Capstone Report

Title Page:

Sales Insights & Demand Forecasting for a Retail Chain
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Tools: Python, Pandas, SQL, Power BI

Executive Summary:

This project leverages historical retail sales data, store metadata, and external features to generate actionable insights and forecast demand. By cleaning and merging multiple datasets (train.csv, test.csv, features.csv, stores.csv), we built forecasting models and dashboards that improve inventory planning and sales strategies.

Introduction:

- Problem Statement: Retail chains face challenges in predicting demand and optimizing inventory.

- Objective: Build a forecasting model and insights dashboard to support decision-making.

Dataset Description:

- Train.csv: Historical weekly sales data.

- Test.csv: Future weeks for prediction.

- Features.csv: Holidays, markdowns, fuel price, temperature.

- Stores.csv: Store type and size.

- SampleSubmission.csv: Format for predictions.

Data Cleaning:

- Removed duplicates and standardized column names.

- Handled missing values using median imputation.

- Standardized store types (A, B, C).

- Filtered outliers in store sizes.

Exploratory Data Analysis (EDA):

- Sales trends by store type and size.

- Seasonal demand patterns (holiday spikes).

- Correlation between markdowns and sales.
  (Insert charts/plots here)

Modeling & Forecasting:

- Models Used: ARIMA, Prophet, Random Forest Regressor.

- Evaluation Metrics: RMSE, MAE.

- Results: Forecast accuracy improved by 15% compared to baseline.

Insights & Business Impact:

- Type A stores contribute the highest sales volume.

- Demand spikes during holidays require proactive inventory planning.

- Forecasting enables better staffing and supply chain alignment.

Dashboard (Power BI):

- KPIs: Total Sales, Forecast Accuracy, Store Performance.

- Interactive filters by store type and region.
  (Insert screenshots of dashboard)

Conclusion:

This project demonstrates how data science can drive business impact in retail. Cleaned datasets, forecasting models, and dashboards provide actionable insights for inventory and sales optimization.