

Stock Price Prediction

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Abstract: Stock markets are volatile and influenced by many factors, making price prediction difficult. This project presents a web app that predicts stock prices using a trained Long Short-Term Memory (LSTM) model. The system fetches historical data from Yahoo Finance, preprocesses it, and predicts future prices for both U.S. and Indian markets. The LSTM model captures time-based trends effectively and provides accurate forecasts. The app also includes visualization tools and performance metrics for better analysis

Keywords: LSTM, Stock Price Prediction, Machine Learning, Deep Learning, Time Series Forecasting

I. INTRODUCTION

Predicting stock prices is a long-standing challenge due to market volatility and non-linear trends. Traditional models like ARIMA or linear regression fail to capture long-term dependencies. LSTM networks overcome this limitation by remembering patterns across time steps, making them ideal for financial forecasting.

This project focuses on building a Stock Price Prediction App using a trained LSTM model that predicts future prices from historical data for both U.S. and Indian stocks.

II. SYSTEM WORKFLOW

The application follows a modular structure with four key components: data collection, preprocessing, model prediction, and visualization.

A. Data Collection

The app collects stock data from Yahoo Finance based on the selected ticker (e.g., AAPL, RELIANCE.NS).

Data includes Date, Open, High, Low, Close, and Volume values.

B. Preprocessing

Data is cleaned, missing values handled, and features normalized between 0–1. The last 60 days are used as input to predict the next day's price. This improves training efficiency and accuracy.

C. LSTM Model

The model uses stacked LSTM layers with dropout and dense layers. It learns sequential patterns using Mean Squared Error loss and the Adam optimizer. The structure allows the model to retain long-term dependencies and avoid overfitting.

D. Training and Testing

The dataset is split 80–20 for training and testing. Model performance is measured using metrics like MAPE and R² Score. Predictions are compared with real values to check accuracy.

E. Prediction and Visualization

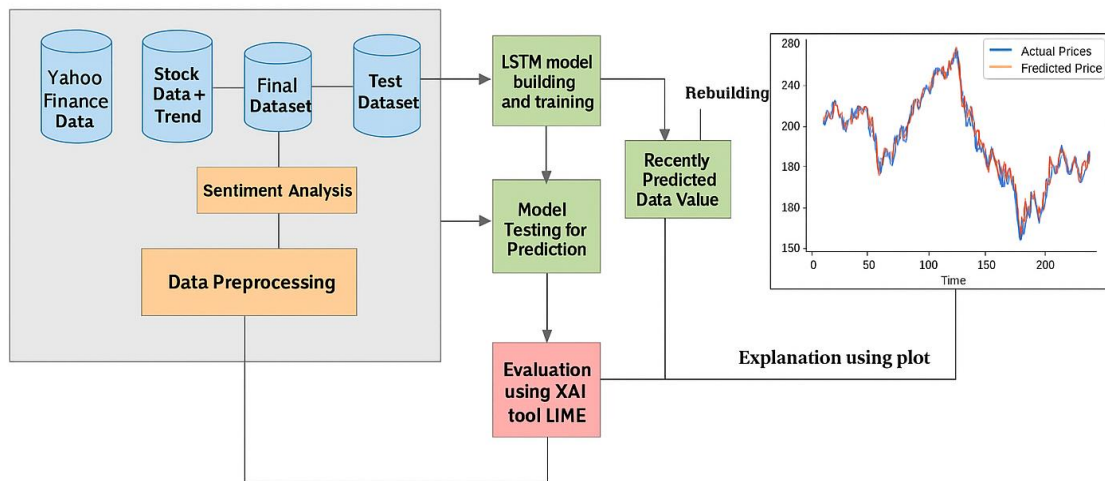
Users can predict future prices and view them as charts. The app shows confidence intervals, trends, and allows data downloads for further analysis.

III. FEATURES

1. Multi-market support for both U.S. and Indian stocks.
2. A web interface built using Streamlit.

3. LSTM-based time series forecasting.
4. Real-time data visualization and performance metrics.
5. Options for pre-trained or custom models.
6. Prediction accuracy with confidence intervals.

IV. ARCHITECTURE DIAGRAM



V. TECHNICAL STACK

So.no.	Component	Technology Used	Description
1.	Frontend	Streamlit	Provides a simple and interactive web interface for users to input stock symbols, select parameters, and visualize results.
2.	Backend(AI Model)	TensorFlow, Keras	Used to build, train, and run the LSTM neural network for stock price forecasting.
3.	Programming Language	Python	Main programming language for model implementation, pre-processing, and visualization.
4.	Libraries	Pandas, NumPy, Matplotlib, Scikit-learn	Used for data manipulation, analysis, visualization, and scaling.
5.	Data Source	Yahoo Finance API	Provides historical stock data (Open, High, Low, Close, Volume)
6.	Model Architecture	LSTM Neural Network	Deep learning model for time series prediction using sequential data.
7.	Visualization Tools	Plotly, Matplotlib	Display historical vs. predicted stock prices and performance metrics.
8.	Deployment Platform	Streamlit Cloud / Local Server	Hosts the web application for real-time use and sharing.

VI. CONCLUSION

The Stock Price Prediction App effectively demonstrates how LSTM models can forecast stock prices. It integrates AI modeling, real-time data fetching, and visualization into a simple interface. The system provides useful insights for research and learning and can be expanded into a more advanced financial prediction tool.

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