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A Review Paper on Bitcoin Price Prediction using Machine Learning Techniques

[1]Divya, [2]Dr. Monika Bhatnagar

[1]M.Tech. Scholar, Department of Computer science and Engineering
Oriental institute of science and technology, Bhopal
[2]Associate Professor, Department of Computer science and Engineering
Oriental institute of science and technology, Bhopal

Abstract

Bitcoin uses a peer-to-peer technology to operate with no central authority or banks. Bitcoin is open-source; its design is public, nobody owns or controls Bitcoin and everyone can take part. It is a crypto currency, so-called because it uses cryptography to control the creation and transfer of money. Users send payments by broadcasting digitally signed messages to the network. Participants known as miners verify and timestamp transactions into a shared public database called the block chain, for which they are rewarded with transaction fees and newly minted bit coins. The Bit coins value varies just like any other stock . There are many algorithms used on stock market data for price forecast. However, the parameters affecting Bit coin are different. Therefore it is necessary to foretelling the value of Bitcoin so that correct investment decisions can be made. The price of Bitcoin does not depend on the business events or intervening government authorities, unlike the stock market. Thus, to forecast the value it is proposed to leverage machine learning technology to predict the price of Bitcoin.

Keywords: Bitcoin, price prediction, forecasting, crypto currency, data mining.

I. INTRODUCTION

Time series prediction is not a new phenomenon. Prediction of mature financial markets such as the stock market has been researched at length [1][2]. Bitcoin presents an interesting parallel to this as it is a time series prediction problem in a market still in its transient stage. As a result, there is high volatility in the market [3] and this provides an opportunity in terms of prediction. In addition, Bitcoin is the leading cryptocurrency in the world with adoption growing consistently over time. Due to the open nature of Bitcoin it also poses another paradigm as opposed to traditional financial markets. It operates on a decentralised, peer-to-peer and trustless system in which all transactions are posted to an open ledger called the Blockchain. This type of transparency is unheard of in other financial markets.

Traditional time series prediction methods such as Holt-Winters exponential smoothing models rely on linear assumptions and require data that can be broken down into trend, seasonal and noise to be effective [4]. This type of methodology is more suitable for a task such as forecasting sales where seasonal effects are present. Due to the lack of seasonality in the Bitcoin market and its high volatility, these methods are not very effective for this task. Given the complexity of the task, deep learning makes

for an interesting technological solution based on its performance in similar areas. Tasks such as natural language processing which are also sequential in nature and have shown promising results [5]. This type of task uses data of a sequential nature and as a result is similar to a price prediction task. The recurrent neural network (RNN) and the long short term memory (LSTM) flavour of artificial neural networks are favoured over the traditional multilayer perceptron (MLP) due to the temporal nature of the more advanced algorithms [6].

The aim of this research is to ascertain with what accuracy can the price of Bitcoin be predicted using machine learning.

II. LITERATURE REVIEW

In (Monisha Mittal, et al., 2022) [1], Bitcoin is the world's first decentralized digital crypto currency which does not need an intermediary like a bank and is most secure because of block chain implementation. The price of a single bitcoin has been increasing drastically since 2010 as a form of digital gold. Thus, bitcoin is very volatile as its price changes every second which is a high risk for investors. The purpose of this paper is to analyse the machine learning algorithms which are of maximum efficiency in predicting the bitcoin price. I have explored many machine learning regression-based algorithms to build a prediction model for analysing future bitcoin prices. This paper is based on a deep learning-based artificial neural network model named GRU (Gated Recurrent Unit) to predict bitcoin future prices accurately based on past price information available. Root Mean Square Error and Mean Absolute Percent Error are the key performance indicators to measure forecast accuracy.

In (Akhilesh Kumar Singh, et. al. 2022) [2], It has been a decade since the formation of the first cryptocurrency in the world. Bitcoin was The first ever crypto invented by Satoshi Nag moto in 2008. It is a digital currency or virtual currency which is not controlled by the central government and operates without a central bank or single administrator. Block chain technology is used in the cryptocurrency, the cryptocurrency block chain is the chain of the blocks, where each block contains a hash of the preceding block till the top block of the chain. A network gets formed by the blocks where block chain represents a public ledger of the transaction happened in the network. Bitcoin and other cryptocurrencies have seen a rise in the attention of different sectors in the last few years. It has been in the eyes of everyone for the perks. It offers to be comparable to a fiat currency structure of banking sector, stakeholders, government and individual investors. Although research and awareness about cryptocurrencies or digital currency are very less and it is on the initial stage, this paper provides an important look and guide about the different aspects of cryptocurrency. The authenticity of this paper is on the discussion at various intervals of law and regulation with the consumption of high energy, possibility of crash collisions and security threat on the network attacks. The relative observations on future of applications of bitcoin can be seen throughout the paper.

