visualization, with libraries such as pandas for data manipulation, matplotlib and seaborn for static visualizations, and Plotly and Altair for interactive visualizations. These tools offer a flexible and cost-effective solution for sales forecasting and analysis but require programming knowledge. Interactive web application frameworks like Streamlit and Dash (by Plotly) enable the creation of custom, interactive dashboards that can be tailored to specific business needs and integrated with various data sources. These frameworks make it easier to develop user-friendly and dynamic applications that enhance data exploration and insight generation.

The evolution from traditional statistical methods to advanced machine learning and deep learning techniques has significantly improved the accuracy and robustness of sales forecasting.

However, each method has its strengths and limitations, making it crucial to choose the appropriate method based on the specific characteristics of the sales data. The integration of these forecasting models with interactive data visualization tools like Streamlit enhances the accessibility and usability of the forecasts, enabling real-time, data-driven decision-making.

2.3 Problem Identification

Sales forecasting is a critical aspect of business strategy, directly influencing inventory management, resource allocation, and financial planning. The main challenges identified in the current sales forecasting and analysis practices are:

1. **Data Fragmentation:** Sales data is often scattered across different systems and formats, making it difficult to consolidate and analyze comprehensively.
2. **Manual Processes:** Traditional methods involve significant manual effort in data collection and analysis, leading to inefficiencies and potential errors.
3. **Outdated Information:** Many existing solutions do not provide real-time updates, resulting in outdated information and delayed decision-making.
4. **Limited Interactivity:** Existing dashboards and reporting tools often lack interactive features, restricting users' ability to explore data dynamically and derive deeper insights.
5. **Variability and Uncertainty:** Sales data can be highly variable and subject to uncertainty, making it challenging to develop accurate forecasting models. Sudden changes in consumer behavior, economic conditions, or supply chain disruptions can significantly impact sales trends.

Need for a Robust Forecasting Solution:

There is a pressing need for a robust sales forecasting solution that can address the complexities of sales data, provide accurate predictions in real-time. Such a solution would empower businesses to make data-driven decisions, optimize operations, and stay ahead of market trends.

2.4 Objectives

The objectives of the project are as follows:

1. **Data Extraction:** To extract comprehensive sales data from ERPNext, ensuring the data is accurate and complete. Ensure the data extraction process is automated and capable of handling large volumes of data.
2. **Sales Analysis:** To analyze the sales data using descriptive statistics and exploratory data analysis (EDA) techniques. Identify key sales trends, patterns, and seasonality. Calculate essential sales metrics such as monthly sales totals, year-over-year growth, and customer segmentation.
3. **Data Visualization:** To create clear, interactive visualizations using Altair and Plotly, enabling users to explore sales data dynamically. Develop a range of visualizations including time series plots, bar charts, scatter plots, and heatmaps. Ensure the visualizations are interactive, allowing users to drill down into specific data points and filter data dynamically.
4. **Dashboard Development:** To develop an interactive dashboard using Streamlit, providing an intuitive interface for users to interact with sales data and visualizations. Design the dashboard layout to be user-friendly and informative. Integrate data visualizations and interactive widgets to allow users to customize their data views.
5. **Enhanced Decision-Making:** To provide real-time insights and comprehensive analysis that aid in strategic planning and decision-making for businesses. Implement real-time data integration to ensure the dashboard provides up-to-date information. Offer detailed insights and actionable recommendations based on the analysis, helping businesses to optimize their sales strategies and operations.

CHAPTER - 3

PLATFORM USED/TECHNOLOGY/METHODOLOGY

3.1 Work Carried Out

This project involved extracting and analyzing sales data from ERPNext software and creating an interactive dashboard for sales forecasting and analysis. The main tasks performed include:

1. **Data Extraction:** Sales data was extracted from the ERPNext database using the ERPNext API. This involved querying the ERPNext system to retrieve relevant sales data, such as sales orders, invoices, and customer details.
2. **Data Wrangling:** The extracted data was then cleaned and processed using Python, particularly the pandas library. This step included handling missing values, normalizing data formats, filtering irrelevant data, and aggregating sales data at various levels (e.g., daily, monthly, yearly).
3. **Data Visualization:** Visualization of the cleaned data was carried out using Altair and Plotly. These libraries were used to create various charts and graphs, such as time series plots, bar charts, and scatter plots, which help in identifying trends and patterns in the sales data.
4. **Dashboard Development:** The final interactive dashboard was developed using Streamlit. This involved integrating the visualizations and providing interactive widgets such as sliders, dropdowns, and input boxes to allow users to filter and manipulate the data displayed on the dashboard.

