

Time-Series Prediction of Cryptocurrency Market using Machine Learning Techniques

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Abstract

In the market of cryptocurrency the Bitcoins are the first currency which has gain the significant importance. To predict the market price and stability of Bitcoin in Crypto-market, a machine learning based time series analysis has been applied. Time-series analysis can predict the future ups and downs in the price of Bitcoin. For this purpose we have used ARIMA, FBProphet, XG Boosting for time series analysis as a machine learning techniques. The parameters on the basis of which we have evaluated these models are Root Mean Square Error (RMSE), Mean Absolute Error (MAE) and R². We conduct experiments on these three techniques but after conducting time series analysis, ARIMA considered as the best model for forecasting Bitcoin price in the crypto-market with RMSE score of 322.4 and MAE score of 227.3. Additionally, this research can be helpful for investors of crypto-market.

Keywords: data mining, visualization, machine learning, Emerging Nature Inspired Computing.

Received on 27 June 2021, accepted on 06 July 2021, published on 07 July 2021

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doi: 10.4108/_____

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1. Introduction

With regard to the analysis of volatility and predictions in cryptocurrency prices [1] divides the factors influencing cryptocurrency prices into domestic and external factors [2]–[4]. 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) [5], [6]. 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) [7].

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 [8], [9]. 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 [10]–[12]. In [13] author shown ChainSQL, the open-source Blockchain integration framework with the database, i.e. the Blockchain application platform, which has Block chain's decentralized, distributed and audible functionality and fast query processing and a well-designed database data structure [14], [15]. The currency is based on a decentralized peer-to-peer network that creates currencies and management of transactions without central authority [16], [17]. All Bitcoin transactions are posted in blocks to an open Blockchain directory, which is called Blockchain [18], [19]. This authentication is carried out in a non-trust

XGBoost	R ²	435.4
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D) Comparative Analysis

All of the three models has been compared on the basis of their RMSE, MAE and R-square. Figure 10 shows the comparative analysis graph of these three models for time series forecasting.

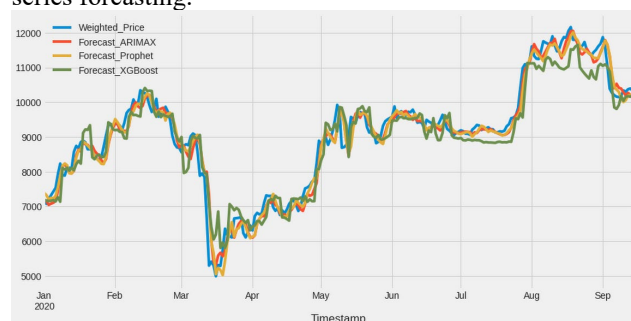


Figure 10. Comparative Analysis of ARIMAX, FBProp and XGBoost

Table 5 shows the comparative performance according to RMSE, MAE and R square for each model of regression.

Table 6. Comparative Performance of Each Model

Model	Parameter	Score
ARIMAX	RMSE	322.4
ARIMAX	MAE	227.3
ARIMAX	R ²	189.6
FBProp	RMSE	229.5
FBProp	MAE	323.00
FBProp	R ²	205.4
XGBoost	RMSE	369
XGBoost	MAE	470.00
XGBoost	R ²	435.4

5. Conclusion

Our dataset contains the timestamps of yearly, monthly daily close, open, high, low and weighted price of bitcoins. We have pre-processed that data according to our requirement of normalization. Then we have applied three machine learning algorithm for time series forecasting of the bitcoin prices in the cryptocurrency market. We found that ARIMAX is the best algorithm to forecast the change in the bitcoin price in the market with RMSE of 322.4. While FBProp and XGBoost algorithms have gained the RMSE score of 229.5 and 369 respectively which is far less than ARIMAX algorithm. This study can further be improved by Hypertuning the

parameters of time-series analysis algorithms in order to improve RMSE value.

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