In (Grace. LK. Joshila , et. al. 2021) [3], This work aims to enhance the existing analysis made on bitcoin and predict the price of a Bitcoin by taking some parameters into consideration. After a huge research taking all the parameters which affect the price of the bitcoin value and identified daily changes in the bitcoin market. In this work all the data consists of different features over the past few year's daily records. This work is started by gaining all the information that all are needed to predict the bitcoin price. All the information was collected from the past few years and implemented the data into this

work. In this work Support Vector Machine (SVM) algorithm is used as it gives much more accuracy better than previous algorithms. This study predicts sign of change in the price of bitcoin to the investors so that they can invest in this easily and also for the newcomers to this market or business.

III PROBLEM DEFINITION

Cryptocurrencies such as Bitcoin, Ethereum, etc. generated significant attention in 2017. Cryptocurrencies have significant volatility as there is rampant speculation. Given the high variance in prices, can data science methods be used to model the market dynamics?

There are many directions this project could take.Trading Strategy Can an effective trading strategy be found? We are looking for a demonstration of sound data science principles here.

Market Analysis Given there is now option trading on certain cryptocurrencies, is it possible to create a volatility index for cryptocurrencies such as VIX? Is variance of this market infinite and therefore not predictable? Are there any rational reasons for investing that you can justify using data science?

Arbitrage Given the number of different currencies and different markets, how efficient is the market? Are there arbitrage opportunities? Can evidence be found of arbitrage?

The objective of this proposed system is to develop an application which will predict the bitcoin prices in future with decent accuracy. This allows the investors to invest wisely in bitcoin trading as the prices of bitcoin have gone up to an exaggerating amount in the last ten years.
There are various Machine learning algorithm explained in reference papers such as supervised machine learning algorithms like Support Vector Machine (SVM), Random Forest, Decision Tree, Logistic Regression, etc . We also trying to implement both classification & regression type of algorithms on predicting bitcoin prices.

IV PROPOSED WORK

The Bitcoin’s value varies just like any other stock . There are many algorithms used on stock market data for price forecast. However, the parameters affecting Bitcoin are different. Therefore it is necessary to foretelling the value of Bitcoin so that correct investment decisions can be made. The price of Bitcoin does not depend on the business events or intervening government authorities, unlike the stock market. Thus, to forecast the value we feel it is necessary to leverage machine learning technology to predict the price of Bitcoin.
Our Steps or Algorithm Steps will follow:

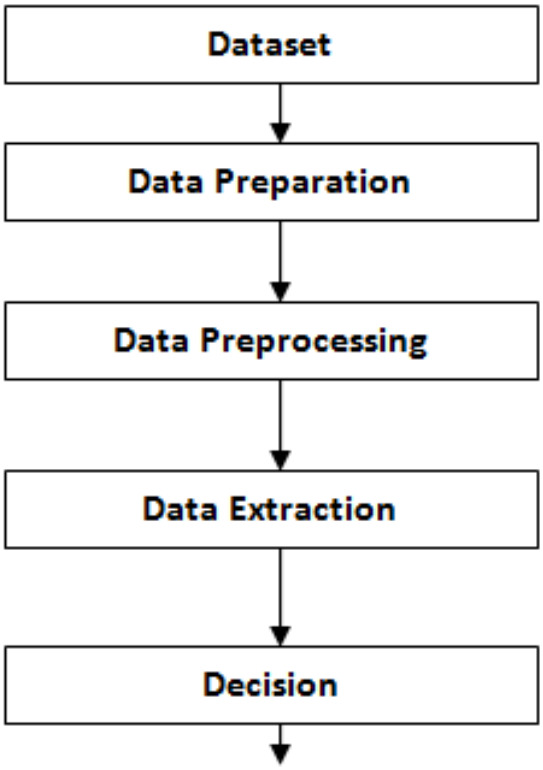

Figure 1. Analysis Steps

1. Dataset:- we first collect and download the data set from publicly available datasets.
2. Data Preparation: Since the dataset acquired cannot be applied directly to the churn prediction models, so aggregation of data is required where new variables are added to the existing variables by viewing the periodic usage behavior of the data.
3. Data Preprocessing: Data preprocessing is the most important phase in prediction models as the data consists of ambiguities, errors, redundancy which needs to be cleaned beforehand. The data gathered from multiple sources first is aggregated and then cleaned as the complete data collected is not suitable for modeling purposes. The records with unique values do not have any significance as they do not contribute much in predictive modeling. Fields with too many null values also need to be discarded.
4. Data Extraction: The attributes are identified for classifying process. we have worked with numerical and categorical values.
5. Prediction: The rule set will let the model trained on historical dataset and Predict the future price trend of bitcoins.

V CONCLUSION

All in all, predicting a price-related variable is difficult given the multitude of forces impacting the market. Add to that, the fact that prices are by a large extent dependent on future prospects rather than historic data. We considered previous Bitcoin transaction in which price and timestamps are the attributes used to predict the bitcoin price for future, We used ML model for price predictions.

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