Mapana - Journal of Sciences
2023, Vol. 22, Special Issue 2, 257-266
ISSN 0975-3303 | https://doi.org/10.12723/mjs.sp2.14

A Forecasting Model of Predicting Cryptocurrency Price

H. Vignesh Ramamoorthy*, Spelmen Vimalraj Santhanam*, V Vibithra priya* & R G Harshini*

Abstract

Nowadays the quest for electronic payments has created a huge ambit among academicians and businesspeople. At the same time, transactions are repressed because of the intervention of third parties. To overcome this situation, the great as well as the puzzling imposter arose which is now the area of interest called cryptocurrency. Bitcoins, Ethereum, and ripple are some embodiments of cryptocurrency. Investors do not always have a bed of roses with cryptocurrency as the frequent oscillation of prices is hard to forecast. The paper here deals with the forecasting of cryptocurrency prices by using data mining algorithms such as Bagging, K-NN, Linear Regression, and Support Vector Machine. The outcome specifies the accuracy value gained from the cryptocurrency forecasting model from which we can predict the price of the cryptocurrency.

Keywords: Cryptocurrency, Bitcoin, forecasting, bagging, linear regression, SVM

1. Introduction

From the time of human trade existence, cashless societies were extant in the form of a barter system. And now it is modernized as cashless transactions such as credit cards, debit cards, phone-pay, g-

* Sri Krishna Arts & Science College, Coimbatore, Tamil Nadu, India; Email: hvigneshram@gmail.com; spelmen@gmail.com; vibithrapriya1405@gmail.com; harshinigopinath26@gmail.com

pay, and digital currency like Bitcoin. Except for the concept of cryptocurrency, all the other forms of cashless payments involve third parties. The main pros of the cryptocurrency system are the negligence of third parties and the only involvement of peer-peer networks.

Generally, in a cash-free community, finance does not include physical notes or coins, but the electronic representation of money that is highly encrypted with the concept of cryptography. Modern civilization locomotes towards the digital equivalence in all the corrals. When considering the financial sectors they infuse e-payment technology everywhere in which legal tender occurs and is recorded. To develop a clearance and far knowledge we initially heed its term.[1]. Bitcoin is a cryptographic money that is utilized worldwide for advanced installments or basically for speculation purposes. This made the researchers incubate several techniques to predict Bitcoin prices such as Support Vector Machines, Multilayer Perceptron,RNN, etc [2].

On the contrary, some countries set certain parameters for the e-transactions and their values for which the payment is officially authorized. India is one of the Asian countries that does not legalize cryptocurrency transactions. But investments can be made all over the world.Cryptocurrency is a revolutionary technology that could disrupt societal structures due to the anonymous nature of its transactions.

Unlike the market stock, they do not hang on to any business sectors or interfere with the government. The appraisal of the bitcoin fluctuates more than the stock price. So, for the venture capitalist, it will be a jump through hoops to know the appropriate time to trade it to get maximum yield. To estimate the value of bitcoin, the utilization of technology is needed.

Data mining is one such non- trivial process of finding hidden patterns and making a knowledgeable one from large voluminous complex data. Many datamining techniques are applied in multiple areas of the country to predict and frame the accuracy and attain efficiency.

The main objective is to eliminate the large time consumption through the typical manual process. Hence, in our study we

monitored every transaction happening through the digital form(cryptocurrency)and used data mining techniques to discover the finest price to get the maximum profit that may aid the beneficiaries in forecasting the price of cryptocurrency (Bitcoin).

2. Background Work

The receivable open slant information,especially from interpersonal organizations could be from the scalable focus over cryptocurrency. [7]. Fatah et al took the data from coinmarketcap.com andhe has pre-processed the data using normalization techniques. Once the data is clean, he processed them using k-NN, decision tree, and neural networks and found the accuracy via Mae and RMSE.

3. Methodology

A. Cryptocurrency Forecasting Model

i. Linear Regression

The simple statistical method of regression demonstrating the linear relationship between the independent variable (consider the x-axis) and the dependent variable(y-axis) is called linear regression. Based on the input variables, they are of two kindsknown as simple linear regression and multiple linear regression respectively. In this paper, the relationship between the variables is found using the linear regression model.

ii. Support Vector Machine

The supervised machine learning algorithm that is operatedfor the motive of classification andregression is called the support vector machine. A line is formed between two classes which manifests that all points in asimilar category possess a similar group. The objective of this linear classifier is to frame a hyperplane whose subspace is one less than itsenveloping area. The reason behind the implementation of this algorithm in our paper is they provide comparatively greater accuracy and analysis afterappropriate labeling.

iii. Bagging

An accumulated machine learning meta-algorithm that depicts revamping the stability and accuracy of the classification and regression models. This bootstrapping aggregation vends the bias-variance trade-offs and they shrank the imbalance of the prediction models. The basis behind this algorithm'simplementation is they neglect the extra addition of data while predicting the models.

iv. K-NN

The k-Nearest Neighbour is a multivariate disposition supervised learning classifier algorithm whichuses propinquity for classification or regression. The legitimatemechanism of steering the multi- class cases can make them enact well for sufficient data. The direct measure of calculation saves each new case.[4].

