(IJISE) 2022, Vol. No. 16, Jul-Dec **e-ISSN: 2454-6402, p-ISSN: 2454-812X**

# DEVELOPING A SMART CRYPTO-CURRENCY PRICE PREDICTION MODEL BY LEVERAGING THE MACHINE LEARNING TECHNIQUES

**Tejas Thakral**

*Vivekananda Institute of Professional Studies*
*Delhi*

## ABSTRACT

*The goal of the proposed research project is to forecast cryptocurrency prices. Cryptocurrencies are digital currency that can be used as long-term investments or for a variety of transactions. The majority of current systems focus just on the Bitcoin cryptocurrency. However, cryptocurrencies other than bitcoin are also widely used. With remarkable precision, the proposed algorithm would be able to forecast the prices of all the important cryptocurrencies. A multitude of factors will be considered in order to make a reliable price prediction. The relationship between the price of cryptocurrency and the US dollar will be the primary criterion. These days, trading cryptocurrency prices is one of the most sought-after forms of exchange. The recommended technique would be very beneficial for both regular traders and investors.*

*Facebook Prophet is the machine learning algorithm that will be used to predict these prices. Facebook Prophet predicts time series with notable speed and accuracy.*

## INTRODUCTION

A binary data collection primarily intended for monetary exchange is called cryptocurrency. Strong cryptography, which is also utilized for extra coin control of the production and coin ownership verification, is employed to secure the individual's coin ownership. It is a type of virtual currency that operates on the Blockchain technology. It uses decentralized control in contrast to a digital money issued by a central bank. Bitcoin was the original cryptocurrency that was made available in 2008. Since the introduction of bitcoin, other cryptocurrencies have been developed. A significant portion of the population has begun trading cryptocurrencies. Cryptocurrency trading has grown in popularity recently, much like stock market trading. Both short-term and long-term investors have begun to make significant financial commitments to cryptocurrency trading. An accurate prediction regarding these coins would be extremely beneficial to investors. Several factors need to be considered in order to anticipate these prices with high accuracy. The field that is utilized to forecast these prices is called machine learning. Facebook Prophet is the machine learning algorithm that made these forecasts. The creator of this algorithm is Facebook. Because

it requires a lot of time-series data to anticipate bitcoin prices effectively, the Facebook prophet algorithm is capable of processing enormous amounts of time-series data quickly and precisely.

## SURVEY OF LITERATURE

Many scholars are interested in developing a way to predict these prices because of the growing popularity of cryptocurrencies. [1] In his work "Bitcoin Price prediction in time of COVID-19," Jiayang Luo claimed that all the characteristics of four distinct machine learning models are contrasted using data from Twitter, COVID-19, and Bitcoin exchange. The performance of each model that aids in the prediction and rate of Bitcoin is what matters most in this case. These are divided into four major categories: historical bitcoin exchange data, historical bitcoin exchange data based on COVID-19 data (including death rate and afflicted population), and historical bitcoin exchange data mostly sourced from Twitter. The four machine learning models that are employed in order of improving prediction quality are Random Forest, AdaBoost, Decision Tree, and Support Vector Machine. Utilizing Twitter data sources can enhance the system's prediction and performance as a whole. Though there isn't much COVID-19 data, more research with a larger data set could improve the forecast. [2] Karunya Rathan, Venkat Somrouthu, and Sai Manikantha According to "Crypto-Currency price prediction using Decision Tree and Regression Techniques," investors are fond of cryptocurrencies like Ethereum and Bitcoin. The prognosis for Bitcoin and several other cryptocurrencies is explained in this suggested study based on a number of variables that could impact these coins' pricing.

This can be useful for tracking developments as well as for comprehending and forecasting these currencies. This dataset facilitates comprehension of the operation of the system and transaction method. This dataset contains information about Bitcoin's opening, closing, highest, and lowest prices. These datasets and machine learning modules are used to estimate the price. For the accuracy test, the prediction is here contrasted with the regression model and decision tree.

