



## **MODELLING OF BITCOIN PRICE PREDICTION ALGORITHM USING DEEP LEARNING**

Ann Maria Babu<sup>1</sup>, Hari Priya<sup>1</sup>, Jismin K Jose<sup>1</sup>, Jiss Maria Jijo<sup>1</sup>, Prince V Jose<sup>2</sup>

**Abstract:** Prediction of future trends is always a difficult and curiosity-evolving task. Researchers and scientists are trying every second, every minute of their valuable day to forecast the future events of their particular research works. The project mainly focuses on how a trained model can predict the future prices of bitcoin if we give the right amount of data and computational power. The technologies that we mainly use here include Deep Learning and Machine Learning. The output will be a graph with the forecasted values with variations in accordance with the past, present and future values.

**Keywords:** Deep Learning, Bitcoin, Machine Learning, Neural Networks..

### I. INTRODUCTION

The world around us is changing and also the people around us are transforming themselves into the digital world. Digitalization has been one of the major aspects in this modern day society. Now, the modern day society is transforming into a cashless economy where it brings about the importance of cryptocurrencies.

Cryptocurrency is an encrypted form of virtual currency that provides secure form of financial transaction without the involvement of any external agencies like Government, Reserve Bank etc. There exists several cryptocurrencies like Ethereum, Ripple, Litecoin, Dogecoin, Coinye etc. The first cyptocurrency was discovered in the year 2009 and it was named as the “first decentralized Cryptocurrency” i.e. “Bitcoin”. There was a huge hike and drop in the prices of Bitcoin for the past few years which was a hot topic of discussion in the field of media and public. Bitcoin price had a major rise in the year December 2017 and it had witnessed a downfall in the upcoming year. Since Bitcoin is one of the major research areas in the field of science and technology, researchers and scientists have been trying to find out many factors that make fluctuations in the prices of this digital currency.

Bitcoin follows the approach of peer-to-peer technology and it is one of the innovative modes of payments. There is no authority governing the transactions owned by Bitcoin. The transactions details are stored and distributed in a public ledger called as blockchain. There are several records required for doing this barter form of exchange and each record is called as a block. There will not be any trace of people who are involved within this transaction network and this feature makes it more popular and beneficiary for the people who are using this.

Forecasting the future has always been a difficult task. The importance of predicting the future has always been getting a primary role in the field of computer science and information technology. This prediction of the future trends of digital currency helps investors or traders to take better decisions regarding the investment or selling of Bitcoin. The trend of Bitcoin does not rely on any Government. Fig.1. explains the working of Bitcoin transactions.

The figure below shows in detail about the Bitcoin transactions as well as how the transactions are being recorded. It also shows about the technology used in Bitcoin transactions.

<sup>1</sup>B.Tech Student, Computer Science and Engineering, St. Joseph's College of Engineering and Technology Palai, Kerala

<sup>2</sup>Assistant Professor, Computer Science and Engineering, St. Joseph's college of Engineering and Technology Palai, Kerala

