LSTM Time Series Model to Forecast Walmart Sales

The project titled "LSTM Time Series Forecasting for Walmart Sales" focuses on predicting future weekly sales for Walmart stores using deep learning techniques. The project leverages a rich dataset containing historic weekly sales data per store along with features such as date, holiday flag, temperature, fuel price, CPI, and unemployment rate.
Project Summary:
Data Preprocessing: The dataset spans multiple stores over various weeks. Data preprocessing steps include parsing dates, sorting chronologically, selecting specific stores, and scaling sales data for model readiness.

Feature Selection: The main target variable is weekly sales. Some external factors such as holidays and economic indicators are present but the primary focus remains on the sales time series.

Model: A Long Short-Term Memory (LSTM) network is used to model sequential dependencies in the data. The input sequences are created with a fixed time step, enabling the model to learn patterns over time.

Training and Validation: The dataset is split into train and test subsets with about 80% data for training. The LSTM model has layers optimized for time series forecasting, trained over multiple epochs.

Prediction: The model forecasts sales for the next week based on the most recent sales sequence, facilitating proactive business planning and inventory management.

Evaluation: Metrics such as RMSE, MAE, MAPE, and R^2 are used to evaluate the model performance. Accuracy is derived as 100 minus MAPE to give an interpretable percentage score.

Visualization: The project includes plots comparing actual sales history and predicted future sales, aiding in visual performance assessment.

Inferences:
The LSTM model captures time-dependent patterns in Walmart's weekly sales, producing forecasts that help in operational decision-making. While simple baselines show moderate error rates, the usage of LSTM improves forecasting by understanding complex sequential trends. The provided evaluation matrix highlights how well the model fits the historic data and forecasts unseen weeks, making it a valuable tool for sales forecasting. Visualizations support understanding forecast confidence and help identify pot... This project demonstrates an end-to-end workflow from data preparation, model training, evaluation, to visualization, establishing the effectiveness of LSTM neural networks in retail sales forecasting contexts like Walmart.