AIML INTERNSHIP FINAL PROJECT REPORT ON

"STOCK PRICE TREND PREDICTION WITH LSTM"

SUBMITTED BY

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Introduction: Stock price prediction has long been a subject of interest in the financial industry. Due to the sequential nature of stock data, deep learning models such as Long Short-Term Memory (LSTM) networks are well-suited for this task. In this project, we forecast the closing stock prices of Apple Inc. (AAPL) using LSTM, implemented in PyTorch, trained on historical data. The aim is to capture temporal dependencies to forecast future prices with reasonable accuracy.

Abstract: This project presents an end-to-end time series forecasting model for stock price prediction. We use an LSTM network trained on 60-day windows of Apple's closing prices to predict the next day's price. The dataset is preprocessed using MinMaxScaler to normalize the values, and sequences are generated accordingly. After training the model, we evaluate its performance visually and quantitatively by comparing predicted values against actual test data. The model effectively captures stock price trends, showcasing the potential of deep learning in financial time series analysis

Tools and Technologies Used

- **Language: Python**
- **Libraries:**
  - **pandas, numpy –** for data handling & numerical computations
  - **matplotlib –** for data visualization
  - **sklearn.preprocessing.MinMaxScaler –** for feature scaling
  - **torch, torch.nn, DataLoader –** for deep learning and model training
- **Model: LSTM (Recurrent Neural Network)**
- **Environment: Jupyter Notebook / Visual Studio Code**

Steps Involved:

1. **Data Collection & Cleaning** : Historical AAPL stock prices loaded from a CSV file.Used only the 'Date' and 'Close' columns.Converted date strings to datetime and sorted data chronologically

2. **Data Normalization & Sequence Creation**: Applied MinMaxScaler to normalize closing prices between 0 and 1.Created input-output sequences using a 60-day rolling window

3. **Train-Test Split & Data Loader Preparation**:80% of the sequences were used for training, 20% for testing.Converted numpy arrays to PyTorch tensors o Used DataLoader for efficient batch training

4. **Model Design (LSTM)** : Built a 2-layer LSTM with dropout to prevent overfitting o Final fully connected layer predicts the next price point o Used MSE loss and Adam optimizer

5. **Model Training & Evaluation** Trained the model for 20 epochs. Predicted values were inverse-transformed using the original scaler. Visualized the difference between actual and predicted prices using a plot.

Conclusion: The LSTM model proved capable of learning the underlying trend of stock price movement. It successfully captured upward/downward trends, making it a useful forecasting tool for analysts and investors. Further enhancements can include: (i)Using additional features (Open, High, Low, Volume) (ii)Incorporating more data or longer historical ranges (iii)Using advanced architectures like BiLSTM or Attention mechanisms.This project shows that deep learning combined with real-world financial data can create robust predictive systems that assist in informed decision-making.