

Bitcoin Price Prediction Using RNN And LSTM

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Abstract— *There is constant increase in the usage of bitcoin. The development in technology and hi-tech tools is impacting significantly on the price of the bitcoin which has become an extremely serious problem. Furthermore, bitcoin as a currency is in a non-permanent stage and as a result is more volatile than other currencies such as INR. However, it is top performing currency of the last few years. Hence, its price prediction offers great opportunity and thus provides motivation for research in this area. Factors like exchange closures, replacing crypto currencies, speculation markets, and large amounts of information poses a challenge to analyze such data and identify similarities or relations between the data. Also, there is another challenge, i.e. inconsistency that can occur in the data due to incompleteness in the datasets. The machine learning technique we have proposed for prediction of bitcoin price is recurrent neural networks and LSTM (Long Short-Term Memory) to predict the price of bitcoin. The main goal of the system is to analyze and study the hidden patterns and relationships between the data present in bitcoin dataset. Bitcoin price prediction problem solution can provide extremely useful information which will led or we can say which will prevent investors from losing money invested on bitcoin. In addition, the ability to predict the price of an asset such as bitcoin offers the opportunity for profit by trading it.*

Indexed Terms-- *Bitcoin, prediction, Machine Learning, bitcoin, RNN, LSTM*

I. INTRODUCTION

Digital currencies have become the favourable and most used for commercial money transactions all over the world. The rising usage is because of its innovative characteristics such as transparency thus increasing

acceptance throughout the world. El Salvador became the first country to do this.

Furthermore, Bitcoin is the leading cryptocurrency in the world with adoption growing consistently over time. First introduced in 2008, and deployed as open source in 2009 by Satoshi Nakamoto [1] whose identity is still unknown. Currently, the virtual currency market value is close to 1.4 trillion INR, but it varies from time to time. Digital currency especially bitcoin has been adopted by the people, and since then the digital currency market has been growing up.

Bitcoin is a peer-to-peer cryptocurrency in which all transactions are not regulated or controlled by any third party. It has highly volatile market price working 24/7[2]. It operates on a decentralised, peer-to-peer and trustless system in which all transactions are posted to an open ledger called the Blockchain. Transaction blocks consist of secure shell algorithm which is used to connect each other, and blocks are served as a non-editable data which is recorded when the transaction is being done [3]. This type of transparency is not seen in other financial markets.

The popularity of bitcoin has increased within a short period of time. Different technologies and businesses are joined with bitcoin. Some of the companies which are joined with bitcoin are Microsoft, Dell, PayPal, Wikipedia and others.

Prediction of time series is not a new thing. Prediction of most financial markets such as the stock market has been researched at a very large scale. Bitcoin presents an interesting parallel to this as it is a time series prediction problem in a market that is still in its early stage. As a consequence, there is high volatility in the market and this provides an opportunity in terms of prediction.

Many works have been done to predict time series, as well as bitcoin price. However, any deep learning models have not been much used yet to predict the bitcoin price.

The main challenge of bitcoin is its high rate of price fluctuation. Given the complexity of the task, deep learning makes for an interesting technological solution based on its performance in similar areas [4].

The objective of our study is to predict the future price of bitcoin efficiently using machine learning (Recurrent neural networks and long short-term memory) which will eventually minimize the risk for investors.

II. LITERATURE REVIEW

Following table summarises various methodologies applied by different researchers along with inferences.

| S No. | Author | Title of the paper | Methodology | Conclusion |
|-------|---------------|--|---|--|
| 1 | Deris Stiawan | A LSTM-Method for bitcoin price prediction : A case study yahoo finance stock market | LSTM and RNN are used, dataset is collected from yahoo finance stock market based on the USD Exchange rate and collected from CCC - Crypto Compare. Currency in | Proposed model succeeded to provide the result prediction bitcoin from yahoo finance stock market. But the disadvantage is the result it's not good enough regarding the RMSE (Root mean |

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| | | | USD, with 5 years period, this is historical data prices, so in this research used time-series data on this experimental, with 1829 number of datasets, on CSV format. | square error), maybe under the hundreds or near close to 50 score RMSE. |
| 2 | Temesgegn Awoke Muniye | Bitcoin Price Prediction and Analysis Using Deep Learning Models | Deep learning mechanisms such as LSTM and GRU | The study reveals that the GRU model is the better mechanism for time series cryptocurrency price prediction and takes lower compilation time |
| 3 | Alvin Ho, Ramesh Vatambe | Bitcoin Price Prediction | Linear Regression algorithm | The study reveals that the best |