Rifat Haciano\LU, Zehra SARAÇ, Ayat ALTAN, and Serkin KARASU Support Vector Machines (SVM) and Linear Regression (LR) machines are used for Bitcoin prediction, according to "Prediction of Bitcoin Prices with Machine Learning Methods using Time Series Data." learning modules created from a compilation of Bitcoin closing prices between 2012 and 2018. In this case, filters with various weight coefficients are applied for all window lengths. This system's cross-fold validation contributes to the development of a higher prediction rate for the high-performance system. Because the parameters from the SVM were combined using linear and polynomial kernel functions, the model had the lowest error rate. Indicators like Mean Absolute Error (MAE), Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and Pearson Correlation are used to gauge the model's performance in this case. Compared to the LR model, the SVM model performs at a higher performance rate. [4] In a paper titled "Bitcoin Price Prediction using Machine

Learning," authors Siddhi Velankar, Sakshi Velankar, and Shreya Maji stated that we want to exactly predict the price of Bitcoin by utilizing a variety of parameters that affect the coin's value. It involves a few procedures that aid in obtaining the necessary prediction. Investigating the system is necessary for the first phase. It entails figuring out the patterns that surround and influence the currency's price. The cost of the coin and the network payment where the currency is accepted are included in the basic document file. A prediction with the highest degree of accuracy comes next. [5] According to Theresa Phaladisailoed's "Machine Learning Models Comparison for Bitcoin Price Prediction," bitcoin is the cryptocurrency with the highest demand on exchanges. These coins' pricing are highly erratic, which makes them unreliable investments. The system is employed in a plan to make the most accurate predictions. The technology uses a machine learning algorithm to make predictions. It traded data at one-minute intervals using this strategy. It is a compilation of information every minute. Large data sets that can guarantee an accurate prediction rate are aided by this.

By using regression models from SCIKITLEARN and KERAS LIBRARIES, the exchange rate data from January 2012 to mid-January was obtained from the Bit Stamp forum. These modules provide a prediction-capable Python interface for artificial neural networks. [6]

In their paper "Price prediction of bitcoin," Grace L.K., Asha P., D. Usha Nandini, and G. Kalaiarasi reported that support vector machine algorithms—which provide far higher accuracy than earlier algorithms—are being used to boost the prediction of bitcoin. [7] Sudhir N. Dhage, Prachi Vivek Rane According to "Systematic erudition of bitcoin price prediction using machine learning techniques," comparative research is conducted on different machine learning algorithms to determine which is better because the previous work has some significant mistakes. [8] In their paper "Performance evaluation of machine learning algorithms for bitcoin price prediction," Kavitha H., Uttam Kumar Sinha, and Surabhi S. Jain explained that three distinct algorithms are used for prediction: linear regression, long short-term memory, and recurrent neural networks. There are two algorithms that are the best out of the three. [9] In their paper "Sentiment-driven price prediction of bitcoin based on statistical and deep learning approaches," Giulia Serfani, Qingquan Zhang, Macro Brambilla, Jiayue Wang, and Yiwei Hu examined the sentiment and financial aspects using two models: RNN and ARIMAX. [10] Simon Caton, Jason Roche, and Sean McNally According to the article "Predicting the price of bitcoin using machine learning," the objective is to ascertain the direction of price accuracy and to do so by utilizing recurrent neural network algorithms and lengthy short-term memory. [11] According to Leonardo Felizardo, Roberth Oliveira, Emilio del Moral Hernandez, and Fabio Cozman, more algorithms have been created as computer power has increased. It contrasts various algorithms for projecting bitcoin's future pricing.

