

Capstone Project

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1 Project: Predicting Bitcoin Weighted Price Using Time Series Forecasting

1.1 Overview

This project aims to develop a time series forecasting model to predict the future weighted price of Bitcoin.

1.2 Problem Statement

Bitcoin's price is highly volatile, making it challenging to predict future trends. This project seeks to create a model that can analyze historical price data and identify patterns to forecast future weighted prices.

1.3 Metrics

The model's performance will be evaluated using two key metrics:

- * Mean Squared Error (MSE): Measures the average squared difference between predicted and actual values. Lower MSE indicates better performance.

- *Visualizing the results

2 Analysis

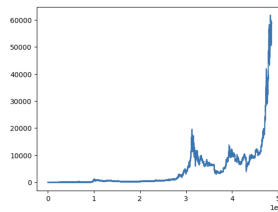


Figure 1: "Showcasing Bitcoin market data"

2.1 Data Exploration

I will explore historical Bitcoin price data, focusing on factors like opening price, closing price, trading volume, but mainly on the Weighted Price since it captures all the aspects i need, and it being a good indicator of the market value, while only using timestamps to predict.

2.2 Data Visualization

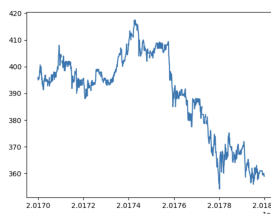


Figure 2: Data from 2017-2018

In figure 1: We can see that Bitcoin market pricing hasn't been stable at all, which is one of the main reason i am building a time series forecaster.

In figure 2: We can see the amount of deviation given a smaller time interval.

3 Methodology

3.1 Data Preprocessing

The data preprocessing steps will include:

- * Handling Missing Values: Filling missing data points using techniques like interpolation.
- * Feature Scaling: Standardizing features to a common scale to ensure all features contribute equally to the model.
- * Time Stamp Conversion: Transforming the timestamp column from a basic timestamp format to a datetime format for more granular analysis.

3.2 Implementation

We will implement and compare different time series forecasting models, such as:

- * Long Short-Term Memory (LSTM) Multi Layer Perceptron (MLP)

3.3 Refinement

We will fine-tune hyperparameters of the model to optimize the performance and compare the accuracy using the defined metrics (MSE).

4 Results

4.1 Model Evaluation and Validation

After Trying different models and libraries including pytorch scikit learn and tensorflow I have found that tensorflow performed faster even the model is larger,

At first i was starting with a smaller model with 1 hidden layer with a total number of parameters: 350

Secondly i tried to make the model larger up to 570 with noticeable improvement,

Thirdly i went for a different activations and found that Relu was an amazing choice for the hidden layers

And lastly i made the model larger up to 1500 parameters and found that it resulted the best given the limited computing resources.

4.2 Justification

5 Conclusion

5.1 Reflection

This project will provide insights into the effectiveness of time series forecasting for predicting Bitcoin prices, Being this unpredictable can make it difficult for models to learn certain aspects, especially since this field is difficult to begin with.

5.2 Improvement

By getting access to better resources and more up to date data, there will be noticeable improvement to the accuracy and effectiveness of the model.