B. Block Diagram

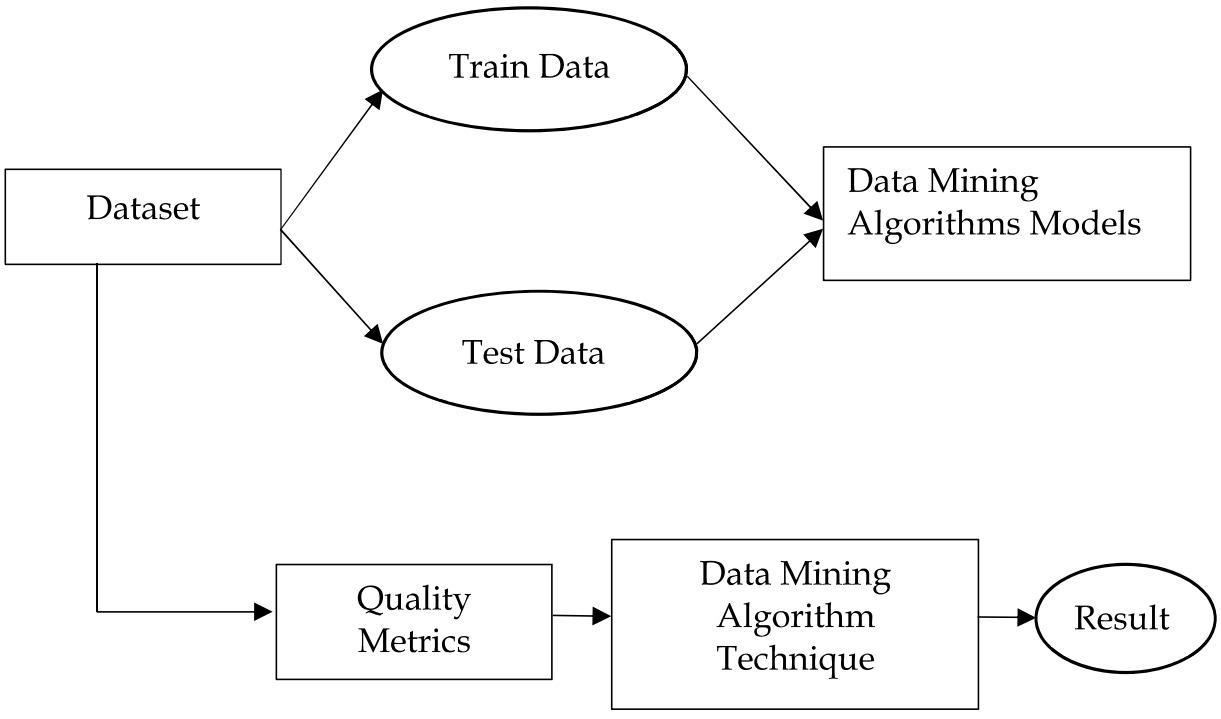

Figure 1: Block diagram of the model

C. Evaluation Metrics

Evaluation of the accuracy valuein this study is not only seen from the amount of accuracy obtained from a method but also seen from the value ofMean Absolute Error (MAE) and RootMean Squared Error (RMSE) generated by each method. In the prediction model, accuracy is said to be best if the value of MAE and RMSEis 0. [3]. For a better analysis of the model, certain evaluation metrics are followed:

Regression

Here, the data that are not implemented during amodel furnishing are considered for thedetermination of predicting the accuracy. In a regression model, certain scale- dependent errors are widelyused. They are as follows: -

Mean Absolute Error (MAE)

The average of the actual and predicted values [24] is the mean absolute-error and it is represented as:

$$\text{Mean absolute error} = \frac{\sum_{i=1}^{d} |y_i - y_i'|}{d}$$

Mean Squared Error (MSE)

The average is calculated from the difference between the actualand predicted values.

