Stock Price Trend Prediction Using LSTM

Introduction

Predicting stock prices is one of the most challenging and rewarding applications in finance. With the advent of deep learning, models like Long Short-Term Memory (LSTM) have become powerful tools to learn time series data patterns. In this project, we use historical stock price data of Tata Motors to forecast future trends using an LSTM neural network.

Abstract

The main objective of this project is to build a model that can accurately predict future stock prices using past closing prices. The dataset used contains historical stock data of Tata Motors. The closing prices are scaled and structured into time series sequences for LSTM training. The model is evaluated by comparing predicted prices with actual prices and visualizing the results. The project demonstrates the effectiveness of LSTM for time series forecasting and its potential in real-world financial analysis.

Tools Used

- Python
- Pandas, Numpy (Data Handling)
- Matplotlib (Visualization)
- Scikit-learn (Scaling)
- Keras & TensorFlow (Model Training)
- Google Colab (Execution Platform)

Steps Involved in Building the Project

1. Data Collection: Downloaded the tatamotors.csv dataset from Kaggle.
2. Data Preprocessing: Extracted 'Close' prices, normalized values using MinMaxScaler, and created time series sequences of 60 previous prices as input.
3. Model Building: Built an LSTM-based neural network with two LSTM layers and Dense output.
4. Model Training: Trained the model on 80% of the dataset for 10 epochs with a batch size of 32.
5. Testing & Prediction: Created test sequences from the last 20% of data and made predictions.
6. Result Visualization: Plotted actual vs predicted prices using Matplotlib to evaluate performance visually.

Conclusion

The LSTM model successfully captured trends in Tata Motors' stock prices and provided predictions close to actual values. This demonstrates the power of deep learning in time series forecasting. The project can be extended further by including technical indicators like RSI, MACD, or by predicting multiple stock attributes. It also lays a strong foundation

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for building real-time stock forecasting dashboards using Streamlit or Flask.