PROJECT

AI POWERED SALES FORECASTING DASHBOARD

By :

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1. About the Project

This project focuses on designing a predictive analytics dashboard that enables retail businesses to forecast future sales using machine learning techniques. By integrating historical transaction data with time-series forecasting and Power BI visualizations, the project bridges the gap between raw data and actionable business insights.
This end-to-end solution blends data science, business intelligence, and interactive storytelling, simulating a real-world scenario in consulting, analytics, or SaaS industries.

2. Objective

- Forecast retail sales using historical data with ML models.
- Derive trends and patterns using engineered features like holiday spikes, seasonal variations, etc.
- Present past and future sales data in an intuitive Power BI dashboard.
- Deliver business recommendations for better decision-making.

3. Tools & Technologies Used

- **Python:** Data cleaning, feature engineering, model development
- **Facebook Prophet:** Time series forecasting
- **Jupyter Notebook:** Exploratory data analysis (EDA) and model training
- **Power BI:** Dashboard creation for business insights

4. Machine Learning Model

- **Type**: Time Series Forecasting
- **Model Used:** Facebook Prophet
- **Target Variable:** Sales
- **Features Engineered:**Month-wise trends , Holiday effects , Seasonal decomposition Lag features (previous month/quarter sales),
- **Evaluation Metrics**: RMSE (Root Mean Square Error) , MAE (Mean Absolute Error)

5. Power BI Dashboard Overview

The Power BI dashboard provides a concise and interactive view of sales performance.
Key visuals include:

- Actual vs. Forecasted Sales (Area Chart)
- Sales by Region, Product, and Customer
- KPI Cards for Total Sales, Profit, Quantity
- Monthly and Yearly Sales Comparisons
- Filters for Region, Category, and Product
- Highlighted Trends and Low Sales Seasons

This layout enables quick insights for better sales strategy and forecasting decisions.

6. Business Insights Derived

- Top-performing categories and items identified for scaling.
- Low seasons observed — useful for marketing push or inventory cutback.
- High-profit regions visualized to allocate more resources.
- Forecasted spikes during holidays and promotional months detected.

These insights assist businesses in inventory planning, resource allocation, and marketing strategy

7. How This Project is AI-Powered

- The integration of Facebook Prophet, a machine learning-based time series model, enables accurate future predictions.
- These predictions are not rule-based or static but dynamically generated based on historical patterns.
- By embedding these outputs into Power BI, the dashboard becomes predictive — helping decision-makers act before trends happen.
- Thus, it blends AI with BI, creating a smart analytics system.

8. Skills Gained

- Time Series Forecasting (Prophet)
- Data Preprocessing & Feature Engineering (Pandas, Excel)
- Business Analytics & Data Storytelling (Power BI)
- Forecast Visualization and KPI Reporting
- Real-world deployment thinking for retail sales

Conclusion

This AI-powered sales forecasting project demonstrates how machine learning and visualization tools can empower retail businesses to make data-driven decisions. By integrating time series forecasting models with an interactive Power BI dashboard, we've transformed raw data into actionable insights. The solution not only captures historical trends but also provides future projections in a visually intuitive format — helping businesses optimize inventory, boost profitability, and respond proactively to market demands.