

BITCOIN PRICE PREDICTION

Group Members

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PROJECT OVERVIEW

Objective:

Analyze Bitcoin price patterns and forecast closing prices.

Data Source:

Yahoo Finance (Daily historical Bitcoin prices).

Project Goals:

- *Forecast Bitcoin closing prices*
- *Identify Bitcoin price trends*
- *Compare machine and deep learning*
- *Support informed investment decisions*

DATASET DETAILS

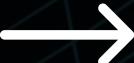
Description:

The dataset contains daily historical Bitcoin price data for the last five years from Sep,2019 to Sep,2024.

Key Columns:

- **Date**
- **Open**
- **Close**
- **High**
- **Low**
- **Volume**

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DATA COLLECTION

Involved Process:

- ***Web scraping with Selenium***
- ***Parsing data using BeautifulSoup***
- ***Storing data in a Pandas DataFrame***

Challenges with Dynamic Website:

- ***Yahoo Finance updates information in real-time using JavaScript***
- ***Solution: Selenium rendered JavaScript content for accurate extraction.***

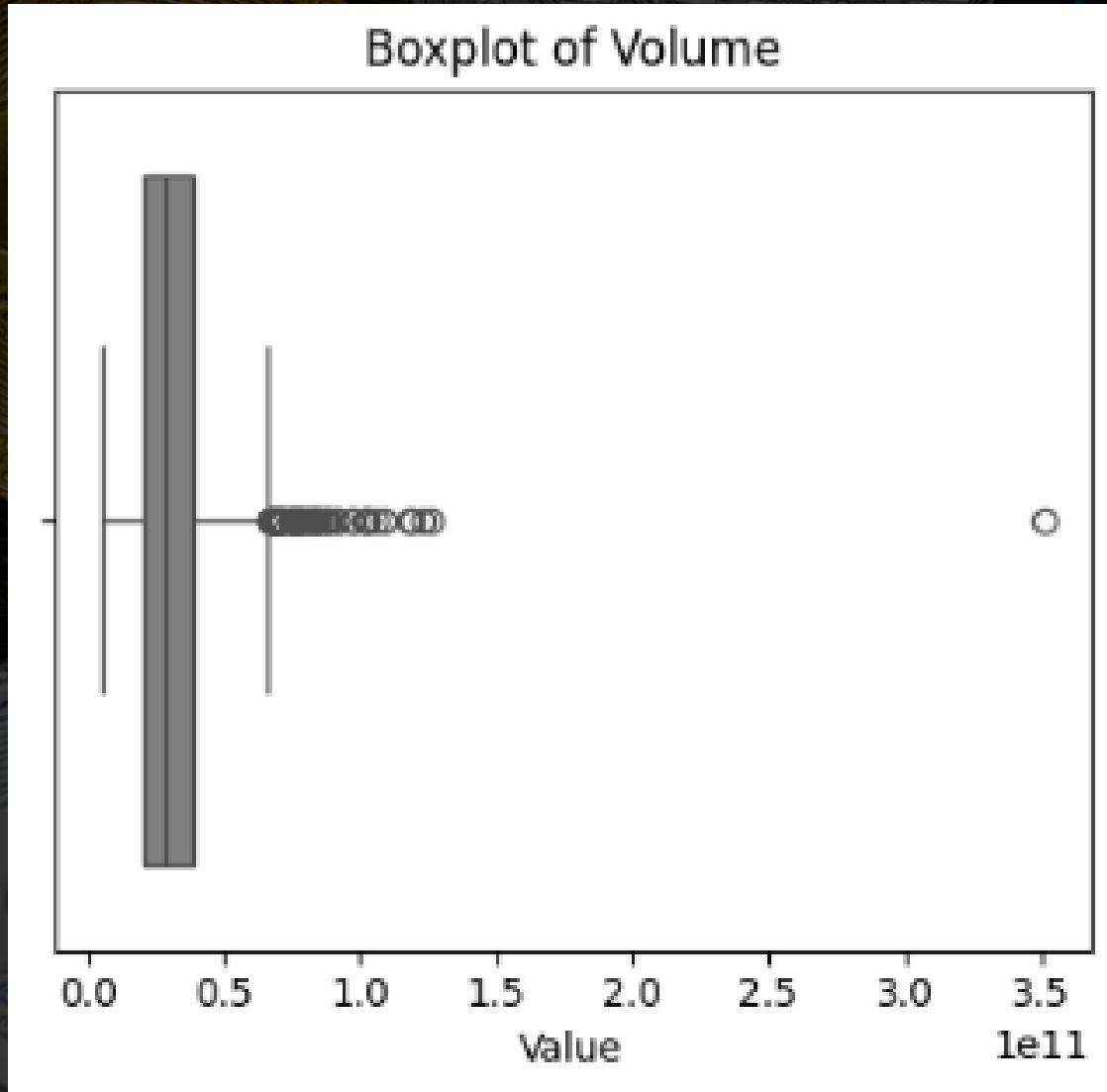


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DATA CLEANING AND PREPARATION

Steps taken:

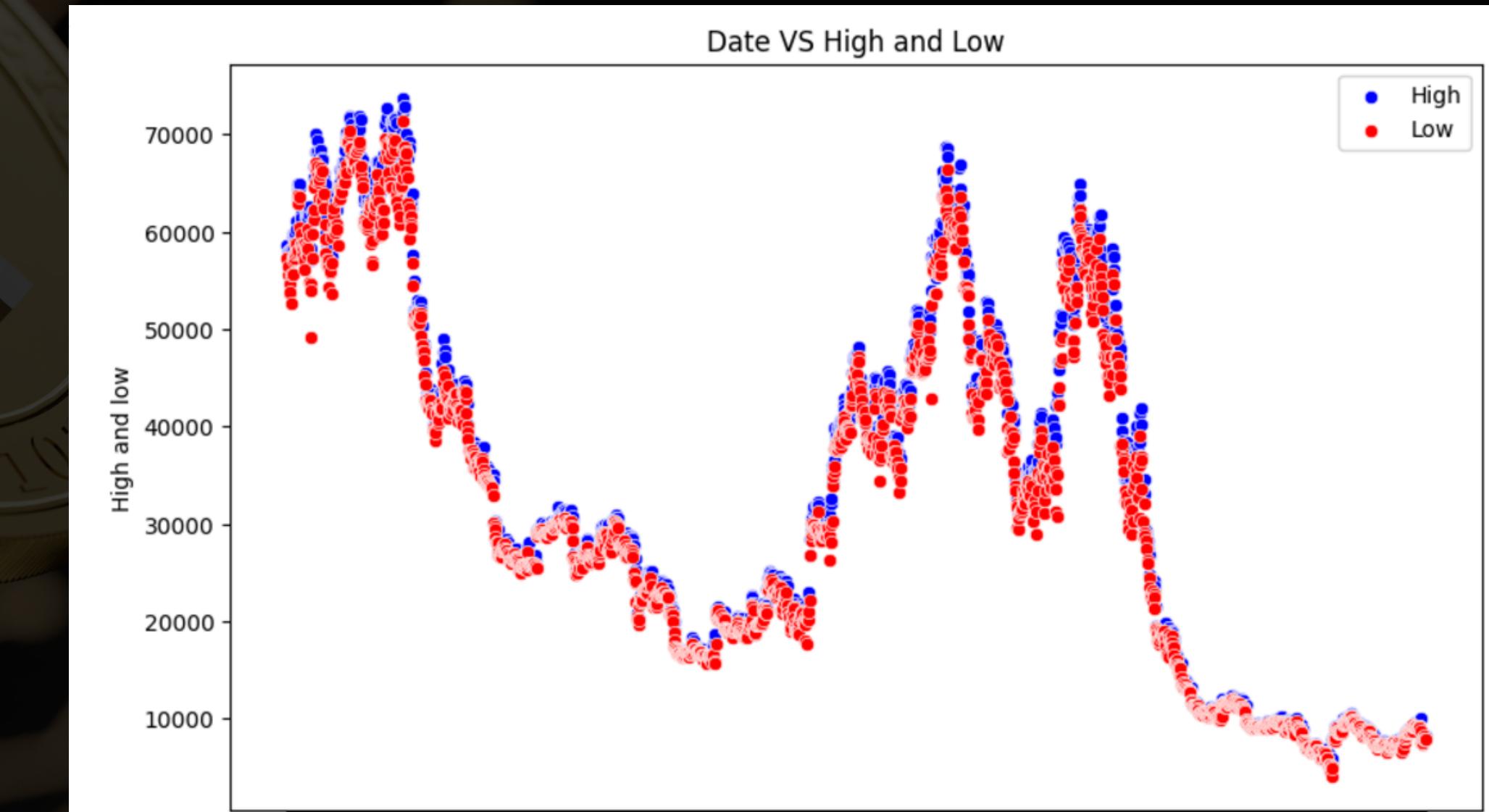
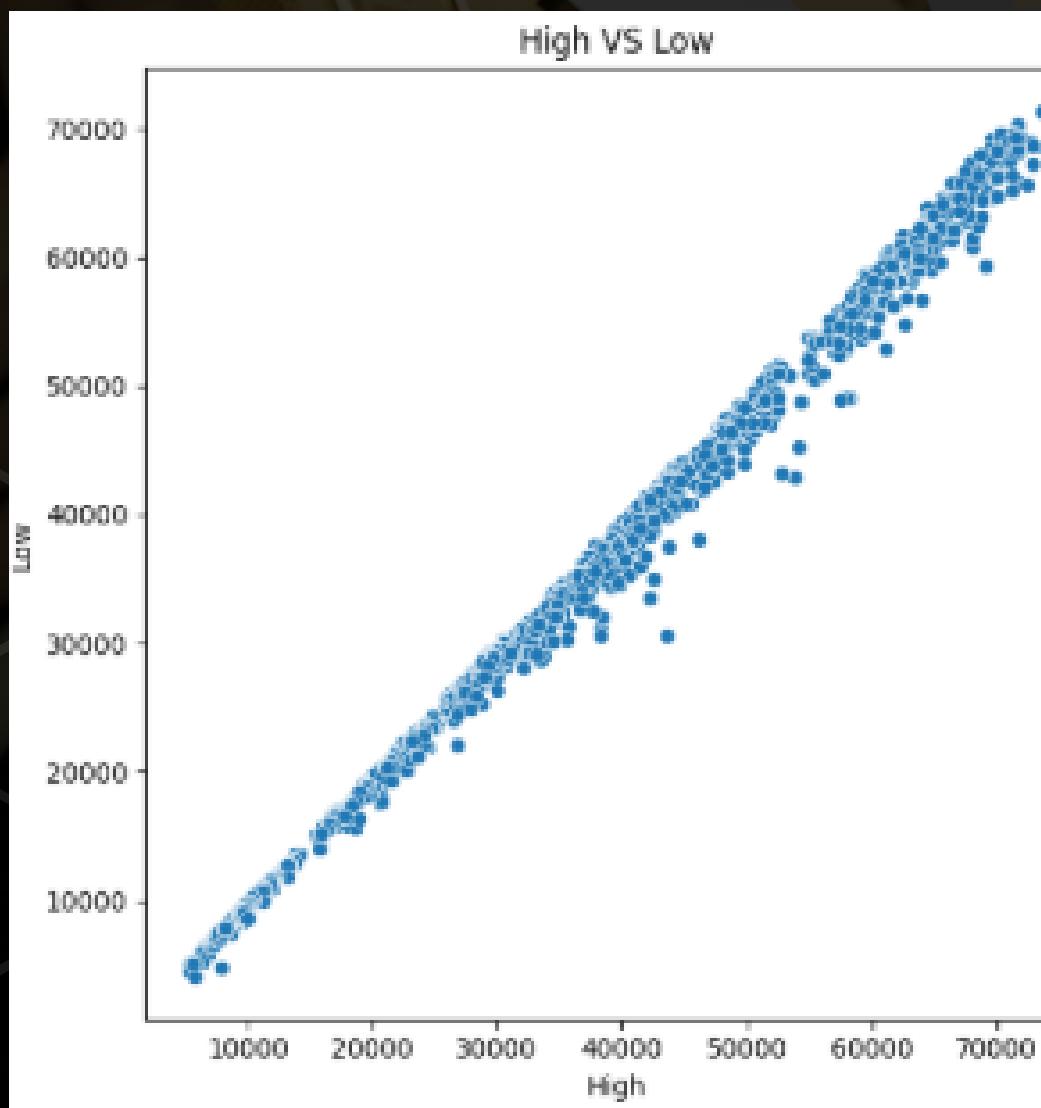
- ***Converting string format data to numeric***
- ***Check for Duplicate Values***
- ***Check for Null Values***
- ***Detecting Outliers by both IQR and Z-Score***
- ***Check Uniformity of data by Chi-Squared***
- ***Normalize data by Min-Max Normalization***



