Stock Price Trend Prediction using LSTM

Introduction

Stock market prediction is the act of trying to determine the future value of a company stock or other financial instrument traded on an exchange. Predicting stock market trends is a complex but valuable task in the financial industry. With advancements in deep learning, models like LSTM (Long Short-Term Memory) are increasingly used for time-series forecasting. LSTM is an artificial recurrent neural network used in deep learning and can process entire sequences of data. This project aims to analyze historical stock data and predict future price trends using an LSTM-based model.

Abstract

In this project, I have focused on building a machine learning model to predict the stock price trend of companies such as Apple (AAPL), TSLA(Tesla), GOOGL(Google), AMZN(amazon) etc., using LSTM networks. Firstly, I gathered historical stock data and created technical indicators like SMA (Simple Moving Average) and RSI (Relative Strength Index) to enhance prediction accuracy. The model was trained on past prices, tested on unseen data, and visualized using an interactive Streamlit dashboard. The results showed that LSTM can capture sequential patterns effectively for stock trend forecasting.

Tools Used

- Python
- Libraries: TensorFlow, Keras, Pandas, NumPy, Matplotlib, Scikit-learn, yfinance
- Streamlit for dashboard interface
- Visual Studio Code as the development environment

Steps Involved

1. *Data Collection*: Fetched historical stock prices using the yfinance library.
2. *Feature Engineering*: Computed indicators like 50-day SMA and RSI to identify trends and momentum.
3. *Preprocessing*: Scaled and reshaped data for LSTM input using MinMaxScaler.
4. *Model Building*: Designed and trained an LSTM model using Tensorflow-Keras.
5. *Evaluation*: Compared actual vs. predicted values, and calculated RMSE to assess accuracy.
6. *Deployment*: Integrated the trained model into a Streamlit dashboard for user interaction.

Conclusion

The LSTM model provided promising results in forecasting stock trends based on past data. The use of technical indicators helped in improving predictive performance. The interactive UI allows users to explore trends visually. In the future, adding external factors like news sentiment and financial indicators could further enhance prediction accuracy.