


Cryptocurrency Price Estimator

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Abstract: Bitcoins are the first currency to attain substantial prominence in the cryptocurrency industry. The problem that most investors face when delving into cryptocurrency investing is that they do not know when to buy or sell at an optimal price point. The objective of this project is to help investors predict the price of cryptocurrencies. A machine learning-based time series analysis was used to anticipate Bitcoin's market price and stability. Time-series research helps forecast future Bitcoin price swings. The data set used was scraped using a python module known as yfinance which scraps cryptocurrency data from the yahoo finance website. We utilised FBProphet for time series analysis and machine learning. To test the model, we conducted back test predictions using the FBProphet algorithm. The findings of this project is that the accuracy of the price predictor is not fully accurate and should not be taken as financial advice but more of a guideline of roughly when to buy or sell cryptocurrencies. The significance of this project is to help cryptocurrency investors to manage their buying and selling price point of their cryptocurrency.


Keywords: Cryptocurrency, Price, Prediction, FBProphet

1 INTRODUCTION

Analysis of volatility and predictions in cryptocurrency prices divides the factors influencing cryptocurrency prices into domestic and external factors. Three external influences exist: Crypto market: popularity (attraction), market trend, speculations, macro financial: equity, exchange rates, gold price, interest rate, other policies; political: legalization (fitting), restrictions (ban), other markets, external markets; The main factors are: supply & demand, cost of transactions, compensation scheme, hash rate, circulation of coins and forks (rule changes). Crypto market-related variables like beta, trade volume and uncertainty, both short- and long running and the strong volatility of bitcoins, seem to be significantly determining in all five cryptocurrencies (Bitcoin, Ethereum, Dash, Litecoin and Monero). Cryptocurrency relies on the Blockchain automated bookkeeping framework. By implementing an access management mechanism, Blockchain systems provide ways of ensuring the privacy and protection of user data. A Blockchain is a decentralized connected data structure characterized

by its inherent data alteration resistance, but search query deficiencies are mostly due to the inferior data formatting. ChainSQL, the open-source Blockchain integration framework with the database, i.e., the Blockchain application platform, which has Blockchain's decentralized, distributed and audible functionality and fast query processing and a well-designed database data structure. The currency is based on a decentralized peer-to-peer network that creates currencies and management of transactions without a central authority. All Bitcoin transactions are posted in blocks to an open Blockchain directory, which is called Blockchain. In fact, the advent of cryptocurrency and actual trading is a time series issue. It differs from conventional financial markets because of its unique nature and high volatility, so it offers an important subject for price forecasting.

The price pattern of cryptocurrency has many causes and is difficult to understand. For potential investors and government agencies, it is necessary to establish a cryptocurrency price prediction mechanism.

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For this purpose, we have used Facebook Prophet to forecast the bitcoin prices in the market. The main goal of this research is to predict the future trend of Bitcoins.

2 LITERATURE REVIEW

Cryptocurrencies are a kind of electronic money. It is virtual money with no physical value. Unlike fiat cash, which is centralized, virtual currency users may access services without any third-party influence. However, the extreme price volatility of these cryptocurrencies has an influence on international relations and commerce. A few examples include Bitcoin, Ripple and Ethereum. Our research focuses on a prominent cryptocurrency, bitcoin. Among numerous virtual currencies, bitcoin is widely accepted by investors, academics, traders, and policymakers. This project's goal is to use efficient deep learning-based prediction models such as long short-term memory (LSTM) and gated recurrent unit (GRU) to manage bitcoin's volatility and achieve high accuracy. Our research compared these two-time series deep learning approaches and predicted the price of bitcoin. (Temesgen Awoke Muniye et al., 2020)

Bitcoins are the first cryptocurrency to attain major prominence. A machine learning-based time series analysis was used to anticipate Bitcoin's market price and stability. Time-series research helps forecast future Bitcoin price swings. The employed models were ARIMA, FBProphet, and XG Boosting for time series analysis. The parameters used to assess these models are RMSE, MAE, and R2. We tested all three approaches but found ARIMA to be the best model for predicting Bitcoin price in the crypto market with RMSE 322.4 and MAE 227.3. This study may also aid crypto-market investors (Iqbal et al., 2021).

With escalating geopolitical and economic difficulties, global currency values have fallen, stock markets have struggled, and investors have lost capital. This has rekindled interest in cryptocurrencies. Due to its consistent success over the past several years, cryptocurrency has become one of the most sought-after digital currencies among investors and businesses alike. Technical Trade Indicators (TTI) graphs depicting a real BTC value 5 to 10 times in 300-days of the current fiscal year have further supported this increasing trader confidence and shift in the global cryptocurrency graph by predicted BTC values. Using Machine Learning and

Sentiment Analysis, we are studying bitcoin prices. We also track stock market patterns to help anticipate bitcoin values. To determine if Bitcoin has the stability to dethrone global currencies and become the exclusive medium of exchange, we examined the influence of global currencies on Bitcoin prices. Predicting Bitcoin prices using a machine learning-based neural network achieved an accuracy of 94.89 percent in all scenarios of technical trade signal, bringing down its price forecast by over 13.7 percent in April 2020 during assessment (Salman & Ibrahim, 2020).