(IJISE) 2022, Vol. No. 16, Jul-Dec **e-ISSN: 2454-6402, p-ISSN: 2454-812X**

## DESIGN OF THE SYSTEM

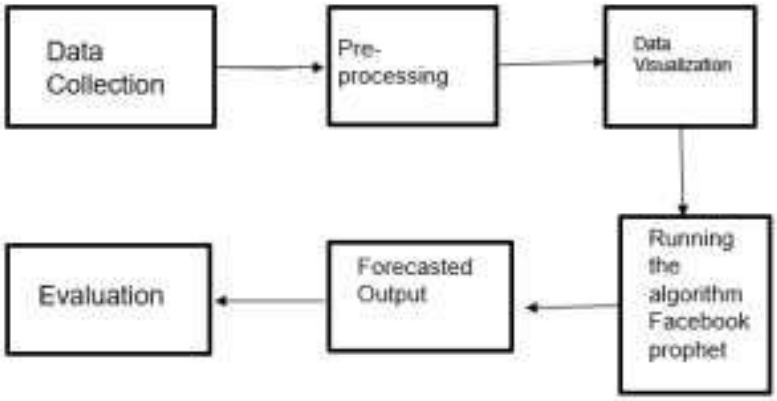


Fig 1: System Architecture

The process of gathering datasets is the first step in the system architecture. The time series dataset is gathered since time series are involved in bitcoin values. The dataset was obtained from the Yahoo Finance website, which provides historical cryptocurrency price data. Data from the past five years is gathered. Next, such values are also gathered because the market value of US dollars has a significant influence on cryptocurrency prices. For the execution, Google Collaboratory is utilized.

Using the panda function, the gathered datasets are published to Google Collab. Pre-processing is then carried out to determine how the value of the US dollar affects cryptocurrency values. As a result, it has been seen that the value of cryptocurrencies rises in tandem with drops in the value of the US dollar.

Data visualization is then completed to demonstrate how the value of the US dollar affects cryptocurrencies. Using the "Facebook Prophet" machine learning algorithm is the next stage. Ultimately, we obtain the anticipated results for the costs.

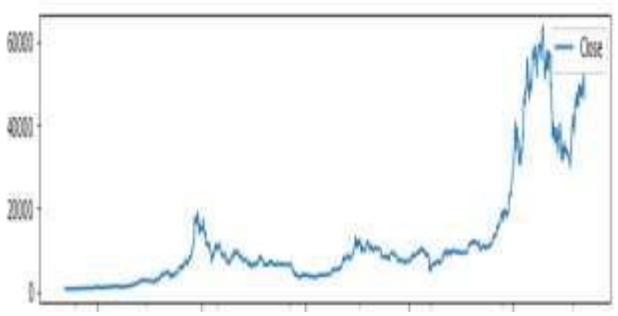


Fig. 2: Data on cryptocurrency prices

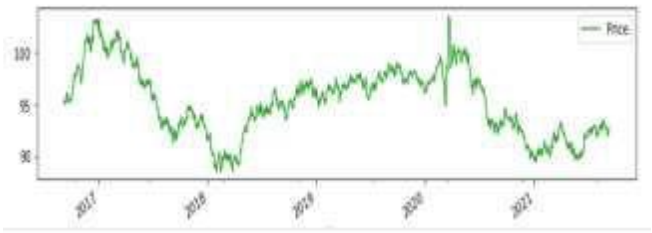


Fig 3: Value price data in US dollars

The relationship between the price range of cryptocurrencies and US dollars is seen in the above figures (2&3). The accompanying graphs show that the value of cryptocurrencies rises in tandem with a decline in the US dollar's value. This is a result of cryptocurrencies' decentralized structure.

## INNOVATION

The sole focus of the currently in use system is the bitcoin cryptocurrency. Since bitcoin was the first cryptocurrency to gain traction, the majority of mechanisms in place are only focused on it.

However, cryptocurrencies other than bitcoin are widely available. Ethereum, Doge, Litecoin, Binance Coin, and other well-known cryptocurrencies are also in demand. Thus, the only system that will be really helpful would be one that can forecast the values of every major cryptocurrency. The prices of all the major cryptocurrencies that are now in circulation can be predicted using the proposed approach.

The cryptocurrency dataset nature is shown in picture (4) below. Date, open value, high value, low value to close value, adjacent close value, and total amount of cryptocurrency in circulation are some of the dataset's variable factors. The closure value at the end of the day when the cryptocurrency market closes and the total amount of cryptocurrencies in circulation will be the primary factors considered.

