

Project: Demand Forecasting
Industry: E-Commerce, Retail

1. Project Overview

The "Retail - Demand Forecasting" project aims to develop an advanced demand forecasting model to optimize retail inventory management and supply chain operations. By analyzing sales history, promotional events, seasonal trends, and economic indicators, the project's objective is to accurately predict product demand and minimize issues such as excess inventory and stockouts. The ultimate goal is to enhance inventory planning, reduce costs, and improve overall retail efficiency.

2. Objectives

- Develop a demand forecasting model that accurately predicts product demand across different time periods.
- Enhance retail inventory management by minimizing excess inventory and stockouts.
- Utilize time series analysis, regression modeling, and feature engineering techniques to improve prediction accuracy.
- Incorporate historical sales data, promotional events, seasonal variations, and economic indicators to capture demand factors.
- Improve supply chain efficiency and retail profitability through optimized inventory planning.

3. Scope

The project encompasses the following aspects:

- Data Collection: Gather historical sales data, promotional event information, seasonal trends, and economic indicators.
- Data Preprocessing: Clean and preprocess collected data, handle missing values, and ensure data quality.
- Feature Engineering: Engineer features that capture temporal trends, promotional impacts, and external influences.
- Model Development: Utilize time series analysis techniques and regression modeling to build the demand forecasting model.
- Inventory Planning Integration: Integrate the forecasting model with inventory planning strategies.

4. Data Sources

The project will require data from the following sources:

- Historical sales data reflecting past product demand patterns.
- Promotional event data indicating periods of increased marketing activity.
- Seasonal trends and factors that influence retail demand variations.
- Economic indicators that may impact consumer spending and purchasing behavior.

5. Methodology

5.1 Data Collection and Preprocessing

- Collect historical sales data, promotional event information, seasonal trends, and economic indicators.
- Clean and preprocess data, handle missing values, and ensure data quality.
- Prepare a consolidated dataset suitable for time series analysis and regression modeling.

5.2 Feature Engineering

- Engineer temporal features capturing day of the week, month, and year to capture seasonal patterns.
- Incorporate promotional event indicators and marketing campaign details.
- Integrate economic indicators like GDP, inflation rate, and consumer confidence.

5.3 Model Development

- Choose appropriate time series analysis techniques (e.g., ARIMA, Prophet) and regression models (e.g., Linear Regression, Random Forest) based on data characteristics.
- Train the model using historical sales data and relevant features.
- Validate the model's performance using metrics such as Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE).

5.4 Inventory Planning and Optimization

- Integrate the forecasting model with inventory planning strategies.
- Utilize the forecasts to optimize inventory levels, reorder points, and safety stock quantities.
- Minimize excess inventory and stockouts while ensuring products are available for customer demands.

6. Deliverables

- A demand forecasting model for retail inventory management.
- Improved inventory planning strategies based on accurate demand predictions.
- Documentation detailing data collection, preprocessing steps, feature engineering techniques, model architecture, and validation results.

7. Risks and Mitigation

- Data Quality: Ensure reliable data sources and handle potential data quality issues through preprocessing.
- Model Accuracy: Continuously evaluate and fine-tune the model to improve demand prediction accuracy.
- Seasonality and Trends: Account for complex seasonal patterns and long-term trends that may impact demand.

This expanded PRD provides a more detailed outline of the goals, scope, methodologies, and deliverables for the "Retail - Demand Forecasting" project. Keep in mind that this document should be tailored and adapted to the specific requirements, technologies, and resources of your organization or project team. Collaboration with retail experts and stakeholders will be essential for the successful execution of this project. provided "Retail - Demand Forecasting" project requirement document expanded into a more detailed format:

Project Requirement Document (PRD): Retail - Demand Forecasting

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