EXPLORATORY DATA ANALYSIS (EDA)

Analysis Performed:

- ***Univariate Analysis: Analyzing Individual variables***
- ***Bivariate Analysis: Relationship between variables***
- ***Trivariate Analysis: Interaction among three variables***



DEEP LEARNING MODELS

1. Long Short-Term Memory (LSTM) Model:

Purpose:

Predict Bitcoin closing prices based on historical data patterns.

Architecture:

Input, LSTM layers, and Dense output.

Framework:

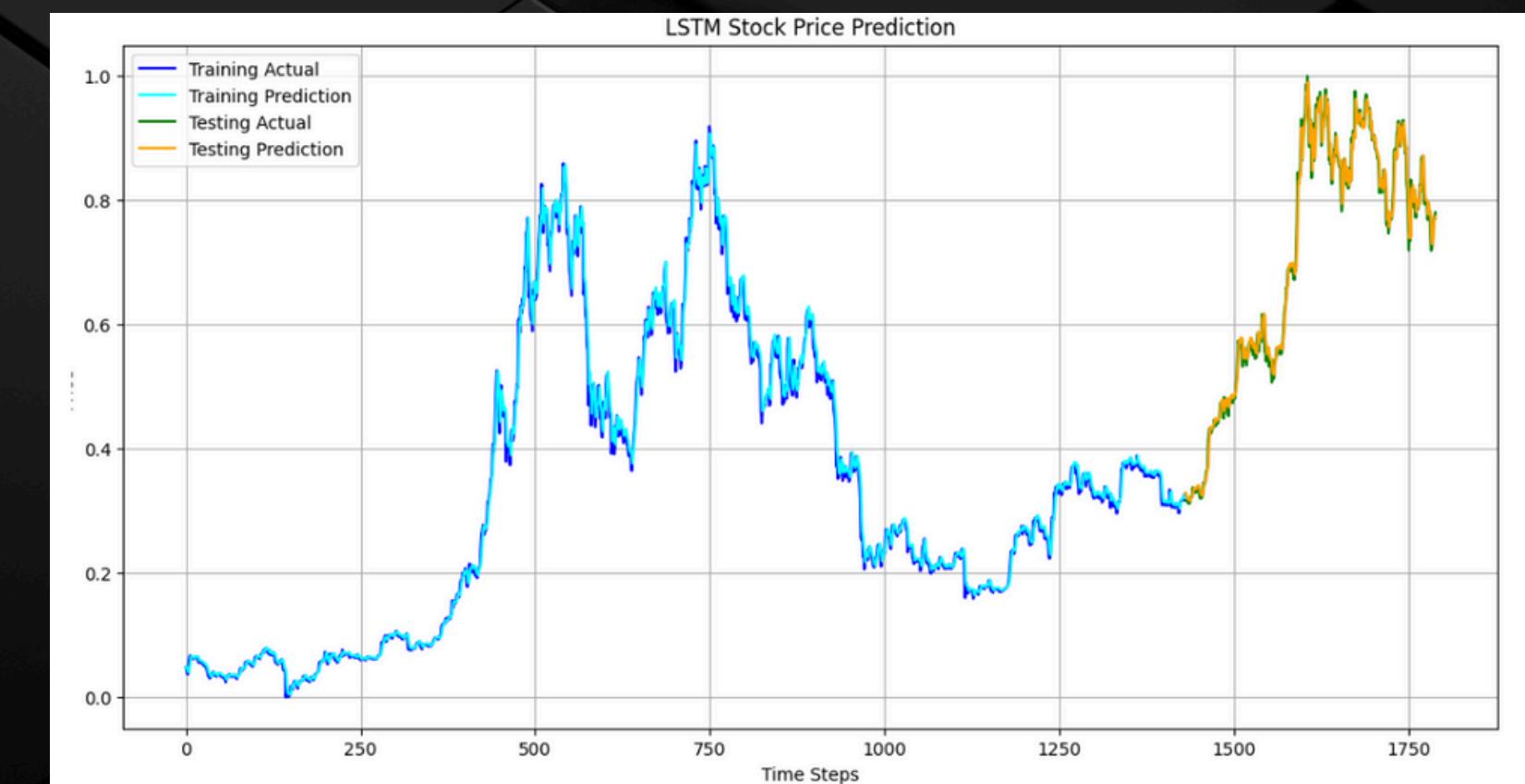
TensorFlow, trained for 50 epochs and batch size 16.