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| | ti, Sathish kumar Ravicha ndran | n Using Machine Learning and Artificial Neural Network Model | m and Long Short- Term Memory Algorith m | accuracy rate is shown in Long Short- Term Memory than Linear Regressi on |
| 4 | Ali Moham mad Tarif | Real- Time Predictio n of BITCOIN Price using Machine Learning Techniqu es and Public Sentiment Analysis | Long Short- term memory and ARIMA model is impleme nted to compare its predicta bility with the LSTM and figure out which is the most suitable method for time series data which has huge fluctuati ons. | LSTM (Long Short- Term Memory) is obviousl y an effective learner on training data than ARIMA, with the LSTM more capable of recognizi ng long- term dependen cies. This study uses the daily price fluctuatio ns of the Bitcoin to further investigat e the model's predictab |

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| | | | | ility with hourly price fluctuatio ns in the future. This paper consists only of comparin g ARIMA with LSTM. In this work, only Twitter and reddit posts data are considere d to analyse people's feelings that may be biased because not all people who trade in stocks share their views on Twitter and Reddit. |
| 5 | Marco Santos | Time Series Models to Forecast Cryptocur rency Prices | SARIM A and an additive model impleme nted by Faceboo | The study reveals growth direction for the price of bitcoin. |

| | | | k Prophet. | |
|---|--|--|--|--|
| 6 | Isaac Zhao | Automate d Bitcoin trading via machine learning algorithm s | Machine learning algorithm i.e. custom algorithm m which includes both the random forest and generalized linear model. | It was proved that they had gained an accuracy of 50- 55% in predicting the future price. The data was considered with a time interval of 10 minutes. |
| 7 | Alivia Pandit, Bhaskar Jindal | Bitcoin Price Prediction using machine learning | RNN and LSTM ARIMA model for time arrange ment gauging as a correlation with the profound learning models. | The study done is not able to predict future bitcoin price efficiently. |

III. METHODOLOGY

To achieve the objectives of this paper, a 7 stage approach will be followed, which starts with collection of real time data about prices of bitcoin. The data thus collected will be normalised and inconsistencies, if any will be removed. Then this data will be split into two parts, one set will be used for training the model

using RNN and another set will be used to validate the model [5,6]. Recurrent Neural networks are robust networks that are best suited for data like text, audio, video, speech, financial data, weather etc. Because of its recurrence it takes data from previous cycles to predict the output of next stage. As the method will also be using LSTM (Long Short-Term Memory), it has the advantage of removing the data that is of no significance with respect to the prediction. Predicted results will be analysed for accuracy using mean square error technique. Bitcoin trading is always been a keen requirement in the fin-tech market, as financial literacy is very important from an individual to big organisations. Predictions always influence various investments and GDPs of various countries. It will also be helpful in taking decisions for regulatory bodies.

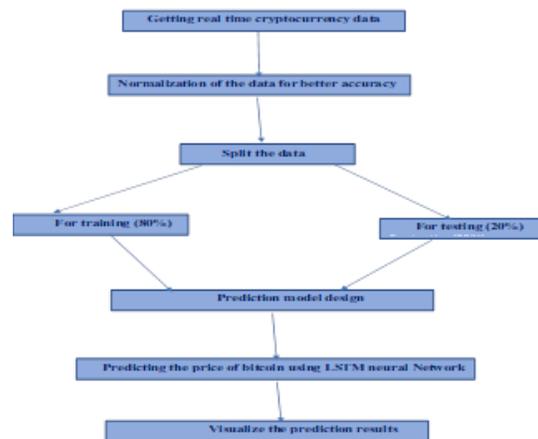


Fig1: Methodology for predicting bitcoin price

IV. CONCLUSION

Overall, given the numerous dynamics that influence the market, predicting a price-related variable is challenging. Furthermore, prices are heavily influenced by future prospects rather than past data. However, we now have a better knowledge of Bitcoin, RNN LSTM architecture and use of deep neural networks. Implementing hyperparameter tuning to obtain a more accurate network architecture is part of the future work.

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