| Date | Open | High | Low | Close | Adj Close | Volume |
|---|---|---|---|---|---|---|
| 2016-09-08 | 614.635010 | 628.770020 | 613.843994 | 626.315979 | 626.315979 | 8.671300e+07 |
| 2016-09-09 | 626.351990 | 626.630017 | 620.263000 | 622.861023 | 622.861023 | 6.455020e+07 |
| 2016-09-10 | 622.927002 | 625.094971 | 622.395020 | 623.508972 | 623.508972 | 4.501680e+07 |
| 2016-09-11 | 623.424011 | 628.817993 | 600.505981 | 606.718994 | 606.718994 | 7.361080e+07 |
| 2016-09-12 | 607.005005 | 608.458984 | 605.411011 | 608.242981 | 608.242981 | 7.281230e+07 |
| ... | ... | ... | ... | ... | ... | ... |
| 2021-09-04 | 50009.324219 | 50545.582031 | 49548.781250 | 49944.625000 | 49944.625000 | 3.747133e+10 |
| 2021-09-05 | 49837.859375 | 51868.679688 | 49638.597656 | 51753.410156 | 51753.410156 | 3.032265e+10 |
| 2021-09-06 | 51768.003906 | 52700.941406 | 51063.679688 | 52633.535156 | 52633.535156 | 3.888411e+10 |
| 2021-09-07 | 52660.480469 | 52853.765625 | 43285.207031 | 46811.128906 | 46811.128906 | 6.521005e+10 |
| 2021-09-08 | 46799.257813 | 47292.269531 | 44561.394531 | 46196.464844 | 46196.464844 | 6.592235e+10 |

Fig 4: Dataset for Bitcoin

Next, a sizable time-series dataset is gathered in order to achieve excellent accuracy. Data from time series covering the previous five years is gathered. These massive time-series data sets should be processed by a machine learning method that is quick and accurate. The primary purpose of the Facebook Prophet algorithm is to handle massive time-series data sets. Facebook Prophet will enable quick and precise prediction-making.

Secondly, in order to achieve high accuracy, a sizable time-series dataset covering the previous five years is gathered. Processing these large time-series data requires a machine learning algorithm that is both precise and quick. The Facebook Prophet algorithm is specifically designed to process large time-series data, so using Facebook Prophet will result in a prediction that is both precise and quick.

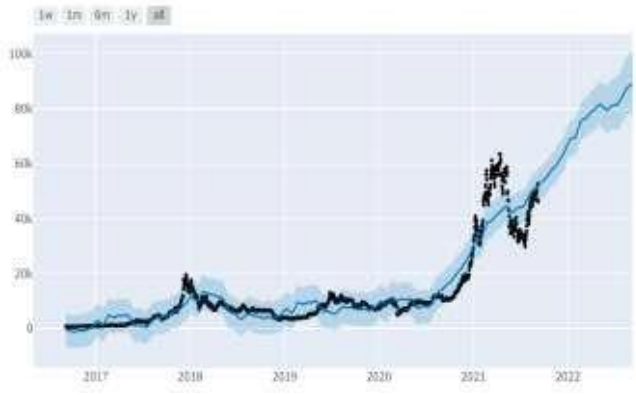


Fig 5: Bitcoin Price prediction

The prediction for the cryptocurrency bitcoin is made using the Facebook Prophet algorithm, utilizing datasets for the previous five years to forecast the future price of that asset. An additional benefit of using the Facebook prophet algorithm is that it can provide predictions for daily, monthly, and annual time periods. As previously mentioned, the Price Range Year proposed system will be able to predict the prices of all the major cryptocurrencies. Based on the above prediction, it is evident that the price range for bitcoin is expected to increase in the coming year. At the moment, the price range is approximately 40K US dollars, and it is anticipated to rise more than that in the coming year.

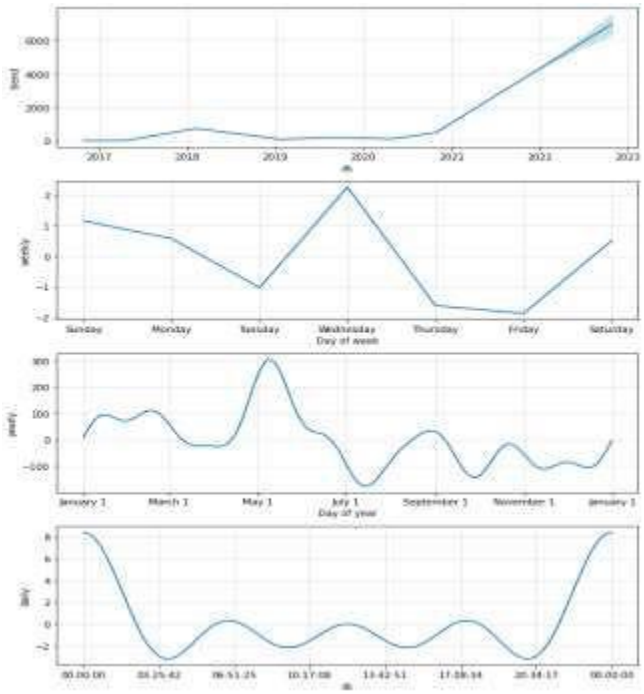

Fig. 6: Time range for prediction

The time range forecast provided by the Facebook prophet algorithm is shown in figure (6) above. By the above figure, it can be seen that the forecast is done for weekly, yearly and monthly time period.