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Results:

- **Mean Squared Error (MSE): 0.0006**
- **Mean Absolute Error (MAE): 0.0172**
- **R-squared (R²): 0.99**



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2. Recurrent neural Network (RNN) Model:

Purpose:

- ***Predict Bitcoin prices using sequential pattern.***
- ***Captures dependencies across time steps***
- ***Utilizes past data to predict future values***

Architecture:

- ***Input Layer: Processes sequential data (Bitcoin prices)***
- ***Hidden Layers: Recurrent connections to retain memory of past steps***
- ***Output Layer: Predicts the next closing price***

Framework:

Use TensorFlow.Keras and in the testing phase predict the accuracy of unseen data after train it with sequence learning.

Results:

- **Mean Squared Error (MSE): 0.0001**
- **Mean Absolute Error (MAE): 0.0105**
- **Root Mean Squared Error (RMSE): 0.0129**



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Machine Learning MODEL

1. Random Forest Model:

Why to use:

Combines the predictions of 100 decision trees to minimize errors and improve accuracy

Purpose:

- **Predict BitCoin Closing Price**
- **Handle Non-Linear Relationships**
- **Quick Baseline Model**

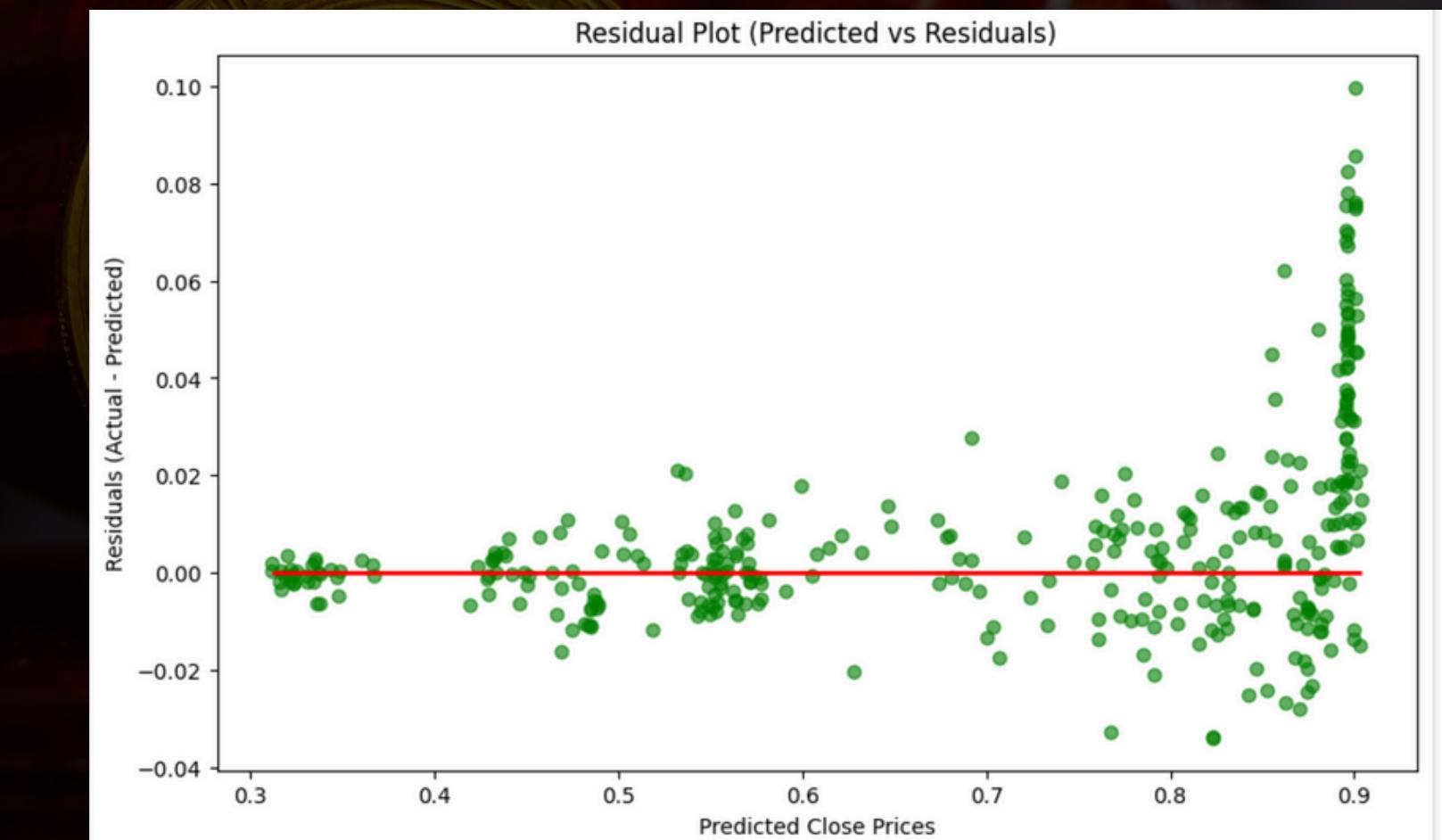
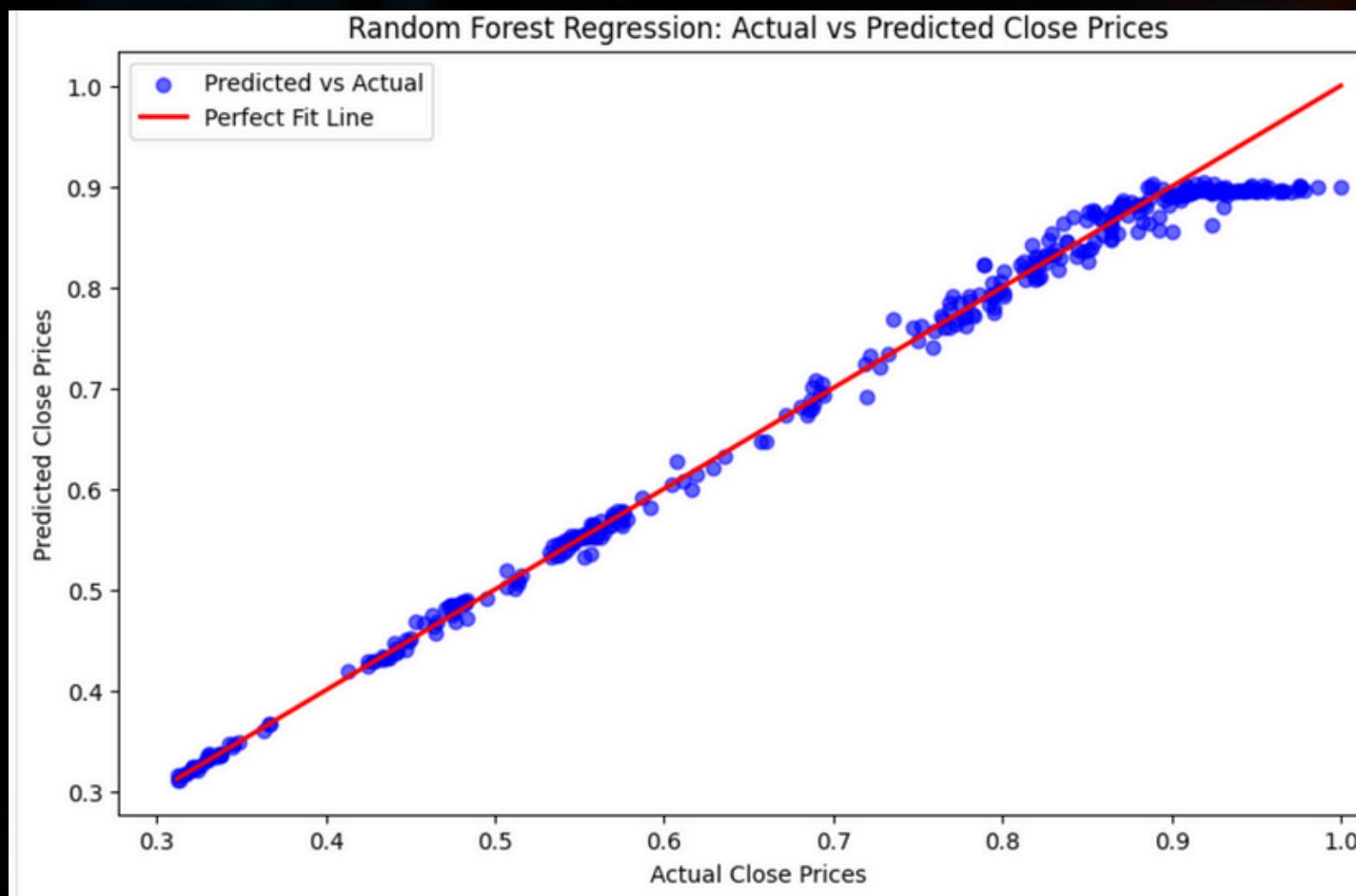
Steps:

- **Used RandomForestRegressor with 100 estimators**
- **Train-Test Split into the ration of 80% and 20% ratio**
- **By averaging predictions from multiple decision trees, Random Forest reduces overfitting and improves reliability**



Results:

- **Mean Absolute Error (MAE): 0.0143**
- **R-squared (R²): 0.99**



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COMPARISON OF MODELS

Long Short-Term Memory (LSTM):

- ***Captures sequential patterns well.***
- ***Higher accuracy and lower errors.***

Recurrent Neural Network (RNN):

- ***Captures basic patterns but struggles with long-term dependencies .***
- ***Simpler architecture as compared to LSTM but fast in training.***

Random Forest:

- ***Faster; better for feature-based data.***
- ***Higher error for volatile trends give like this.***

Conclusion:

LSTM excels for sequential predictions.



Thank you.