The mathematical expression is as follows:

$$\text{Mean Squared Error} = \frac{\sum_{i=1}^{d} (y_i - y_i')^2|}{d}$$

Root Mean Squared Error (RMSE)

The square root of themean squared error gives the RMSE value

$$\text{Root Mean Squared Error} = \sqrt[2]{\frac{\sum_{i=1}^{d} (y_i - y_i')^2}{d}}$$

Where:

y_i = actual value

y_i^I = predicted value

Classification

The metrics used for classification models are **Precision, Recall, Accuracy**

Precision

Precision can be evaluated bytaking the true positive and dividing them with the average of the true positive and false positive

$$\text{Precision} = \frac{TP}{TP+FP}$$

Recall

The recall is the true positive divided by the average of the true positive and the false negative

$$\text{Recall} = \frac{TP}{TP+FN}$$

Accuracy

Accuracy is the sum of the true positive and true negative divided by the average of true and false positive and true and false negative.[5].

$$\text{Accuracy} = \frac{TP+TN}{TP+TN+FP+FN}$$

4. Experiments

A. Data Set

The value of the closing price is clutched from the historical dataset from a website called Kaggle.com. The target variable in the study is the price of Bitcoin in USD.[2]. The dataset consists of attributes of a bitcoin (BTC-USD). BTC is an authorized mark for a bitcoin used in the US Dollar Exchange Rate. This base cryptocurrency is applied because it is deeply volatile. Table 1

has the attributes of the dataset that consist ofdate, open, high, low, and close.and Pandaswere imported for undergoing statistical operations.

5. Results & Discussion

A. The Result Acquired by Classification

Attribute	**Description**
Date	Transaction date
Open	Specified time's beginning price
High	Maximum opening price
Low	Minimum opening price
Close	Specified time's final price

Table1: The Dataset for Cryptocurrency

MODEL	ACCURACY	PRECISION	RECALL
SVM	94.97%	0.898	0.871

Table 2: Classification Evaluation Parameters

B. Data Processing

Since the data is clean, we have directly proceeded to data processing by implementing the data mining technique of prediction such as k- Nearest Neighbour, Support Vector Machine, Bagging, and Linear Regression for the cryptocurrency dataset. An Accuracy value can be obtained from each of these algorithms and the prediction will be further made based on the method that produces the correct Accuracy value

C. Experimental Environment

We have used an apt python environment called "jupyter notebook". And libraries like NumPy

Table 2 represents the result acquired during classification. The outcome was acquired when the model was subjected to precision, recall, andaccuracy based on true positives and false positives as well as true and falsenegatives. The result acquired by regression The refined dataset is a USD Bitcoin dataset and is treated with various data mining algorithms such as K-NN, bagging, and Linear Regression. The cross-validation with 8-fold is kept simultaneously. to linear regression and the least accuracy was scored by K-NN. **Table** 3 clearly shows the evaluation parameters acquired through variousalgorithms.

Cryptocurrency Type	LR			Bagging			KNN		
	MAE	MSE	RMSE	MAE	MSE	RMSE	MAE	MSE	RMSE
(BTC-USD) Bitcoin	0.0048	0.0793	0.0063	0.0052	0.2685	0.0721	0.1692	0.6413	0.4113

