

COMPARISON OF BITCOIN PRICES BY USING LSTM & MULTI LSTM

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Abstract- This project shows the Recurrent Neural Network Learning Model on the basis of LSTM, which analyzes the previous prices of a cryptocurrency, Bitcoin and predicts the next price by using best algorithm. Regularized data set for Modeling is divided into test data set and training data set at the ratio of 1:9. The latter set is once again separated into training data and verification ones. Machine Learning of this study needs to use Neural Network library, Keras's framework. Here we compare the two algorithms namely LSTM and Multi LSTM to know which algorithm is best to predict the price.

Keywords— Bitcoin; Time Series; Forecasting; Analysis; ARIMA; R

1. INTRODUCTION

Digital or virtual currencies having economic properties are known as cryptocurrencies. They may be used as a medium of exchange on the internet. It's now a worldwide occurrence that most people are acquainted with. Banks, governments, and countless businesses recognise the relevance of blockchain technology, despite the fact that it may seem a little nerdy to the average person. In addition to securing and authenticating transactions, cryptocurrencies use cryptography to regulate the creation of new components of a certain coin. At the beginning of the year 2008, Satoshi Nakamoto launched Bitcoin, the first and most widely used cryptocurrency. Decentralized "electronic payment system" introduced in 2009. Peer-to-peer as well as client-to-client channels may be used to send and receive it. In May of that year, a Florida programmer bought a pizza with his first bitcoin. In late 2017, the price of Bitcoin was also over \$100,000. Due to its dominance in the digital currency industry, Bitcoin now accounts for 56.83 percent of total market capitalization (coinmarketcap.com). An essential part of Bitcoin's blockchain (BC) technology is the development of a spine that ensures the better security and safety of multiple applications, including the Internet of Things (IoT). Research in both academia and industry is now being carried out using Blockchain in a variety of different contexts. An advanced record of unalterable exchanges is maintained via the Proof-of-Work (PoW) numerical test, which provides BC security. As an extra layer of security, BC uses an alterable Public Key (PK) to record the identity of its customers. On the internet voting, decentralised information conveyed storage systems, confirmation of-area and social insurance are all examples of non-monetary frameworks where BC has been effectively used. Increased capacity, improved security, and quicker settlement are all benefits of decentralisation in the blockchain technology. Cryptocurrency based on the principle of solving encryption algorithms to produce unique hashes with a limited number of possible values [1]. Altcoins are a new kind of speculative, cryptographic money that has emerged. While there are various methods to make money with cryptocurrencies, "Buying and Holding" is one of the most secure options. To acquire excellent cryptocurrency that contains a vital use case and retain them till they have a decent market share. Cryptocurrencies like Bitcoin, Litecoin and Monero are just a

few examples. As a result, we are making a Bitcoin price forecast in this article since the cryptocurrency is now receiving a lot of media attention and has a market cap of \$20 billion as of March 2017. Some major central banks have recently begun to study the use of cryptocurrencies and blockchain technology for retail transactions as well as larger transactions. Using blockchain technology, the People's Bank of China, for example, hopes to create an international digital money. From a fundamental value of \$0 in 2009, Bitcoin's market price has increased to a current value of \$6,386.07 at the time of this writing. Bitcoin's closing price is the most important factor for investors in this study, hence it was chosen for prediction. As shown by the literature, employing the ARIMA model to forecast Time Series data might provide better outcomes than predicting directly. [4]. In 1979, Box and Jenkins invented the Autoregressive Integrated Moving Average (ARIMA) model, which is used to turn nonstationary data into stationary data. To recognise, evaluate, and diagnose ARIMA models using time series data, Box and Jenkins devised an approach. The ARIMA model shows the following when a variable's long-term value is a straight mix of previous values and past errors:

$$Y_t = \phi_0 + \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \dots + \phi_p Y_{t-p} + \epsilon_t - \theta_1 \epsilon_{t-1} - \theta_2 \epsilon_{t-2} - \dots - \theta_q \epsilon_{t-q} \quad (1)$$

A random error at "t" is represented as ϵ_t , Y_t is the actual value, ϵ_t is a random error, ϕ and θ are coefficients, p and q are integers that are sometimes referred to as autoregressive and moving average, respectively. Adewumi and Ayo (2014; Ariyo, Adewumi & Aiyoy, 2014) In the ARIMA model, it is assumed that the future value of the variables is influenced by autoregression, integration, and moving averages (p,d,q). Choosing the values of p , d , and q is critical to the ARIMA model's functioning. It was also repeatedly reworked till it couldn't come up with a good model.