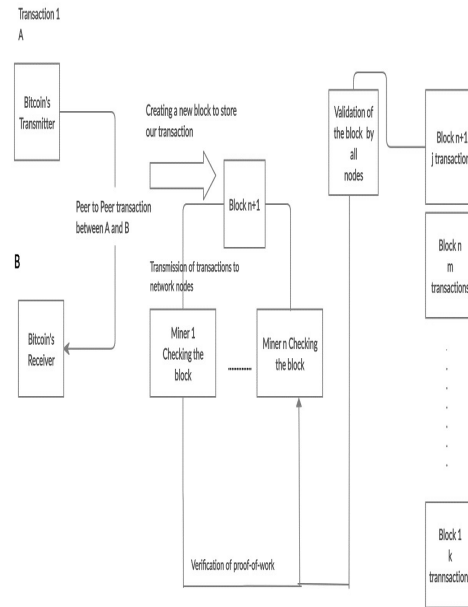


Fig. 1. Working of Bitcoin

## II. RELATED WORKS

### 1. BITCOIN PRICE PREDICTION USING ENSEMBLES OF NEURAL NETWORKS

Here, we explored the relationship between Bitcoin characteristics and how there occurs a change in the prices of Bitcoin using a special approach, using Artificial Neural Network ensemble approach known as Genetic Algorithm based Selective Neural Network Ensemble. Here, the neural network for this project is built using Multi-Layered Perceptron. This has been as a better real world application where forecasting the future has been one of the latest trends. The entity used here was used to forecast the direction of the next day values of Bitcoin prices provided with approximately around 200-300 characteristics of cryptocurrencies over a period of 2 years. Several models were generated to predict the future trends of the famous cryptocurrencies like Bitcoin. Various classification models such as Logistic regression and Support Vector Machines (SVM) had been developed. Some other models for forecasting were based on several machine learning algorithms like regression algorithms such as Autoregressive Integrated Moving Average (ARIMA). The models based on neural networks like Recurrent Neural Network (RNN) are implemented and is the undergone testing procedures. All the models that were developed were undergone several assessments. The different types of models are generated because the researchers had been trying to ensure how well a model works compared to the other models.

### 2. DEEP LEARNING APPROACH TO DETERMINE THE IMPACT OF SOCIO ECONOMIC FACTORS ON BITCOIN PRICE PREDICTION

Bitcoin is a most familiar and valuable cryptocurrency. Its future price prediction helps the traders to get a fair idea about variations in the price values and it helps them to take the correct trading decisions. Here we make a comparative study of the various parameters affecting bitcoin price prediction. This can be done based on Root Mean Square Error (RMSE) using various deep learning methodologies like Convolutional Neural Network (CNN), Long Short Term Memory (LSTM) and Gated Recurrent Unit (GRU). Here we compare this based on their algorithmic complexity and accuracy of the results. The Bitcoin future price prediction is modelled as a binomial classification problem using machine learning algorithms like random forests and generalized linear models. It focuses on optimal features affecting Bitcoin prices and this price prediction technique using different machine learning algorithms like Bayesian Regression and Random forest. Here we uses Bitcoin Price Index as data source and compares the ARIMA model with various deep learning models.

### 3. USING BAYESIAN REGRESSION AND RANDOM FOREST

The paper makes a prediction of Bitcoin future price by evaluating various parameters that affects the Bitcoin price. The paper in its first phase performs experiments for feature selection and constructs the model for prediction during the second phase. The historic data values are obtained from two databases like Quandl and coinmarketcap. Then the collected data should be smoothened and normalized using different normalization techniques. After this next process is feature selection and the selected parameters are fed into the network for

prediction. The number of network layers and neurons are the selected and then the model is trained for the prediction. The accuracy is then calculated by comparing with different existing models.

**4. PREDICTING THE PRICE OF BITCOIN USING MACHINE LEARNING**

The purpose of this project is predicting the Bitcoin price accuracy in USD. And the project done by using RNN Bayesian recurrent neural network) and LSTM(Long Short Term Memory) methodology .The LSTM obtain 52% highest classification accuracy and RNN obtain 8% of accuracy .In this paper, find the accuracy of Bitcoin price in USD using machine learning and compare it with parallelization method done in multicore and GPU environment .The ARIMA time series model is used to performing comparison purpose with neural network model .The closing price of the Bitcoin in USD as independent variable. To perform the model take the root mean square of closing price(RMSE) then classify price on the bases of predicted price and place each predicted price on categorical variable like price up, price down, no change.

**III. THE PREDICTION MODEL**

The recent popularity of Bitcoins helped many researchers to implement prediction models. Creating a prediction model for bitcoin future price is a difficult task, as there is no right or wrong – best fit must be found over a lot of empirical testing for each specific use case. Fig.2 explains the brief idea of how the project works. The block diagram of the overall project has been depicted using the given figure.