Table 3: Regression Evaluation Metrics

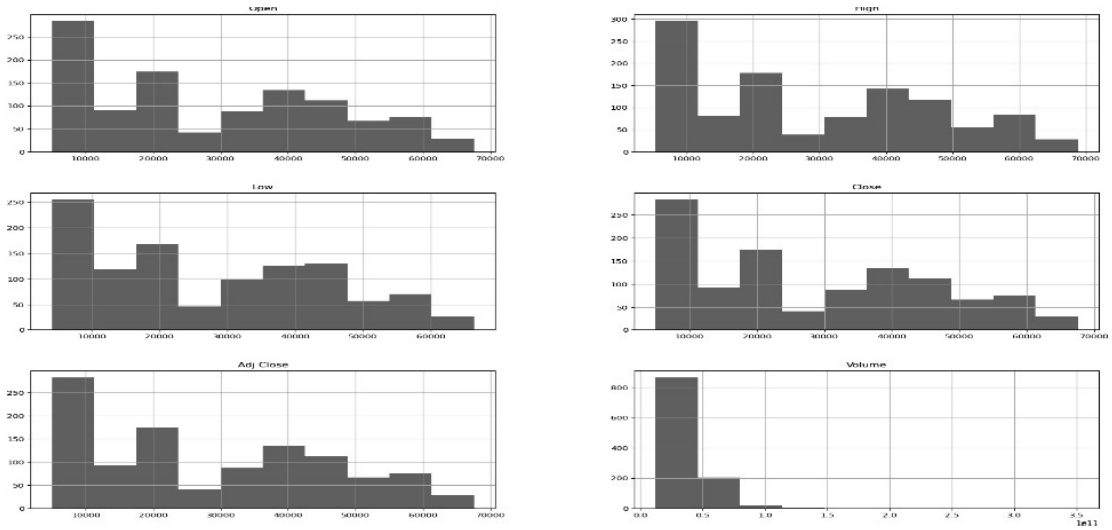

Figure 2: A Boxplot for cryptocurrency data attributes

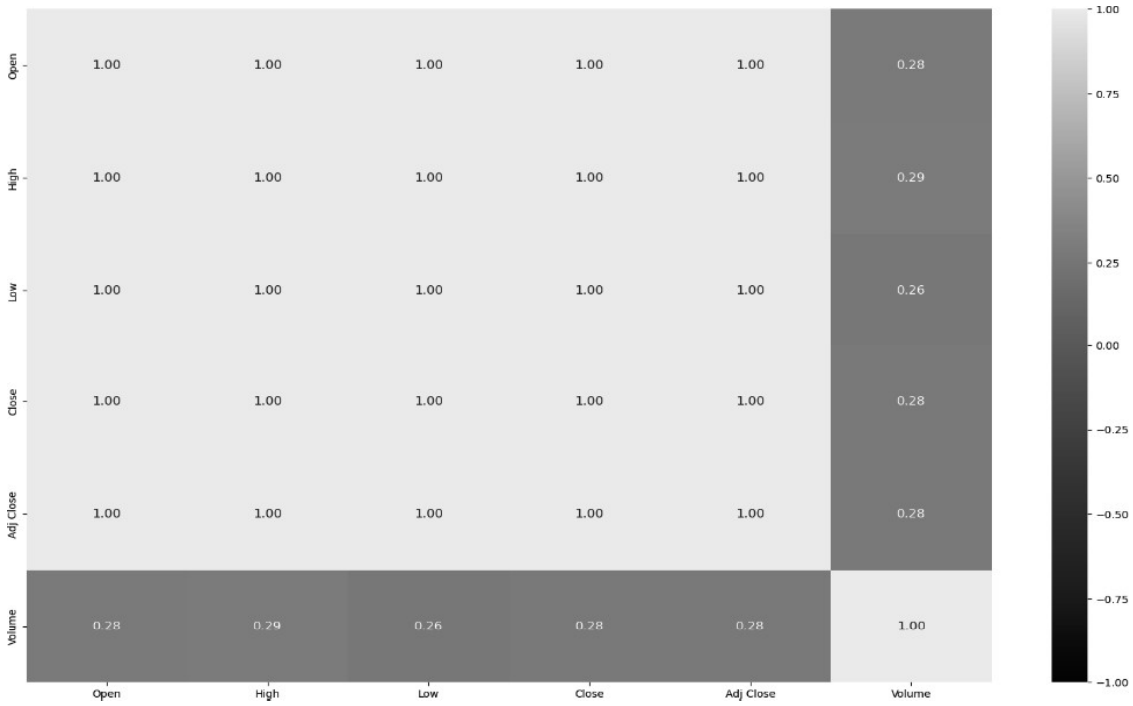

Figure 3: Heatmap for cryptocurrency dataset

6. CONCLUSION

Cryptocurrency could be a network- based medium of exchange within the style of digital assets and currencies that uses cryptographic functions to conduct financial transactions. There, are multiple forms of cryptocurrency. the most common is Bitcoin. The black-and-white nature of their prices is a hard row to hoe for investors. To obtain the maximum profit, the prediction of these embodiments can be actioned. The research thrives by providing the imperative information with the best accuracy of cryptocurrency price prediction by refining them using the data mining algorithm of LINEAR REGRESSION and the study shows that SUPPORT VECTOR MACHINE has got 94.97% accuracy. For future betterment in our research in forecasting the cryptocurrency price the incorporation of several datasets and validation techniques that have not been used in this study may be implemented.

REFERENCES

[1]. Mrs. Vaidehi M et al, Bitcoin price prediction using machine learning, international journal of engineering technologies and management research, 8[5],20-28, May 2021.

[2]. Junwei Chen, Analysis of bitcoin price prediction using machine learning, Journal of risk and financial management, 16:51, 2023.

[3]. Haerul Fatah et al Data mining for cryptocurrencies price prediction 2020 J. Phys.: Conf. Ser. 1641 012059

[4]. Lekkala Sreekanth Reddy, Dr.P. Sriramya A Research On Bitcoin Price Prediction Using Machine Learning Algorithms INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 9, ISSUE 04, APRIL 2020

[5]. Samiksha Marne et al, Predicting the price of cryptocurrency-A deep learning approach, International journal of engineering research & technology, 2278- 0181, Special issue-2021.

[6]. Shaimaa Alghamdi et al, Cryptocurrency Price Prediction using Forecasting and Sentiment Analysis, International Journal of Advanced Computer Science and Applications, Vol. 13, No. 10, 2022.

[7]. SHILPA NAIR Cryptocurrencies Price Movement Prediction Using Machine Learning February – 2021, International Journal of Innovative Science and Research Technology Volume 6, Issue 2, February – 2021