Stock Price Prediction Using LSTM

Abstract

This project predicts future stock prices using **Long Short-Term Memory (LSTM)** networks. LSTM is a type of **Recurrent Neural Network (RNN)** suitable for sequential data such as stock prices. The model uses historical stock data to forecast the next day's closing price.

Introduction

Stock prices are dynamic and often unpredictable. Predicting them accurately is challenging but important for investors. Using deep learning, especially LSTM networks, we can model temporal dependencies in the data and forecast future stock prices based on historical trends.

Dataset

The dataset used in this project is stock_data.csv. It contains historical stock prices with two columns:

- **Date:** The date of the stock price
- **Close:** The closing price of the stock

Example:

Date	Close
2023-01-01	150
2023-01-02	152
2023-01-03	154

Methodology

1. **Load Data:** The dataset is loaded using **pandas**.
2. **Normalize Prices:** Using **MinMaxScaler** to scale prices between 0 and 1.

3. **Create Sequences:** For each day, 60 previous days' prices are used to predict the next day.
4. **Build LSTM Model:**
    - Two LSTM layers with 50 units each
    - One Dense layer to output the predicted price
5. **Train Model:** The model is trained for 5 epochs with a batch size of 32.
6. **Predict Price:** The model predicts the next day's closing price using the last 60 days of data.

Results

- The LSTM model predicts the next stock price.
- A graph compares **actual prices** vs **predicted price**, showing how well the model follows the trend.

Conclusion

The LSTM model can capture patterns and trends in stock prices, making it useful for **short-term predictions**.
Future work can improve accuracy by:

- Using larger datasets
- Adding more features (volume, technical indicators)
- Hyperparameter tuning of the LSTM model

References

- TensorFlow Documentation: https://www.tensorflow.org/
- LSTM Theory: https://colah.github.io/posts/2015-08-Understanding-LSTMs/