3.2 Implementation/ Debugging

Implementation:

1. ERPNext Data Extraction:

- Established a connection to the ERPNext API.
- Used API endpoints to fetch sales-related
- Parsed the JSON responses and stored the data in pandas DataFrames for further processing.

2. Data Wrangling with pandas:

- Loaded the raw data into pandas DataFrames.
- Cleaned the data by handling missing values.
- Normalized and transformed data formats for consistency
- Aggregated data at different levels using groupby operations.
- Visualization with Altair and Plotly:
- Created static visualizations with Altair for straightforward plots like bar charts and line graphs.
- Developed interactive visualizations with Plotly for more complex visualizations, allowing users to hover over data points for more details and to dynamically filter data.
- Dashboard with Streamlit:
- Designed the layout of the dashboard, ensuring an intuitive user experience.
- Integrated data visualizations into the Streamlit app.
- Added interactive elements to allow users to customize the data views.

Debugging:

- Data Consistency Checks: Implemented validation checks to ensure the data extracted from ERPNext was accurate and consistent. This included verifying the completeness of data and cross-checking with known values.
- Error Handling in Data Processing: Added error handling mechanisms in data processing scripts to manage issues such as missing or malformed data. This ensured the robustness of the data pipeline.
- Visualization Testing: Conducted thorough testing of visualizations to ensure they accurately represented the data. This included checking for correct axis labels, legends, and data points.
- Streamlit Application Debugging: Iteratively tested the Streamlit application, fixing bugs related to user interaction and data updates. This included resolving issues with widget responsiveness and ensuring the smooth rendering of visualizations.

3.3 Procedures

1. Data Extraction:

- Procedure: Connect to ERPNext API using authentication tokens, query the API for sales data, parse JSON responses, and convert them into pandas DataFrames.

2. Data Wrangling:

- Procedure: Load data into pandas, clean and transform data, handle missing values, and aggregate data.

3. Sales Forecasting Algorithms:

- Procedure: Apply time series forecasting methods to predict future sales.

4. Visualization:

- Procedure: Create visualizations using Altair and Plotly.

5. Dashboard Development:

- Procedure: Build the dashboard using Streamlit, integrating visualizations and interactive elements.

3.4 Results and Discussion

The project successfully produced an interactive sales forecasting and analysis dashboard with the following key results:

- **Enhanced Data Accessibility:** The dashboard allowed users to easily access and interpret sales data, providing insights into sales performance and trends.
- **Accurate Forecasting:** The implemented forecasting models provided reliable sales predictions, supporting strategic planning and decision-making.
- **Interactive Insights:** Users could interact with the data visualizations to explore various aspects of sales performance, such as seasonal trends and product-specific sales.
- **Scalability:** The use of Streamlit enabled easy deployment and scalability of the dashboard, allowing for future enhancements and integration with additional data sources.
- **The choice of Altair and Plotly** balanced simplicity and interactivity, enabling the creation of both static and dynamic visualizations.
- **Pandas** proved effective for handling complex data wrangling tasks, ensuring the data was in a suitable format for analysis.
- **Streamlit** facilitated rapid prototyping and deployment of the dashboard, though future iterations might consider additional frameworks to enhance performance and customization.

```

1 import streamlit as st
2 import pandas as pd
3 import plotly.express as px
4
5 # Set page configuration
6 st.set_page_config(layout="wide")
7
8 # Load data
9 uploaded_file = st.file_uploader("Choose a file", type="xlsx")
10
11 if uploaded_file:
12     df = pd.read_excel(uploaded_file)
13
14     # Display the DataFrame for debugging
15     st.write("Data Preview:", df.head())
16
17     # Display column names for debugging
18     st.write("Columns in the DataFrame:", df.columns)
19
20     st.title("Sales Dashboard")
21
22     # Ensure Date column is in datetime format
23     if 'Date' in df.columns:
24         df['Date'] = pd.to_datetime(df['Date'])
25
26     # Add a date filter
27     min_date = df['Date'].min()
28     max_date = df['Date'].max()
29
30     start_date, end_date = st.date_input("Select date range", [min_date, max_date], min_value=min_date, max_value=max_date)
31
32     # Filter data based on date range
33     df = df[(df['Date'] >= pd.to_datetime(start_date)) & (df['Date'] <= pd.to_datetime(end_date))]
34 else:
35     st.error("Column 'Date' not found in the uploaded file.")
36
37 # Apply custom CSS for white background

