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***

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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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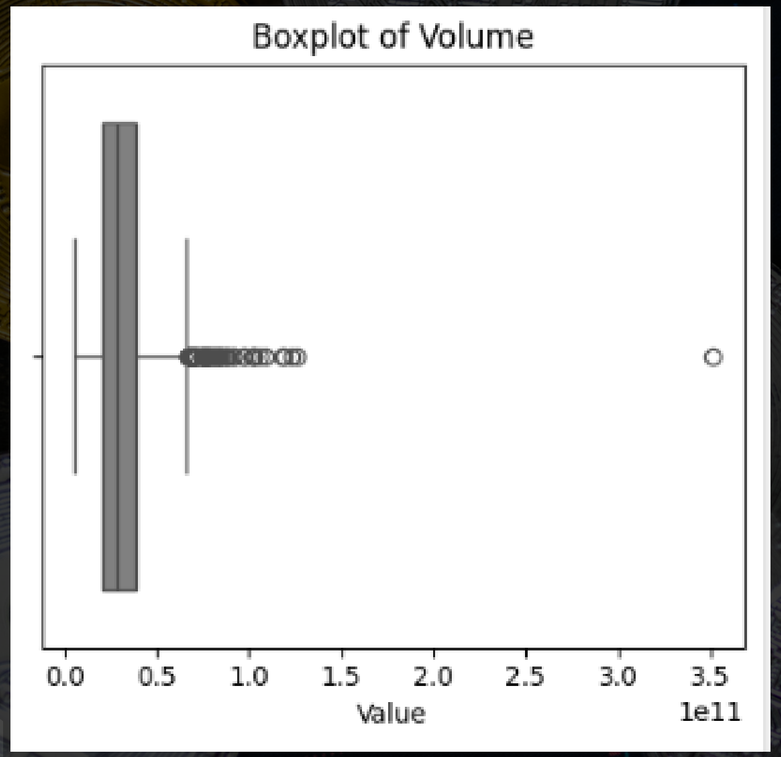
DATA CLEANING AND PREPATION

Steps taken:



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

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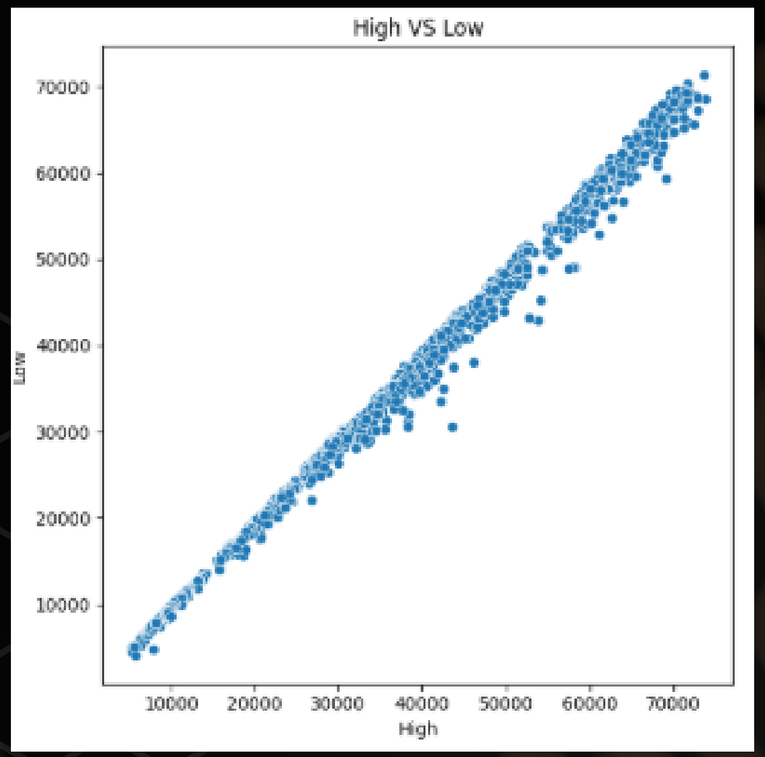
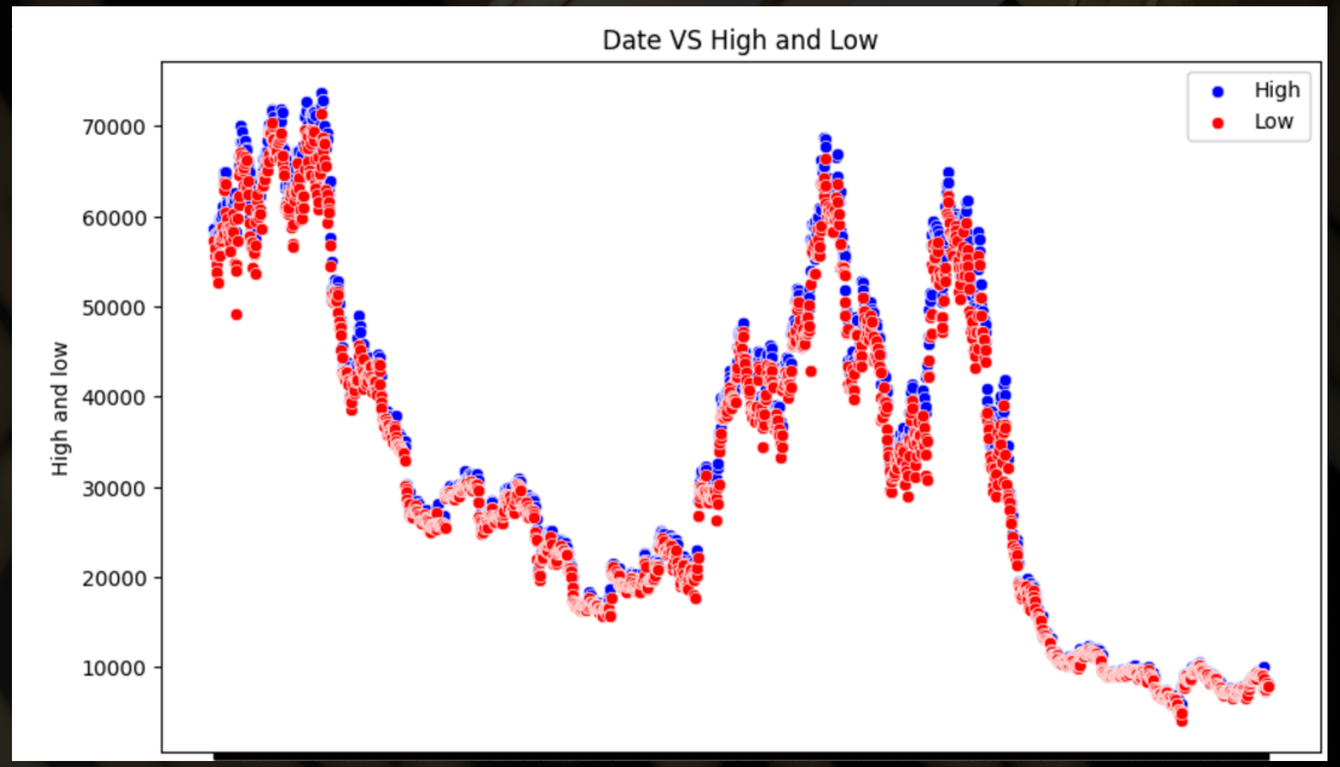
EXPLORATORY DATA ANALYSIS (EDA)

