



Stock Price Prediction Using ML in a Volatile Market

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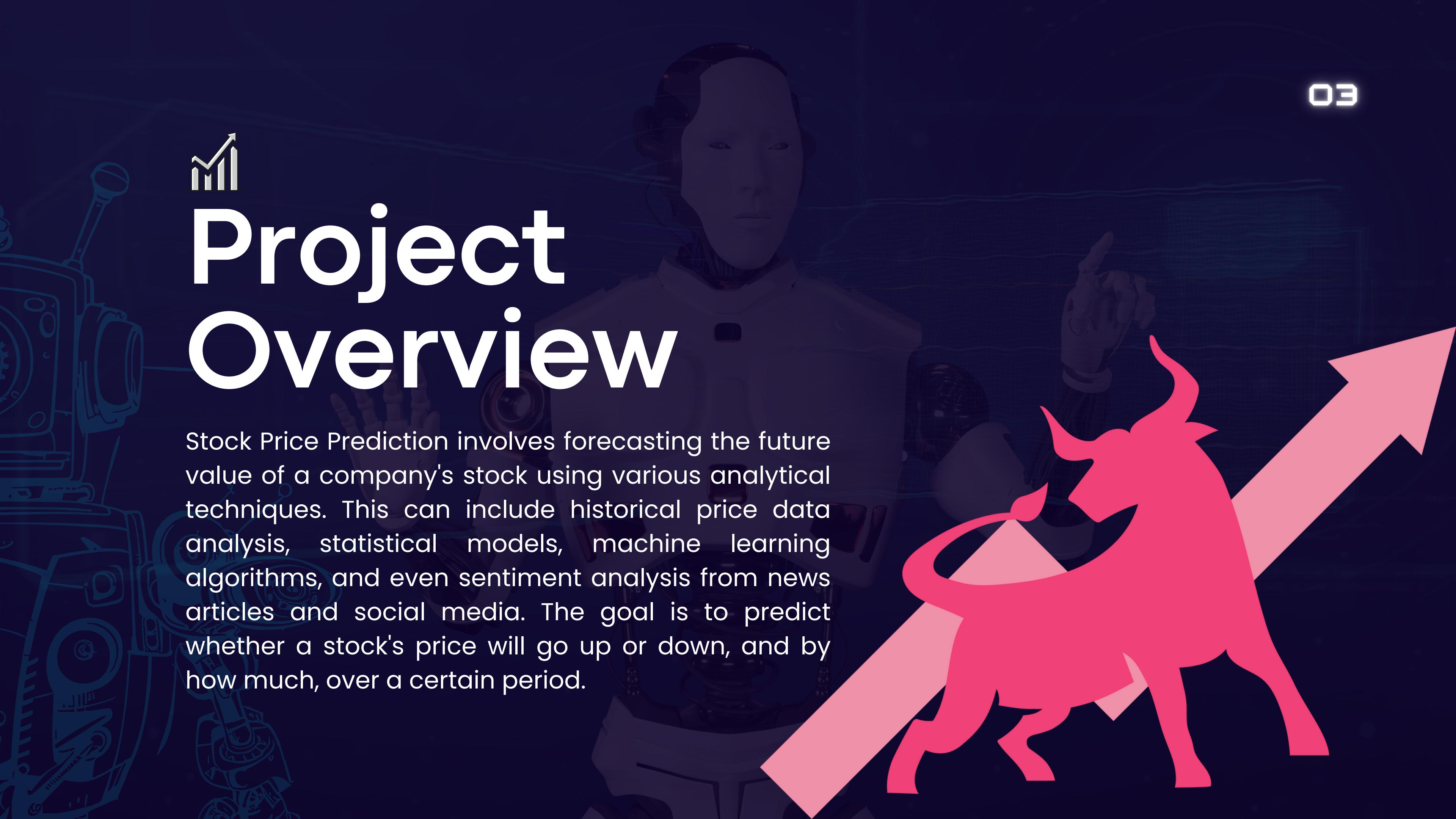
Problem Statement

To predict the stock price using Machine Learning algorithms in a volatile market?



Project Overview

Stock Price Prediction involves forecasting the future value of a company's stock using various analytical techniques. This can include historical price data analysis, statistical models, machine learning algorithms, and even sentiment analysis from news articles and social media. The goal is to predict whether a stock's price will go up or down, and by how much, over a certain period.



Methodology

Evaluation

Model
Development

Data Collection
and Preparation

Data Collection and Preprocessing

Data Source: The historical stock prices were downloaded using the yfinance library, covering the period from January 1, 2015, to June 25, 2024.