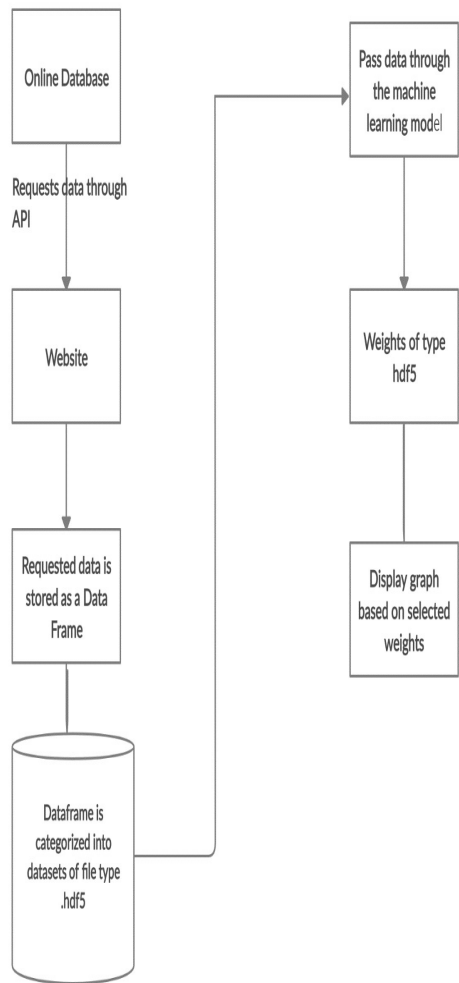


Fig.2. Process Flow Diagram

**IV. PROJECT DESIGN AND IMPLEMENTATION**

*i. DATASET COLLECTION*

The bitcoin time series data is collected from the website poloniex.com. The data set contains the price for the past 5 years that is from 1<sup>st</sup> January 2015 to the current date .The dataset contains attributes such as global trade id, date, amount etc. The date attribute value increases by ten days and provides the bitcoin prices for every 24 hours in a day. The dataset is then stored in a CSV file.

#### *ii. DATA PREPROCESSING*

The extra attributes that are irrelevant or that cannot be used for prediction purpose should be removed from the collected dataset and then it is converted into .h5py format. This dataset is then used in various parts of the project such as training, testing and for evaluation purposes.

#### *iii. TRAINING*

The training of the given test data and the train data that is provided is done by using the help of a neural network that plays a major role in Deep Learning. The neural network used here is Recurrent Neural Network (RNN). Inorder to increase the prediction accuracy and precision, train the model on a larger dataset. This network was chosen because it's one of the neural networks widely used for the training of sequential data. Long Short Term Memory (LSTM) is used as it is one of the memory cells in RNN.

#### *iv. TESTING*

The testing involves the following modes of operations:

*Testing the Dataset:* Multiple times of testing had to be performed inorder to arrive at a conclusion that which data set parameters or attributes had given the perfect results with greater efficiency

*Tuning of the specified Neural Network:* This tuning is done so as to predict which output is better. This is done by either incrementing or decrementing the number of layers in the neural network. By increasing or decreasing the layers and then by comparing helps to check at which layer, output becomes more efficient than the other layers in the neural network.

#### *Testing of Recurrent Neural Network*

There are mainly three layers i.e., Input Layer, Hidden Layer and Output Layer.

- 2 – Layered Approach: The final results obtained after the 2 – layered approach is not accurate as there are huge differences in the values of the predicted and original values.
- 3 – Layered Approach: After performing testing with this layer, it shows certain improvements than the former results.
- 4 – Layered Approach: This approach is far better than the other two approaches that are discussed above.

## V. OUTPUT PREDICTION & RESULTS

After performing all the four steps- Dataset Collection, Data Pre-processing, Training and Testing, the final output is obtained. The output prediction involves several series of processes that are complex as deep learning technology is involved here. Deep Learning strategy is mainly used to do complex pre-processing and that involves the usage of certain complex algorithms.

The final output obtained after this project is a graph that describes the trends of Bitcoin prices in the future which will be the final result of the project. Based on the variations in the graph that involves the prices of past and future predicted prices, Bitcoin users could decide whether they should sell it or not. Figure 3 & 4 shows the final results after the prediction. Fig.4 symbolizes final prediction graph window which is our expected output.

