

# Stock Price Trend Prediction Using LSTM

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## 1.Introduction

The stock market is inherently volatile, influenced by a multitude of financial, political, and psychological factors. Predicting stock prices is a challenging yet crucial task for investors and analysts. With the emergence of deep learning techniques, especially Recurrent Neural Networks (RNNs) and their variants like Long Short-Term Memory (LSTM), more accurate time-series forecasting has become possible. This project focuses on predicting the trend of Apple Inc. (AAPL) stock prices using an LSTM-based deep learning model deployed via a Streamlit web interface

## 2. Abstract

This project aims to develop and visualize a stock price prediction model using LSTM, a powerful sequence modeling algorithm suitable for time-series data. Historical stock data of Apple Inc. is used to train the model. In addition to predicting future prices, the application includes technical indicators such as SMA and RSI to assist users in trend analysis. The entire solution is implemented in Python and deployed with Streamlit for interactive visualization.

## 3. Tools Used

Category	Tools / Libraries
Programming Language	Python
Data Manipulation	Pandas, NumPy
Visualization	Matplotlib, Streamlit
Machine Learning	TensorFlow (Keras), Scikit-learn
Deployment	Streamlit

## 4. Steps Involved in Building the Project

### a. Data Collection & Preprocessing

Loaded historical stock data from a CSV file (Apple Dataset.csv) using pandas. Cleaned and selected the 'Close' price as the primary feature. Scaled the data using MinMaxScaler for LSTM input compatibility.

### b. Feature Engineering

Calculated 50-day and 200-day Simple Moving Averages (SMA) for trend analysis. Computed Relative Strength Index (RSI) to identify overbought and oversold market conditions.

### c. Model Preparation

Prepared time-series sequences (60 timesteps) as input for the LSTM model. Reshaped the data to 3D shape [samples, timesteps, features] required by LSTM.

### d. Model Deployment

Loaded a pre-trained LSTM model (stock\_lstm\_model.h5). Used the model to predict future prices on the test data. Inverse-transformed the predicted values for comparison with actual prices.

### e. Visualization & UI

Visualized actual vs predicted prices using Matplotlib. Integrated interactive checkboxes and charts using Streamlit to provide a user-friendly interface.

## 5. Conclusion

The LSTM model demonstrated promising results in predicting Apple Inc.'s stock price trends. The integration of technical indicators like SMA and RSI provided additional insights into price momentum and reversals. Although the model cannot predict market movements with absolute certainty, it proves valuable for analyzing trends and supporting investment decisions. Future enhancements may include integrating more features like volume, sentiment analysis, or using bidirectional LSTM for improved accuracy.