Data Preprocessing: The dataset was preprocessed by calculating moving averages (50-day, 100-day, and 200-day) and normalizing the closing prices using the MinMaxScaler



Model Development

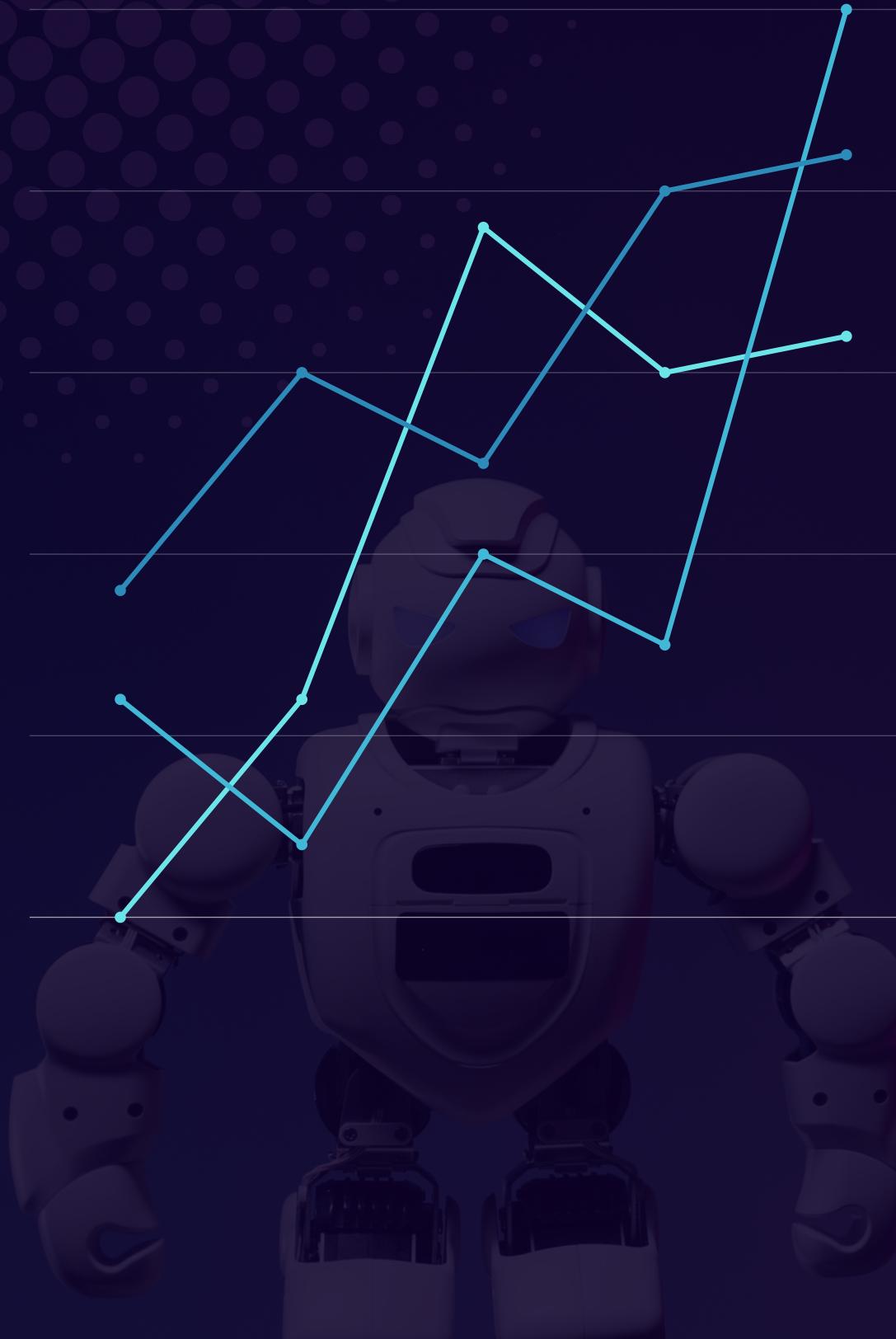
A deep learning model using Keras is designed, consisting of several layers to capture the temporal dependencies in the stock price data using LSTM layers, Dense Layers and compiled using Adam optimizer and the Mean Squared Error (MSE) loss function.



Evaluation Metrics

The performance of the LSTM model was evaluated using the following metrics:

- Mean Squared Error (MSE)
- Mean Absolute Error (MAE)
- Root Mean Squared Error (RMSE)
- R-squared (R²)



Result and Discussion

Evaluation Metrics:

- Squared Error (MSE): 42.81
- Mean Absolute Error (MAE): 5.20
- Root Mean Squared Error (RMSE): 6.54
- R-squared (R²): 0.87

The metrics indicate that the model has a reasonably good performance in predicting the stock prices, with an R² value of 0.87 suggesting that 87% of the variance in the stock prices is explained by the model.



Visualization



This plot demonstrates that the predicted prices closely follow the actual closing prices, indicating the model's effectiveness.

The LSTM model was able to capture the trends and patterns in the stock prices effectively, as evidenced by the high R-squared value and relatively low error metrics. The moving average plots also illustrate that the model's predictions align well with the actual closing prices, reinforcing the model's reliability.

Conclusion and Future Directions

The LSTM-based stock price prediction model developed in this project shows promising results, with high accuracy and low error rates. The model effectively captures the trends and patterns in stock prices, making it a valuable tool for financial forecasting. However, there are few areas of improvement like Overfitting, hyperparameter tuning and Data Scaling. Continuously refining these aspects will likely yield further insights and improvements in predictive accuracy.

