NVIDIA Stock Price Prediction Analysis

Objective

This project focuses on predicting NVIDIA's stock price using historical data and technical indicators. By comparing Linear Regression and Long Short Term Memory models, the goal is to determine which model provides more reliable predictions and insights for both short term and long term forecasting.

Data Sources

Stock Data: NVIDIA's historical stock prices and volume data over the past five years, obtained using the finance library.
Technical indicators: Calculator additional indicators such as Moving Averages (MA20, MA50), Relative Strength Index (RSI), Exponential Moving Averages (EMA12, EMA26), Moving Average Convergence Divergence (MACD), and Signal Line.

Methodology

Data Collection:

- Downloaded and filtered NVIDIA's stock data.
- Calculated indicators to enhance model inputs.
- Selected features like Moving Averages, RSI, MACD, and volume to improve prediction accuracy.

Model Selection:

- Linear Regression: Straightforward model that captures linear trends in stock prices.
- LSTM: A deep learning model suitable for time series data, capable of capturing complex patterns in stock prices.

Evaluation Metrics:

- RMSE (Root Mean Squared Error): Measures the model's overall accuracy by calculating the average squared differences between actual and predicted values.
- MAE (Mean Absolute Error): Assesses average absolute error between predicted and actual values, useful for understanding the typical prediction error.

Findings

Linear Regression:The model provides stable predictions that fit short-term trends effectively. With lower RMSE and MAE values, it is a suitable choice for tasks requiring moderate predictability without the need for highly complex patterns.
LSTM: While capturing long-term trends and complex patterns, LSTM had higher RMSE and MAE. This suggests it is sensitive to fluctuating data and may be more appropriate for high-level, exploratory trend analysis rather than precise, short-term forecasting.

Business Implications

Linear Regression: Ideal for short term forecasting where moderate accuracy is sufficient.
LSTM: Ideal for high level analysis, strategic planning, and exploring long term scenarios.

Conclusion

This analysis demonstrates the importance of using both simple and complex models to capture different aspects of financial data. Linear Regression is useful for immediate, short-term predictions with low costs, while LSTM offers a powerful tool for exploring broader market patterns. Selecting the appropriate model depends on the business need either precision and efficiency for short-term forecasting or depth and trend exploration for strategic planning.