Bitcoin is now the world's top cryptocurrency. Cryptocurrency enables users to securely store and transfer digital cash over the internet. Since its inception, the Bitcoin network has facilitated services and goods transactions. Also, Bitcoin has become the leading decentralized cryptocurrency source. While much study has gone into Bitcoin network analysis, less has gone into Bitcoin price prediction. This study's goal is to forecast Bitcoin's price movements using the grey system theory. The first order grey model (GM (1,1)) is utilized. It models time series using a first order differential equation. With the right time period and management of investment assets, the GM (1,1) model reliably forecasts Bitcoin's price. (Jalali & Heidari, 2020)

The bitcoin market's predictability was examined from 1 to 60 minutes. While all machine learning models outperform a random classifier, recurrent neural networks and gradient boosting classifiers outperform a random classifier by a wide margin. We employ a mix of technical, blockchain, sentiment/interest, and asset-based features. Following technological aspects include blockchain-based features and sentiment/interest-based features. We also observe that broader prediction horizons boost predictability. Because of the short holding periods, a quantile-based long-short trading strategy yields monthly returns of up to 39% before transaction expenses. (Jaquart et al., 2021)

Historically, financial price bubbles have been connected to the epidemic spread of an investing notion. This article uses a hidden Markov model to anticipate cryptocurrency bubbles based on the behaviour of innovative online social media indicators. Based on previous data, a trading strategy is developed. This trading technique beats buy and hold. The research shows the efficacy of epidemic-recognizing hidden Markov models in detecting bubble-like activity in time series, as well as the value

of social media in predicting cryptocurrency price changes. (Phillips & Gorse, 2018)

This article by Derbentsev shows how to build a machine learning-based short-term cryptocurrency price forecasting model (Derbentsev et al., 2019). The modified Binary Auto Regressive Tree (BART) model is based on regular regression tree models and time series data. BART mixes classification and regression trees (C&RT) with ARIMA autoregressive models. The BART model was used to anticipate the three most valuable cryptocurrencies: Bitcoin, Ethereum, and Ripple. The suggested technique outperformed ARIMA-ARFIMA models in predicting cryptocurrency time series both in rising (falling) and transition dynamics (change of trend).

An analysis of the predictability of three main cryptocurrencies (bitcoin, Ethereum, and Litecoin) and the profitability of machine learning trading methods (e.g., linear models, random forests, and support vector machines). So even if the market direction changes between the validation and test periods, the models may be assessed for accuracy. Both approaches employ trade and network activity data from August 15, 2015, to March 3, 2019, with the test sample starting on April 13, 2018. During the test period, five out of 18 unique models failed. The trading strategies are model based. The Ensemble 5 (assuming five models provide identical signals) outperforms Ethereum and Litecoin, with annualized Sharpe ratios of 80.17 and 91.35 percent and annualized returns of 9.62 and 5.73 percent, respectively. Cryptocurrency findings support the premise that machine learning can be used to forecast the behaviour of cryptocurrencies and devise effective trading methods in these markets, especially in volatile markets (Sebastião & Godinho, 2021).

Cryptocurrencies are digital currencies that have gotten a lot of investor interest. This project's goal is to anticipate the daily price of Bitcoin, especially the daily high and low. This is important in trading choices. Various variables influence Bitcoin's price, making price prediction difficult and technically difficult. We used historical Bitcoin values to train time-delay neural networks (TDNN) and recurrent neural networks (RNN) for prediction. The opening, highest, lowest, and closing prices of a currency were used to anticipate the following day's high and low. We built predictive models using TDNNs and RNNs using the NeuroSolutions ANN development environment and evaluated them by computing MSE (mean square error), NMSE (normalised mean square

error), and r (Pearson's correlation coefficient) on a subset of each time series' training data held out for validation. (Gullapalli, 2018)

Cryptocurrencies are decentralized electronic money. The most famous cryptocurrency is bitcoin. Cryptocurrencies enable anonymous and secure online transactions. Cryptocurrency's decentralization has diminished central control, affecting international commerce and ties. The volatility of bitcoin values necessitates a precise model to forecast them. Cryptocurrency price prediction is a popular study topic. This research utilizes Bayesian regression, logistic regression, linear regression, support vector machines, artificial neural networks, deep learning, and reinforcement learning. Cryptocurrency has no seasonal impacts, making statistical forecasting difficult. Traditional statistical approaches need unrealistic statistical assumptions, leaving machine learning as the greatest technology in this sector, capable of forecasting pricing based on experience. This article summarizes prior research on bitcoin price forecasts from 2010 to 2020. This article's debate will assist researchers to fill in gaps in current research and acquiring future understanding (Khedr et al., 2021).

In conclusion, cryptocurrency prediction of previous works are usually comprising of static data. It can also be said that most projects regarding this topic mainly work on just Bitcoin which does not allow diversity of predicting other cryptocurrencies.

