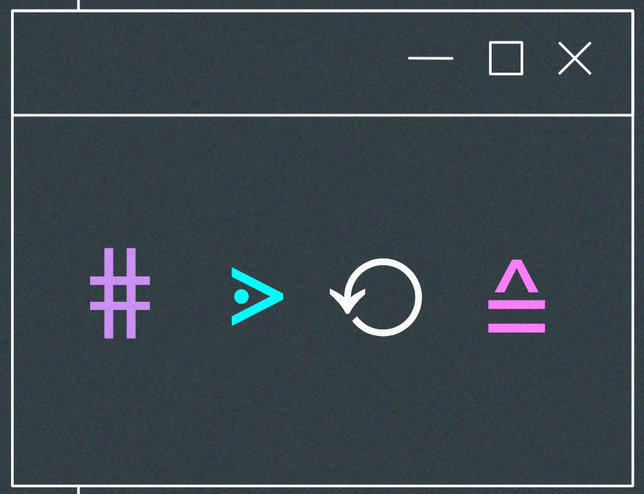
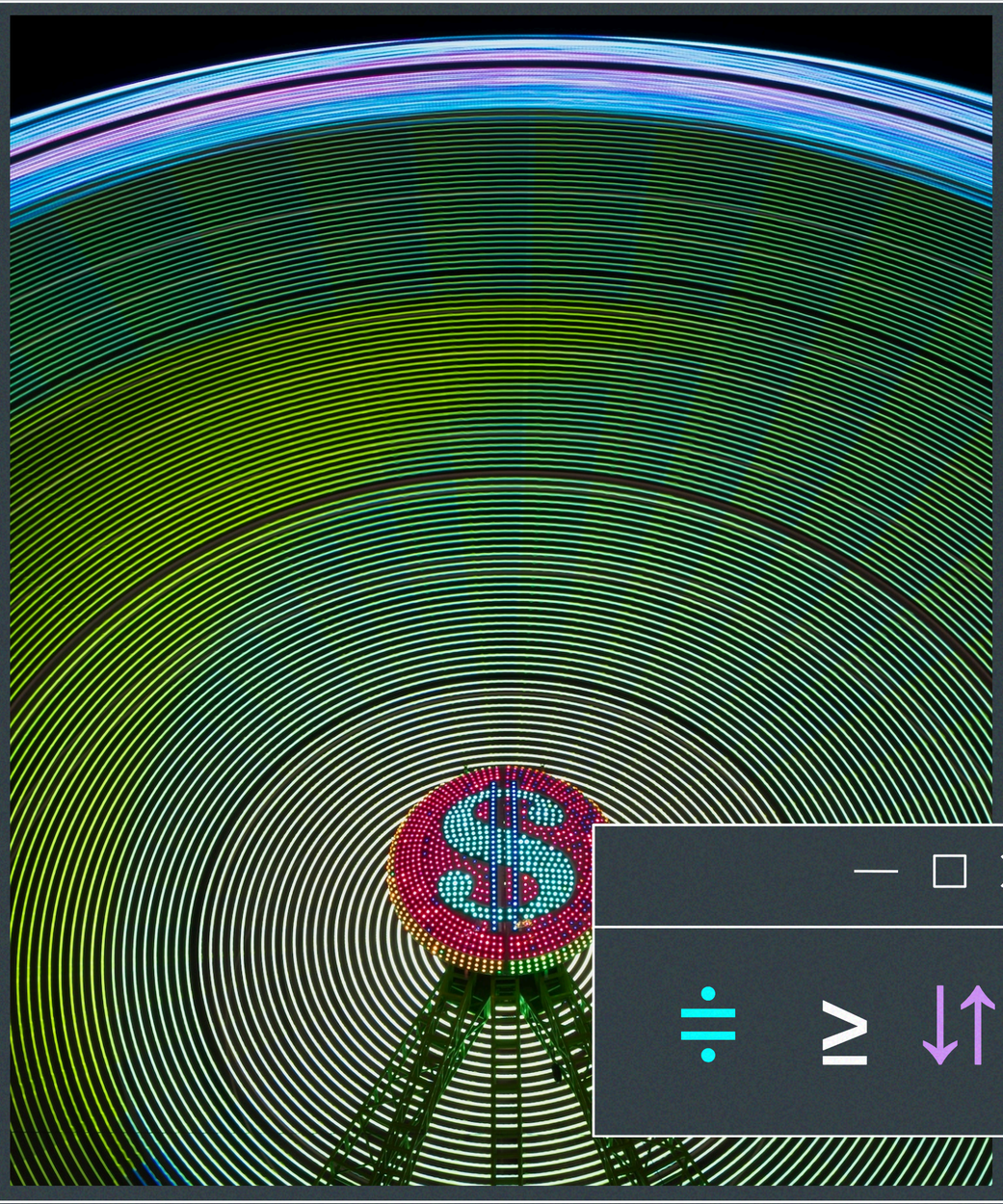
Advanced Stock Price Prediction Techniques: A Comparative Analysis of LSTM, Linear Regression, Decision Trees, and Random Forest Models



