

Requirements Gathering

Stakeholder Analysis

- **Retail Business Owners:** Need accurate sales forecasts.
- **Inventory Managers:** Require demand insights for stock management.
- **Marketing Teams:** Use forecasts for promotional planning.
- **Technical Team:** Responsible for developing, deploying, and maintaining the forecasting system.

User Stories

- **User Story 1:** As a business owner, I want to view sales forecasts so that I can make better financial decisions.
- **User Story 2:** As inventory Manager, I want to see demand predictions so that I can optimize stock levels and reduce waste.
- **User Story 3:** As a marketer, I want to analyze the effect of promotions on sales.
- **User Story 4:** As a data scientist, I want to train and evaluate different forecasting models so that I can select the most accurate model for stock prediction.

Use Cases

- **Use Case 1:** View Sales Forecast

Actors: Business Owner, Inventory Manager, Marketing Manager

Preconditions: System has trained models and historical sales data.

Flow:

- User logs into the system.
- User selects the forecast period (weekly/monthly/yearly).
- System processes and displays predicted sales trends.
- User analyzes and exports data if needed.

- **Use Case 2: Optimize Stock Levels**

Actors: Inventory Manager

Preconditions: Forecast model is trained and operational.

Flow:

- The system predicts upcoming demand for products.
- Inventory manager receives alerts for low/high stock levels.
- Manager adjusts stock orders based on predictions.
- System updates stock reports.

- **Use Case 3: Train & Evaluate ML Model**

Actors: Data Scientist

Preconditions: Historical sales data is available.

Flow:

- Data scientist selects a forecasting model (e.g., ARIMA, LSTM, XGBoost).
- System preprocesses and splits data for training/testing.
- Model is trained and evaluated (RMSE, MAE, MAPE metrics displayed).
- If accuracy is low, scientist fine-tunes the model.

Functional Requirement

- Data import and preprocessing
- Time-series forecasting models
- Performance evaluation metrics
- Model deployment with an interactive dashboard

Non-functional Requirements

- **Performance:** Forecasting within 10 seconds
- **Security:** Role-based access control
- **Usability:** Intuitive UI for easy data exploration