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Project Title: Sales Forecasting and Inventory Optimization for Retail Store Using Machine Learning and Deep Learning

Abstract:

This project focuses on sales trend analysis and inventory forecasting using the sales dataset. The dataset includes product-level data such as product ID, category, price, quantity sold, store location, time of sale etc. which serves as a rich source for analyzing consumer behavior, predicting future demand, and optimizing inventory levels. The project employs a multi-model approach that includes classical machine learning techniques (Linear Regression, Decision Trees), ensemble methods (Random Forest, XGBoost), and basic deep learning models (Multi-Layer Perceptron, feedforward neural networks, LSTM for time-series trends). These models are trained to predict key metrics such as daily or weekly sales volume, stockout risk across different store locations and product categories. In this project, various data preprocessing and Exploratory Data Analysis techniques will be used. Multiple model evaluation metrics like RMSE (Root Mean Squared Error), MAE (Mean Absolute Error) will be used. MLOps practices would be incorporated to build a scalable, production-ready solution. The project aims to improve demand forecasting, reduce stockouts, and support data-driven retail strategies.

Proposed Plan:

Week 1–2: Data collection and Data Understanding

Week 3–4: Data Preprocessing, EDA and feature engineering

Week 5: Feature Selection

Week 6: Classical Machine Learning Models

Week 7: Ensemble Models

Week 8: Deep Learning Models

Week 9-10: Model Selection, Model Evaluation and Model Optimization (Model Tuning)

Week 11: MLOps

Week 12: Report, Presentation and Deliverables.