**INTERNSHIP PROJECT**

***STOCK PRICE TREND PREDICTION WITH LSTM***

**INTRODUCTION**

Predicting stock prices is an essential aspect of algorithmic trading and financial predictions. With the rise of deep learning, models such as Long Short-Term Memory (LSTM) networks have gained popularity for time-series forecasting because of their ability to learn from sequential information and understand long-term dependencies. This project seeks to predict future stock prices by training an LSTM model on historical stock data while also incorporating technical indicators like Moving Average (MA) and Relative Strength Index (RSI) for enhanced analysis.

**ABSTRACT**

This project focuses on predicting the closing price of Apple Inc (AAPL) shares by utilizing a deep learning LSTM model. The process involves retrieving historical stock information through the Yahoo Finance API, normalizing and preparing the data, constructing and training the LSTM model, and visualizing the outcomes. Furthermore, moving averages and the relative strength index (RSI) are calculated to assist with technical analysis and confirm trends. The project concludes with a visualization that compares actual and predicted prices, along with a brief analysis of market movements.

**TOOLS AND TECHNOLOGIES USED**

* **Language**: Python
* **Libraries**:
* **yfinance** – to fetch historical stock data
* **Pandas, Numpy** – for data manipulation
* **Matplotlib** – for visualizations
* **Scikit-learn** – for Min-Max normalization
* **TensorFlow / Keras** – for building the LSTM model

**STEPS INVOLVED**

**1.Data Collection**

* Fetched Apple stock data (2019–2024) using the yfinance library.

**2. Data Preprocessing**

* Visualized the closing price trends.
* Applied MinMaxScaler to normalize the data between 0 and 1.
* Generated time sequences of 60 previous days to predict the next day.

**3. Model Building**

* Constructed an LSTM neural network using Keras.
* Used two LSTM layers and a Dropout layer to avoid overfitting.
* Trained using Mean Squared Error loss and Adam optimizer.

**4. Prediction and Evaluation**

* Predicted stock prices and scaled back to original values.
* Compared actual and predicted prices using line plots.

**5. Technical Indicators**

* Calculated 20-day Moving Average (MA20) to analyse trends.
* Computed Relative Strength Index (RSI) to detect overbought/oversold signals.

**CONCLUSION**

The LSTM model successfully learned from past data and predicted future stock movements, visually aligning with actual prices. While the model does overlook several real-world factors, it establishes a solid foundation for time-series forecasting.

Incorporating RSI and MA20 enriched the analysis, aiding in the assessment of momentum and the reduction of volatility. Potential improvements could involve utilizing multiple stock inputs, conducting sentiment analysis, and deploying a dashboard via Streamlit for live predictions.