```

Fig 1 : Server Side Scripting

```

51
52 with col1:
53     # Top Sales by Order ID
54     st.header("Top Sales by Order ID")
55     if 'Order ID' in df.columns and 'Sales' in df.columns:
56         top_sales_order = df.groupby('Order ID')['Sales'].sum().reset_index().sort_values(by='Sales', ascending=False).head(10)
57         fig1 = px.bar(top_sales_order, x='Order ID', y='Sales', title='Top 10 Sales by Order ID')
58         st.plotly_chart(fig1)
59     else:
60         st.error("Columns 'Order ID' or 'Sales' not found in the uploaded file.")
61
62 with col2:
63     # Sales Trendline
64     st.header("Sales Trendline")
65     if 'Date' in df.columns and 'Sales' in df.columns:
66         sales_trend = df.groupby('Date')['Sales'].sum().reset_index()
67         fig2 = px.line(sales_trend, x='Date', y='Sales', title='Sales Trendline')
68         st.plotly_chart(fig2)
69     else:
70         st.error("Columns 'Date' or 'Sales' not found in the uploaded file.")
71
72 col3, col4 = st.columns(2)
73
74 with col3:
75     # Total Sales by each Product type
76     st.header("Total Sales by Products Type")
77     if 'Products Type' in df.columns and 'Sales' in df.columns:
78         sales_by_product = df.groupby('Products Type')['Sales'].sum().reset_index()
79         fig3 = px.area(sales_by_product, x='Products Type', y='Sales', title='Total Sales by Products Type')
80         st.plotly_chart(fig3)
81     else:
82         st.error("Columns 'Products Type' or 'Sales' not found in the uploaded file.")
83
84 with col4:
85     # Total Sales by each Sales Channel
86     st.header("Total Sales by Sales Channel")
87     if 'Sales Channel' in df.columns and 'Sales' in df.columns:

```

Fig 2 : Server Side Scripting

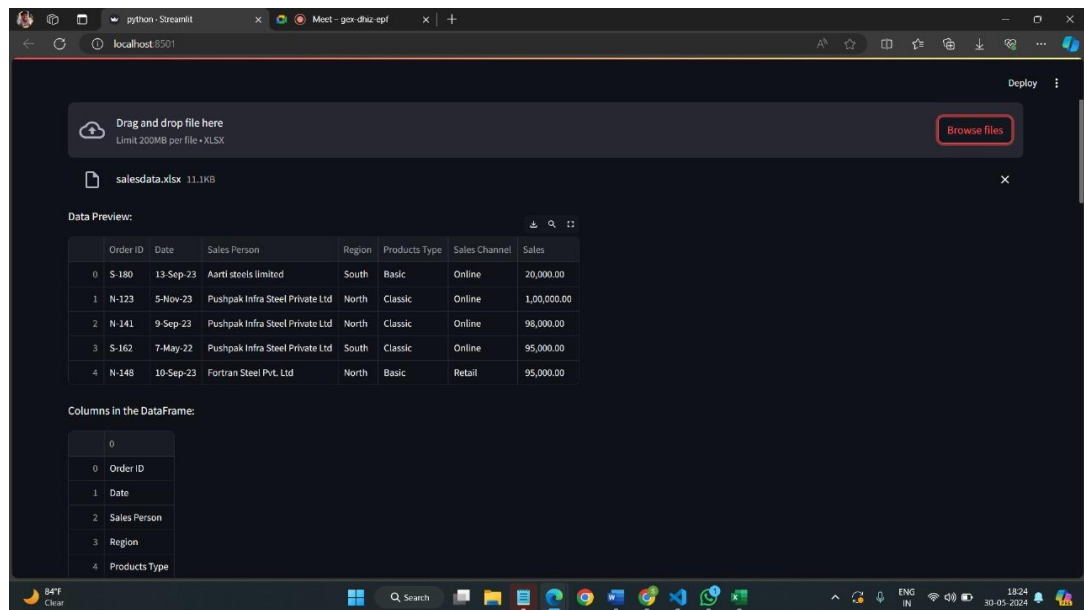


Fig 3 : Sales data

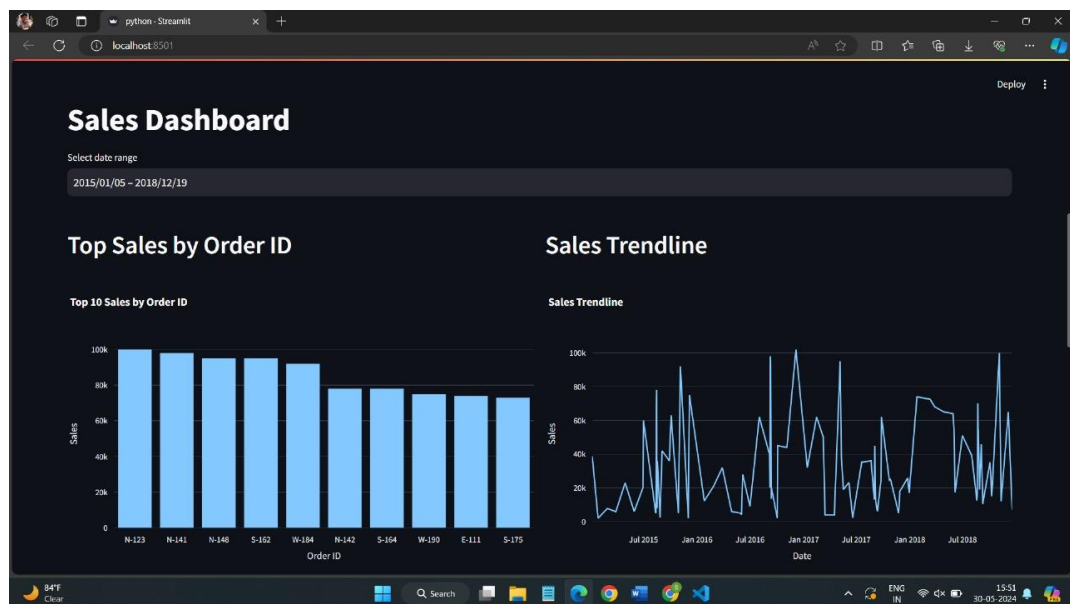


Fig 4 : Dashboards

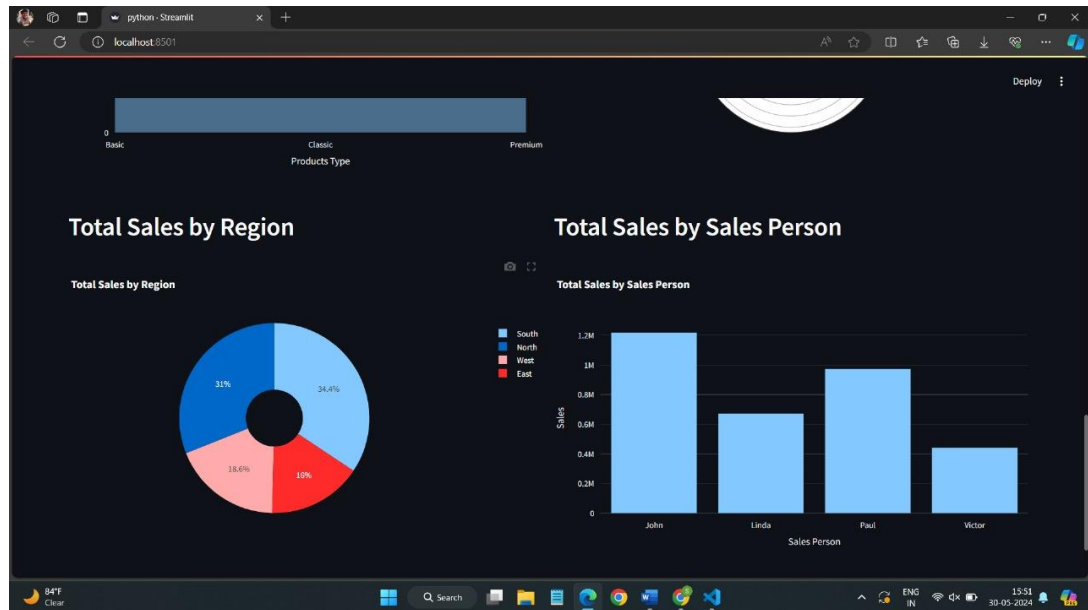


Fig 5 : Dashboards

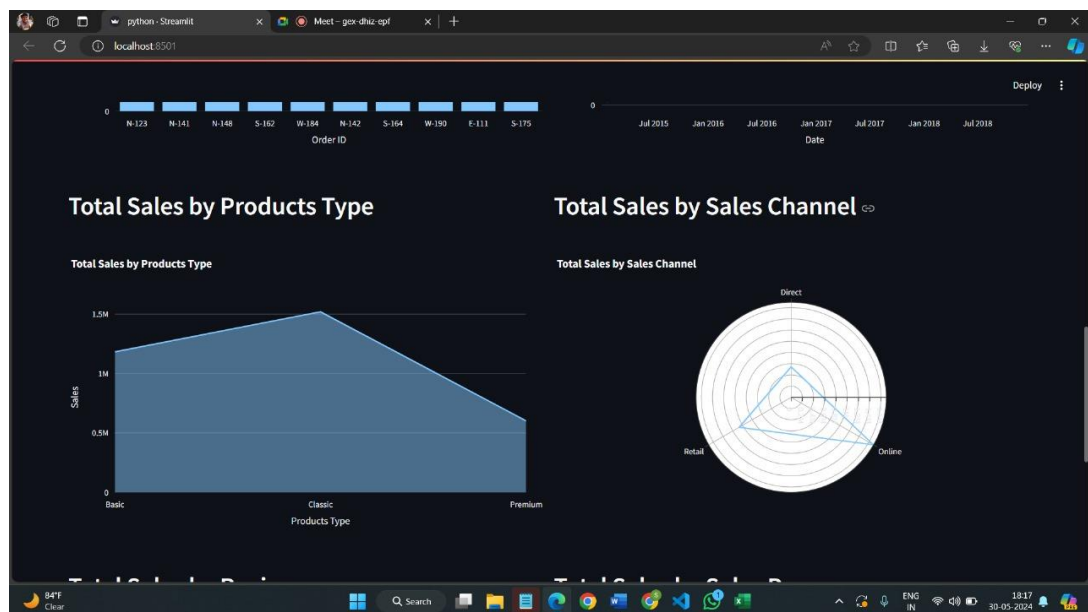


Fig 6 : Dashboards

CHAPTER - 3

CONCLUSION AND FUTURE SCOPE

Conclusion

The project "Data-Driven Sales Forecasting and Analysis on ERPNext Software" successfully demonstrates the potential of integrating modern data analytics and visualization tools with ERP systems to enhance business intelligence capabilities. By leveraging the strengths of Python libraries such as pandas for data wrangling, Altair and Plotly for dynamic data visualization, and Streamlit for creating interactive dashboards, the project addresses several critical limitations inherent in traditional sales forecasting and analysis methodologies.

The interactive dashboard developed in this project provides a comprehensive and user-friendly platform for real-time sales data analysis. It enables users to extract detailed insights into sales performance, identify trends, and make data-driven decisions with greater confidence. The use of interactive visualizations facilitates a deeper understanding of sales dynamics, allowing businesses to explore data from multiple perspectives and uncover valuable insights that were previously inaccessible with standard ERPNext reporting tools.

Key accomplishments of the project include the successful extraction and transformation of sales data from ERPNext, the creation of meaningful and interactive visualizations, and the development of an intuitive dashboard that enhances the user experience. The project demonstrates how data fragmentation, manual processing, and outdated information can be effectively addressed through the integration of advanced data analytics and visualization techniques.