## CONCLUSION

The demand for cryptocurrency trading is steadily increasing. A lot of people have started investing in cryptocurrencies. Nevertheless, there is currently no accepted method to advise investors on where and when to place their money. When it comes to investing in cryptocurrencies, the suggested system will be able to assist traders and investors. The majority of current methods

focus just on bitcoin, but investors cannot benefit from a single cryptocurrency prediction. Given the abundance of cryptocurrencies in the globe, the suggested system will have the capacity to forecast the values of any significant cryptocurrency. Using Facebook Prophet, which is only intended to be used for time series data prediction, The system will operate quickly and forecast with remarkable precision. This suggested system's future scope includes the highly accurate forecast of every cryptocurrency that is currently in circulation.

## REFERENCES

[1] Jiayun Lao, "Bitcoin Price Prediction In a time of covid 19", 2020 Management Science Informatization and Economic Innovation Development Conference.

[2] Karunya Rathan, Samorouthu Venkat Sai, Tubat i Sai, "Cryptocurrency Price Prediction using decision tree and regression techniques", Proceedings of the Third International Conference on Trends in Electronics and Informatics.

[3] Seçkin KARASU, Aytaç ALT AN, Zehra SARAÇ, Rıfat HACIOĞLU, "Prediction of Bitcoin Prices with Machine Learning Methods using Time Series Data".

[4] Siddhi Velankar, Sakshi Valecha, Shreya Maji, "Bitcoin Price Predict ion using Machine Learning", International Conference on communication technology.

[5] Thearasak Phaladis, Thanisa Numnonda, "Machine Learning Models Comparison for Bitcoin Price Prediction".

[6] Grace L.K, Asha P, D. Usha Nandini, G. Kalaiarasi , "Price predict ion of bitcoin".

[7] Prachi Vivek Rane, Sudhir N.Dhage, "Systematic erudition of bitcoin price predict ion using machine learning techniques".

[8] Kavitha H, Ut tam Kumar Sinha, Surbhi, "Performance evaluation of machine learning algorithms for bitcoin price prediction".

[9] Giulia serfani, Qingquan zhang, Macro Brambilla, Jiayue wang, Yiwei hu, "Sentiment-driven price prediction of the bitcoin based on statistical and deep learning approaches".

[10] Sean McNally, Jason Roche, Simon Caton, "Predicting the price of bitcoin using machine learning".

[11] Leonardo Felizardo, Roberth Oliveira, Emilio del-moral Hernandez, Fabio cozman, "Comparative study of bitcoin price predict ion using Wavenets, Recurrent neural networks and other machine learning methods".

[12] Sakshi Tandon, Shreya Tripathi, Pragya Saraswat , Chetna Dabas, "Bitcoin price forecasting using LST M and 10-fold cross validation".

[13] Shaomi Rahman, Jonayed nafis Hemel, Syed junayed Ahmed anta, Hossain Al muhee, Jia Uddin, "Sentiment analysis using R: An approach to correlate cryptocurrency price fluctuations with change in user sentiment using machine learning".

[14] Guangcheng li, Qinglin Zhao, Mengfei song, Daidong du, Jianwen yuan, Xuanhui Chen, Hong liang, "Predicting global computing power of blockchain using cryptocurrency prices".

[15] S.Yogeshwaran, Maninder jeet Kaur, Piyush Maheshwari, "Project based learning: Predicting bitcoin prices using deep learning".

[16] Chen, Joy Iong Zong, and P. Hengjinda, "Early Prediction of Coronary Artery Disease (CAD) by Machine Learning Method-A Comparative Study".

[17] Vijayakumar, T, "Posed Inverse Problem Rectification Using Novel Deep Convolutional Neural Network"