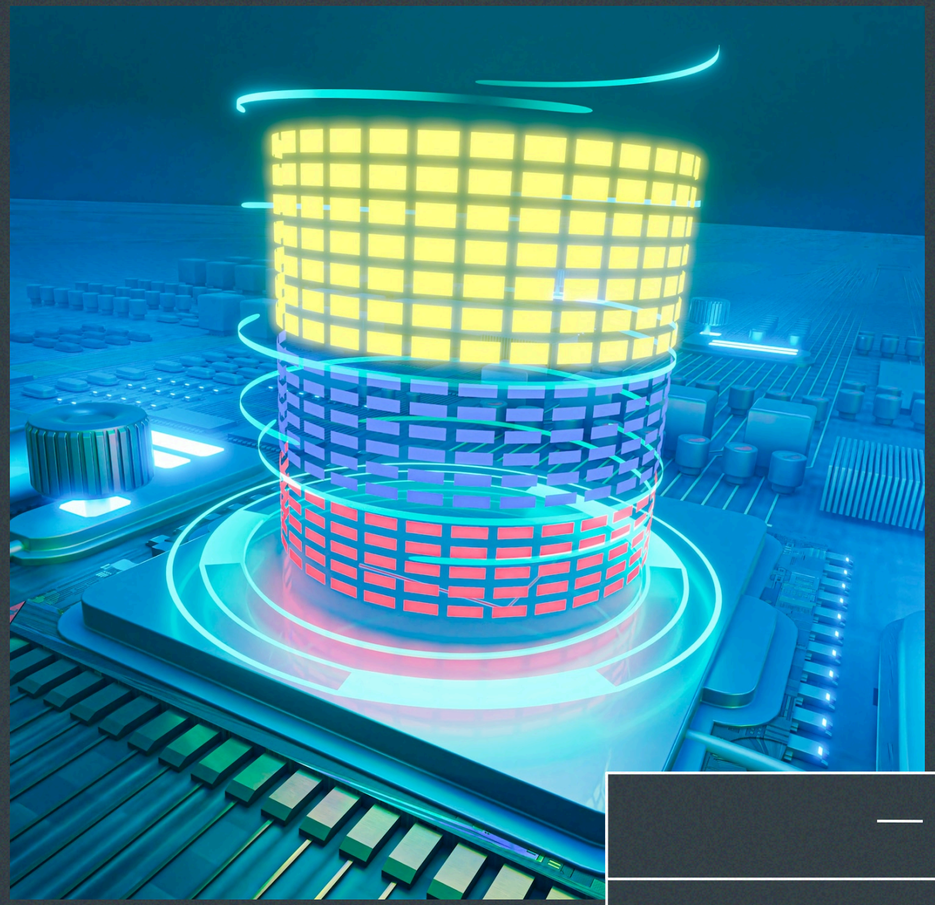
Introduction

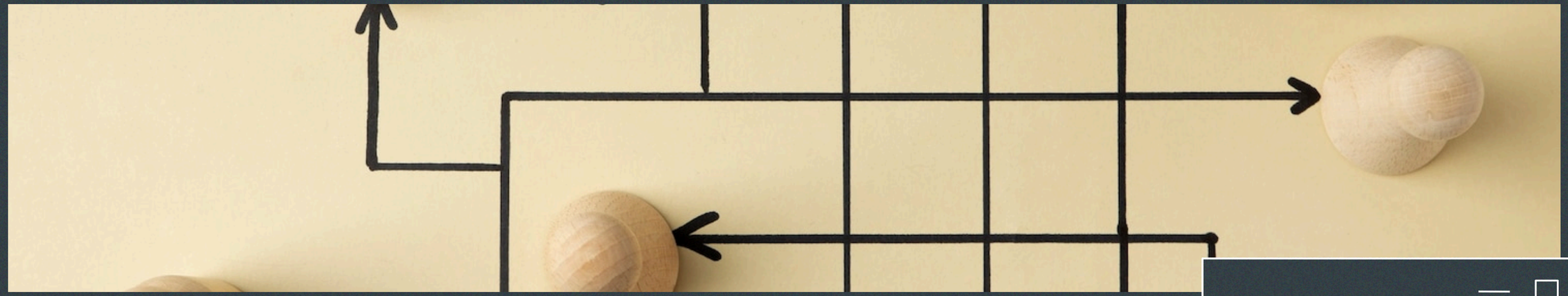
This presentation explores **advanced stock price prediction techniques**. We will conduct a **comparative analysis** of four models: **LSTM**, **Linear Regression**, **Decision Trees**, and **Random Forest**. Understanding these methods is crucial for making informed investment decisions in today's volatile market.



Overview of LSTM

Long Short-Term Memory (**LSTM**) networks are a type of **recurrent neural network** (RNN) capable of learning long-term dependencies. They are particularly effective for **time-series data**, making them suitable for stock price prediction due to their ability to capture trends over time.





Decision Trees Explained

Decision Trees are a **non-parametric supervised learning** method used for classification and regression. They split data into branches to make predictions based on feature values, providing **interpretability** and clear decision rules, which can be advantageous in stock price forecasting.

Random Forest Overview

Random Forest is an ensemble learning method that constructs multiple decision trees during training and outputs the mode of their predictions. This technique reduces **overfitting** and improves **accuracy**, making it a robust choice for predicting stock prices.

