Stock Price Predictor

Abstract

Stock market forecasting is a critical application of data science due to the complex and non-linear nature of financial data. This project leverages deep learning, specifically Long Short-Term Memory (LSTM) neural networks, to build a stock price predictor. It is wrapped in a Streamlit-based web interface to allow users to interactively select stocks, customize forecast durations, and visualize predictions, enhancing decision-making for investors and analysts.

Objective

To build a deep learning model using LSTM networks for predicting future stock prices and deploy it through an interactive web interface that allows:

- Visual trend exploration

- Custom date filtering

- Upload of stock CSVs for personalized prediction

Key Features

- Fetches historical stock data from Yahoo Finance (yfinance)

- Preprocesses and scales closing price data using MinMaxScaler

- Trains a 2-layer LSTM model with dropout for better generalization

- Predicts next-day to 100+ day closing prices

- Allows CSV upload for custom stock predictions

- Offers date-to-date filter options

- Provides interactive graphs:

- Actual vs Predicted

- Forecast Curve

- Loss Curve

- Scatter Plot

- Stylish dark-themed Streamlit UI

- Download option for prediction results

Technologies Used

- Python - Core programming language

- TensorFlow / Keras - Deep learning and LSTM model

- scikit-learn - Preprocessing and performance metrics

- yfinance - Real-time stock data extraction

- Streamlit - Web-based user interface

- NumPy, Pandas - Data handling

- Matplotlib - Data visualization

Workflow

1. Data Preparation

    - Downloads historical data from Yahoo Finance using yfinance

    - Selects Closing Price

    - Normalizes data using MinMaxScaler for neural network training

2. Model Training (Offline Phase)

    - Sequences last 60 days of data to predict the next day

    - Trains a 2-layer LSTM model with dropout regularization

    - Evaluated using Root Mean Square Error (RMSE), MAE, and R^2 Score

3. Prediction & Visualization (Online Phase)

    - Loads saved .h5 model and scaler inside the Streamlit app

    - Accepts user input for forecast duration

    - Generates and plots future predictions dynamically

    - Allows CSV uploads for custom company predictions

Conclusion

This AI-Powered Stock Price Predictor showcases how deep learning, combined with modern web technologies, can be harnessed to create smart financial forecasting tools. It brings predictive insights directly to users through a simple and intuitive dashboard.