3 METHODOLOGY

This section shows the dataset and proposed machine learning algorithms in detail for time series analysis of cryptocurrency prices

A. Dataset

Cryptocurrency price data has been collected using a python module known as Yahoo Finance, an open-source website which contains 8 features. Below table shows the complete description of features of dataset:

Table 1: Dataset Description

Feature	Description	Unit
Date	The date at which each instance or entry has been collected from the	yyyy-mm-dd

	cryptocurrency market	
Open price	Open price for each day according to each date	USD
High price	Highest price on that day in which the data has been collected	USD
Low price	Lowest price on that day in which the data has been collected	USD
Close price	Final price of cryptocurrency on that day in which the data has been collected	USD
Volume	Turnovers in the price of cryptocurrencies	USD
Market Cap	the value of a cryptocurrency calculated by multiplying the total number of cryptocurrencies by the present cryptocurrency price.	USD

B. Pre-processing of Dataset

The removal of unwanted data from a dataset is called Pre-processing. For this project, I have chosen to only keep the Close price of the dataset. In doing so has allowed me to compare different cryptocurrencies as there is only 1 variable to compare across different cryptocurrencies. In this study, Bitcoin (BTC), Ethereum (ETH), Ripple (XRP), and Litecoin (LTC) will be compared.

C. Modelling

For the proposed model, FBProphet have been selected for Cryptocurrency Price Prediction. It is an algorithm using Forecasting time series data using an additive model where non-linear trends are fit with annual, weekly, and daily seasonality as well as holiday impacts. For the modelling phase, I will mainly focus on Bitcoin as it has the highest historical data and therefore has more data to train the model.

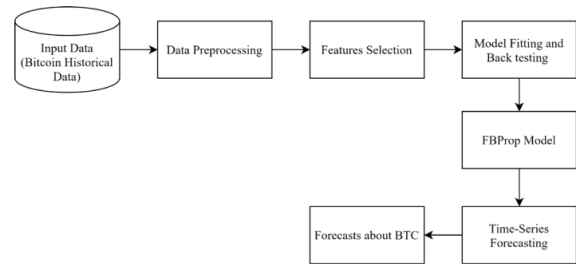


Figure 1: FBProphet model for Cryptocurrency

4 RESULTS AND DISCUSSION

To evaluate the accuracy of the FBProphet model, a back test of 1 year was tested on Bitcoin data for the past 4 years. This back test was roughly accurate as it predicted the price of BTC was roughly 60 thousand USD when at that time it was 48 thousand USD. The results are shown in Figure 2.

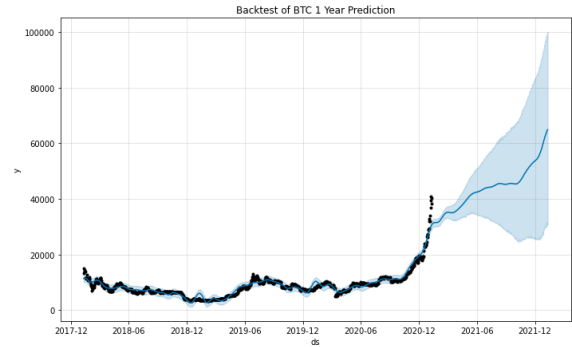


Figure 2: Back test of 1 year on BTC

Next, a research was conducted on how reliant other cryptocurrencies' prices are affected by Bitcoin's price movement. To address this concern, I used the r-squared of the OLS regression model. It showed that Ethereum was the least affected with a score of 0.666, Ripple had a score of 0.672, and Litecoin was the most affected with a score of 0.716.

For discussion, based on the results of the OLS regression model, it is shown that Ethereum's price movement is not as highly affected by Bitcoin's price movement as compared to Ripple and Litecoin. Overall, all three cryptocurrencies are quite highly affected by the price movement of Bitcoin as the average value of all three scores was 0.685. Based on this, investors who are interested in investing in other cryptocurrencies can predict the movement of their cryptocurrency based on the movement of Bitcoin. For example, if Bitcoin price drops, it is safe to assume that the other cryptocurrencies price will drop as well.

5 CONCLUSION

In conclusion, the dataset contains the date, open price, high price, low price, close price, volume, and market cap of cryptocurrencies. I have pre-processed the dataset to allow comparisons of various cryptocurrencies. Then the model FBProphet was used during the modelling phase. Lastly the evaluation of the model was conducted via a back test of bitcoin in the past year, and evaluated three cryptocurrencies dependency on the Bitcoin price movement, Ethereum being the most independent and Litecoin being the least independent among the three cryptocurrencies.

Limitations to this work include that newly emerging cryptocurrencies will not be able to use this project as it there is too little training data to work with. For example if a cryptocurrency was launched 3 months ago and that cryptocurrency only had a stable downtrend, the predictor will not be able to predict the price going upward even though logically it should be able to go back up one day.

For future works, this project can be improved by implementing Hyperparameter tuning of the parameters in the machine learning algorithms. It can also be improved by implementing various machine learning algorithms.

The significance of this work is that it will help many investors to prepare for the timing of when to buy or sell their cryptocurrencies.

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