Sales Forecasting & Anomaly Detection

Comprehensive analytical report summarizing forecasting performance, anomaly detection outcomes, and business insights.

1. Project Overview

This report presents the methodology and findings of the Sales Forecasting & Anomaly Detection project. The objective is to analyze historical sales data, identify anomalies, and predict future sales trends using statistical and machine learning techniques.

2. Data & Preparation

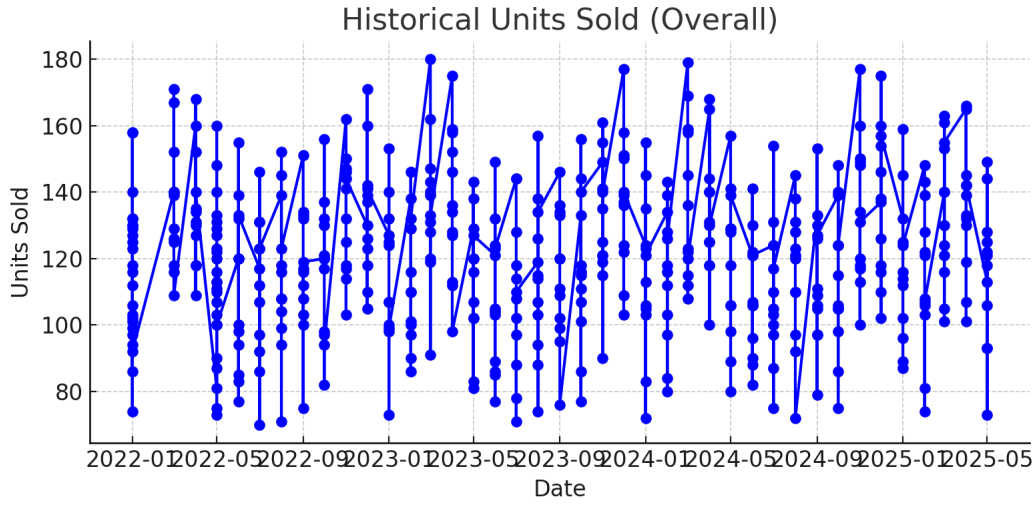
The dataset contains date-wise sales information. Data cleaning and monthly aggregation were performed to ensure temporal consistency. The prepared dataset serves as the foundation for forecasting and anomaly detection.

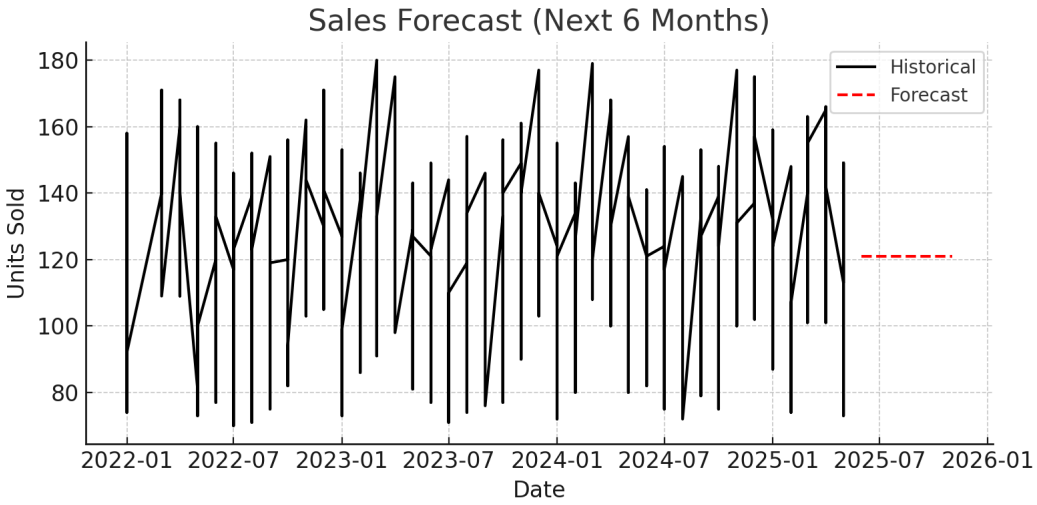
3. Methodology

Two core analytical modules were developed: - **Forecasting:** Implemented SARIMA for time-series modeling with a baseline mean model for comparison. - **Anomaly Detection:** Utilized IsolationForest to identify unusual sales behavior. Performance evaluation was conducted using Mean Absolute Error (MAE).

4. Results & Visual Analysis

The following figures illustrate key outcomes, including historical sales trends and predicted sales for the upcoming six months.





5. Business Insights

Analysis revealed recurring seasonal sales patterns, indicating predictable cycles of demand. Forecasts suggest steady performance over the next six months, with no major anomalies in recent data. These insights support production and inventory planning decisions.

6. Reproducibility & Execution

To reproduce results: 1. Run the **Sales_forecasting.py** script. 2. Provide the input sales CSV file path. 3. Specify the aggregation level and forecast horizon. 4. The script automatically generates reports, forecast charts, and anomaly logs in the chosen directories.

End of Report