Gradient Boosting

Gradient Boosting is an ensemble machine learning technique that builds models sequentially, where each model corrects the errors of its predecessor. It combines weak models (usually decision trees) into a strong one by minimizing a loss function using gradient descent.

Performance Metrics

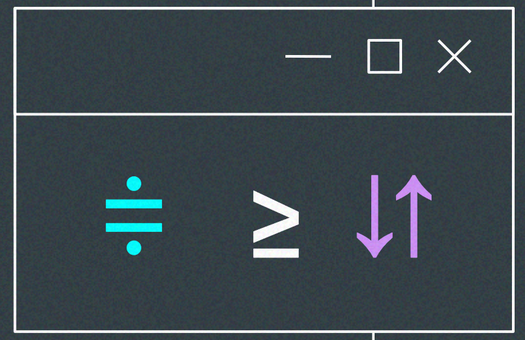
Performance metrics such as **Mean Absolute Error (MAE)**, **Root Mean Squared Error (RMSE)**, and **R-squared** will be used to assess the models. These metrics provide insights into prediction accuracy and help compare the efficacy of each technique.

Results and Discussion

The results indicate varying performance levels among the models. While **LSTM** excels in capturing trends, **Random Forest** shows robust performance across different datasets. This section will discuss the implications of these findings for investors and analysts.

Conclusion

In conclusion, this analysis highlights the strengths and weaknesses of LSTM, Gradient Boosting, Decision Trees, and Random Forest models in stock price prediction. Selecting the appropriate technique depends on specific use cases and data availability, emphasizing the need for careful consideration.



Thanks!

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