Analysis Performed:

- ***Univariant Analysis: Analyzing Individual variables***
- ***Bivariant Analysis: Relationship between variables***
- ***Trivariant Analysis: Interaction among three variables***





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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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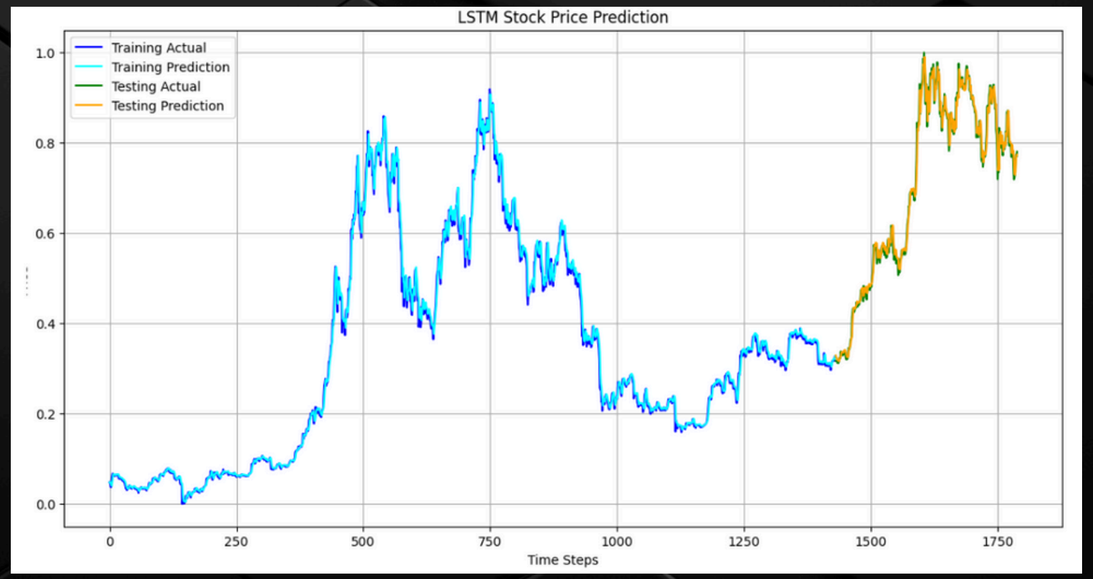
Results:

- ***Mean Squared Error (MSE) : 0.0006***
- ***Mean Absolute Eoor (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 tain 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:

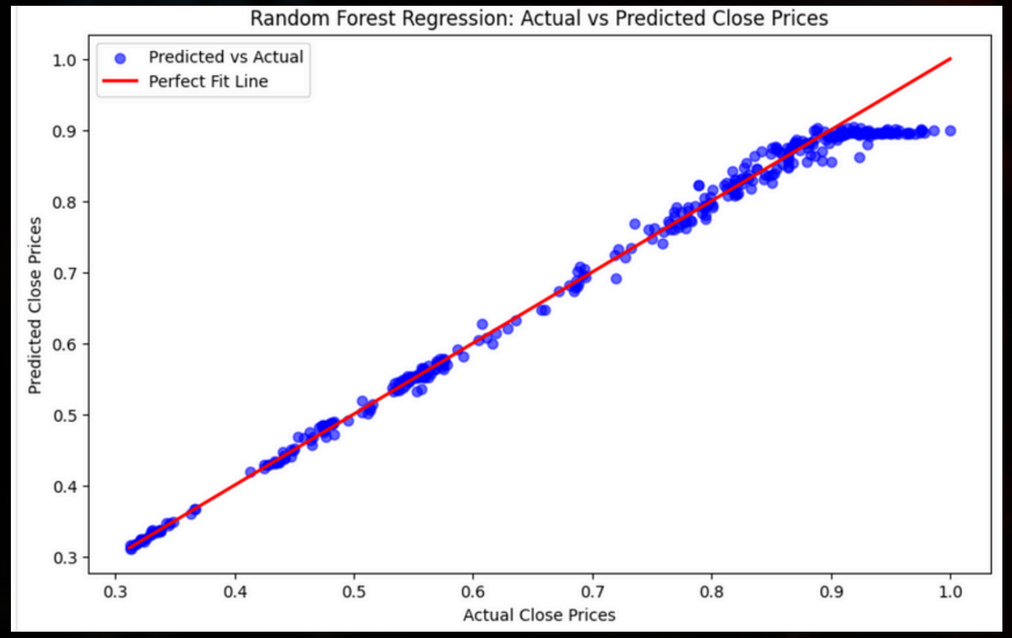
- ***Predict BitCoin Closing Price***
- ***Handle Non-Linear Relationships***
- ***Quick Baseline Model***

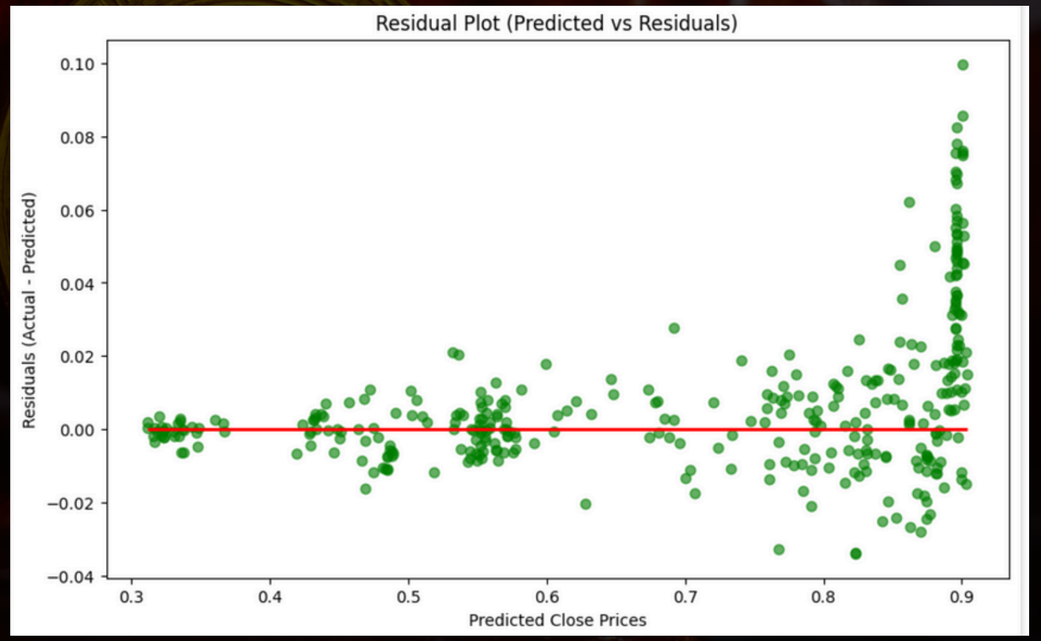
Steps:

- ***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 comparedto 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.