Stock Price Prediction Using LSTM and Gradio

Introduction

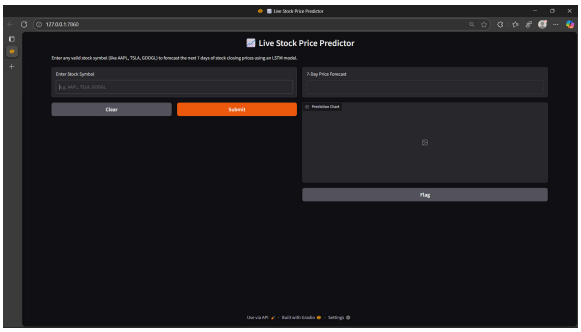
This project focuses on forecasting stock prices for the next 7 business days using historical stock data. It employs Long Short-Term Memory (LSTM) neural networks to capture temporal dependencies in stock price movements. The application provides a simple user interface through Gradio, allowing users to input stock symbols and receive price predictions along with charts.

Abstract

Predicting stock prices is a challenging problem due to market volatility and noise. In this project, we use machine learning—specifically a deep learning model (LSTM)—to predict stock closing prices based on historical data from Yahoo Finance. The model is lightweight, trained on the fly for demonstration purposes, and serves as a proof of concept for real-time stock price forecasting.

Tools Used

- Python: Main programming language
- Gradio: For creating a web interface
- yfinance: To fetch historical stock data
- NumPy / Pandas: Data manipulation
- Matplotlib: Plotting predicted prices
- TensorFlow / Keras: Building and training the LSTM model
- Scikit-learn (MinMaxScaler): Data normalization



Steps Involved in Building the Project

1. **Data Fetching:** Using yfinance, historical closing prices for a given stock symbol are downloaded (default: last 6 months, daily interval).
2. **Data Preprocessing:** Prices are scaled between 0 and 1 using MinMaxScaler. Sequences of the last 60 days are used as input, and the 61st day as output for training.
3. **Model Building:** A Sequential LSTM model with two LSTM layers (50 units each) and a dense output layer is created. The model is compiled with Adam optimizer and Mean Squared Error loss.
4. **Training:** The model is trained for 3 epochs (for speed in a demo environment).
5. **Prediction:** The model predicts the next 7 business days of closing prices using a sliding window approach.
6. **Visualization:** The past 60 days of prices and future 7-day predictions are plotted. Results are displayed in both table (markdown) and graphical form via Gradio.

Conclusion

This project demonstrates how machine learning, and specifically deep learning, can be applied to time series forecasting in finance. While the model here is simplified (trained quickly on limited data), it lays the groundwork for building more accurate and robust financial prediction systems. The use of Gradio makes the solution interactive and easy to use.