The project underscores the importance of utilizing modern technology to unlock the full potential of existing ERP systems. By enhancing ERPNext with powerful data analytics capabilities, businesses can significantly improve their forecasting accuracy, optimize inventory management, streamline supply chain operations, and ultimately drive better financial performance.

Future Scope

The project lays a strong foundation for further enhancements and extensions. The following areas are identified for future work:

1. **Incorporation of Additional Data Sources:** Integrating other data sources such as marketing campaigns, economic indicators, and competitor analysis could provide a more comprehensive view and further improve forecast accuracy.
2. **Advanced Feature Engineering:** Exploring more sophisticated feature engineering techniques, such as incorporating external factors (weather, holidays, etc.), could enhance the predictive power of the model.
3. **Scalability:** Enhancing the system to handle larger datasets and more complex models will be crucial as the business grows and the volume of sales data increases.
4. **User Feedback and Iteration:** Gathering feedback from business users to iteratively improve the dashboard and forecasting model, ensuring it meets their evolving needs.
5. **Automated Alerts and Recommendations:** Developing automated alert systems and recommendations based on forecast deviations can help businesses proactively manage potential issues.
6. **Exploration of Other Business Domains:** Applying the developed methodologies to other domains within ERPNext, such as inventory management, supply chain optimization, and financial forecasting, to provide comprehensive business intelligence solutions.

In conclusion, this project not only improves sales forecasting accuracy but also demonstrates the practical application of machine learning techniques in enhancing ERP systems. The integration of an interactive dashboard ensures that the insights are actionable and accessible, paving the way for smarter, data-driven business decision.

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APPENDICES

A. List of photos in organization along with industry supervisors