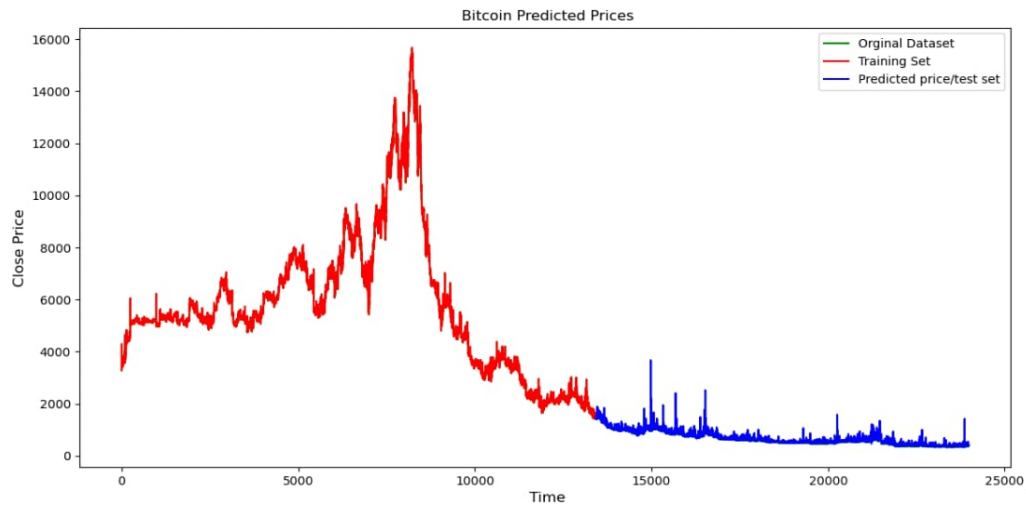


Fig.3. RNN 1-D Prediction Graph Window

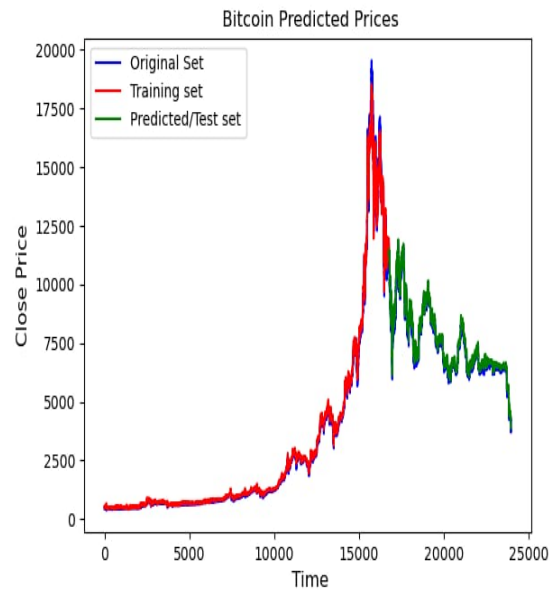


Fig.4.RNN Multivariate Prediction Window

## VI. CONCLUSION AND THE FUTURE LIKELIHOODS

After the successful completion of this project, we had tried to describe the future trends of Bitcoin price prediction using Deep Learning methodologies. Forecasting the future is always a difficult task and so there will be some issues while developing this project. Here, we mainly focused on one of the Deep Learning methodologies- RNN. Predicting a model with 100% accuracy is not practical. So, here we had got a chance to understand the various phases that are involved in the software lifecycle as well as to explore the new technologies.

This project will be very useful for the Bitcoin dealers as well as for the researchers who are doing work on cryptocurrencies. The young budding aspirants could also explore a wide variety of technologies that will be useful for their future prospects.

## REFERENCES

- [1] S. Yogeshwaran, Maninder Jeet Kaur, Piyush Maheshwari, “Project Based Learning: Predicting Bitcoin Prices using Deep Learning”, 9–11 April, 2019 - American University in Dubai, Dubai, UAE.
- [2] Apoorva Aggarwal, Isha Gupta, Novesh Garg , Anurag Goel, “Deep Learning Approach to Determine the Impact of Socio Economic Factors on Bitcoin Price Prediction”, 2019 IEEE.
- [3] Neha Mangla,Akshay Bhat, Ganesh Avabratha, Narayana Bhat, “Bitcoin Price Prediction Using Machine Learning”, Volume 6, Issue 5, May 2019.
- [4] Siddhi Velankar, Sakshi Valecha, Shreya Maji, “Bitcoin Price Prediction using Machine Learning”, ICACT2018 February 11 ~ 14, 2018.
- [5] Sean McNally, Jason Roche Simon, Caton, “Predicting the Price of Bitcoin Using Machine Learning”, 2018 IEEE
- [6] Huisu Jang and Jaewook Lee, “An Empirical Study on Modeling and Prediction of Bitcoin Prices with Bayesian Neural Networks based on Blockchain Information”, IEEE Early Access Articles, 2017, vol. 99
- [7] Satoshi Nakamoto.2008. Bitcoin: A peer-to-peer electronic cash system
- [8] Lipo Wang and Edwin Sin School of Physical and Mathematical Sciences Nanyang Technological University Singapore presented “Bitcoin Price Prediction Using Ensembles of Neural Networks”
- [9] B.Scott, “Bitcoin academic paper database,”suitpossum blog, 2016
- [10] Huberman, G., J.D.Leshno, and C.C. Moallemi (2017). Monopoly without a monopolist: An economic analysis of the Bitcoin Payment System. Columbia Business School Research Paper No 17-92.