StorePulse

Demand Forecasting Automation Platform using NB-INGARCH Models

MTech Technical Presentation - Complete System Architecture

System Architecture Overview

Complete technology stack and component interaction.

graph TB subgraph Frontend["Frontend Layer (React + Tauri)"] UI[User Interface] Upload[Data Upload Module] Train[Training Interface] Forecast[Forecast Dashboard] Reports[Reports Viewer] end subgraph Backend["Backend API (FastAPI)"] Router[API Router] DataRoute[Data Routes] TrainRoute[Training Routes] ForecastRoute[Forecast Routes] ReportRoute[Report Routes] end subgraph Core["Core Services"] DB[(SQLite Database)] FS[Forecast Service] FeatureEng[Feature Engineering] Cache[Forecast Cache] end subgraph ML["ML Engine"] Trainer[INGARCH Trainer] Validator[Model Validator] Baseline[Baseline Models] Artifacts[Model Artifacts] end subgraph Data["Data Layer"] Visits[Visits Repository] Models[Models Repository] Settings[Settings Repository] Holidays[Holiday Calendar] end UI --> Router Upload --> DataRoute Train --> TrainRoute Forecast --> ForecastRoute Reports --> ReportRoute Router --> DataRoute Router --> TrainRoute Router --> ForecastRoute Router --> ReportRoute DataRoute --> DB TrainRoute --> Trainer ForecastRoute --> FS FS --> FeatureEng FS --> Cache FS --> Artifacts Trainer --> Validator Trainer --> Baseline Trainer --> Artifacts FeatureEng --> Visits FeatureEng --> Holidays Validator --> Baseline Visits --> DB Models --> DB Settings --> DB style Frontend fill:#e3f2fd,stroke:#1976d2,stroke-width:2px style Backend fill:#e8f5e9,stroke:#388e3c,stroke-width:2px style Core fill:#fff3e0,stroke:#f57c00,stroke-width:2px style ML fill:#fce4ec,stroke:#c2185b,stroke-width:2px style Data fill:#f3e5f5,stroke:#7b1fa2,stroke-width:2px

Technology Stack

Frontend:
React 18, TypeScript, Recharts, Tauri

Backend:
FastAPI (Python), Uvicorn, Pydantic

ML/Stats:
statsmodels, NumPy, Pandas, scikit-learn

Database:
SQLite3 (Local, Zero-config)

Model Storage:
Joblib (Scikit-learn serialization)

Deployment:
Desktop App (Windows, macOS, Linux)

MTech Project | NB-INGARCH Implementation | Verified Metrics

All diagrams, metrics, and architecture details are based on actual implementation