Ross Ihaka and Robert Gentleman created R in 1993, which is one of the programming languages. It has a visual and statistical approach. R-Studio, a free and effective coordinates development environment for the R language, may let the client to run the ARIMA Model. " R scripts may be executed in a convenient domain with RStudio. [7]

For a period of 534 days, the closing price of bitcoin was predicted in this study. It is possible to implement the ARIMA model in R studio by use of the R programming language. By comparing predicted prices to actual prices, the accuracy of the prediction has been determined. A 60:40 ratio was used to split the data into training and testing for the purposes of data comparison. Then the standard error of the mean was determined. Section 2 goes into detail about prior efforts to forecast stock data. Section 3 explains the experiment's methodology, while Section 4 shows the experiment's findings. Portion 5, the last section, serves as the work's finale.

2. RELATEDWORKS

In addition to statistical, empirical, SWOT (Strength, Weakness, Opportunity and Threat) and time-series analysis, cryptocurrencies are subjected to other forms of study. As a researcher, one of my main tasks is to do a statistical study of the major seven cryptocurrency types (Bitcoin, Litecoin, Litecoin Monero, Dash, MaidSafeCoin and Dogecoin). Analysis and findings of a noncausal autoregressive process with Cauchy errors for Bitcoin's exchange rate when compared to the US

Dollar. According to the findings, the provided Bitcoin/USD conversion scale reveals close patterns that point to theoretical behaviour from web-based exchange. [8]The thesis is also based on a linear regression model of the market price of cryptocurrencies, which is done through statistical analysis. Modeling the relationship between a dependent variable and a set of independent variables is what this technique is all about By deleting inconsequential factors, they hope to reduce the model's complexity and come up with the most accurate one. The price of a cryptocurrency is heavily influenced by the volume of people using Google's search engine to look for that specific coin's designation. Long-term memory, leverage, stochastic volatility, and heavy-tailedness were found in the empirical data study of Cryptocurrencies in [10] and [11]. 224 distinct cryptocurrencies were discovered to be eligible for t-distribution analysis by Phillip and his colleagues. Using a vector autoregressive (VAR) model, [11] was examined. The short-term features of the cointegrated series are examined using the VEC model, which is based on the VAR model. They use VEC because it incorporates any cointegrating association among the variables into the report, making it easier for them to analyse the data. When they write their paper, they see Bitcoin as more of a resource than a currency. According to this theory, the price of Bitcoin may be influenced by macroeconomic factors like as inflation and the cost of scarce materials. A credit money's value may fluctuate as a result of its supply and demand, but Bitcoin is still a long way from being an actual currency. In the SWOT analysis, bitcoins are analysed for their strengths, weaknesses, opportunities, and threats. The best-performing cryptocurrency in the previous several years and its rapid rise in popularity may be cited as advantages. It doesn't have many flaws, but the fact that numerous users share a single block and can't view their own wallets makes it vulnerable to assault. It is possible that in the future, bitcoin will operate as a kind of gold. There are just a few roadblocks to overcome, and the largest one is user acceptability, even if bitcoin has been more popular in recent years. Use natural logarithms for both the dependent and independent variables in time series regression analysis. They're looking for evidence of both short- and long-term flow between the variables. Bitcoin's weekly and daily market prices were analysed using Google trends and Wikipedia views, respectively, as well as their respective weekly averages. When the anticipated distribution of a time series is stable across time, it has a constant mean and variance, and the covariance of two distinct points in the sequence depends only on the step between them, it is said to be a covariance stationary series. [14] Another useful way to think about time series is as a collection of accumulating different layers, and then using the approach of deconstructing each layer to reveal a coherent person behind the model.[15]Using an ARIMA model to forecast stock prices, one of the researchers found that they were able to get the greatest results on a short-term basis by displaying the ARIMA model's potential. [5]Using data mining methods in R, they were able to anticipate stock market data using the ARIMA model, which they found to be quite accurate. The ARIMA model with the use of R code has been shown to be appropriate for the forecasting of digital money, such as Bitcoin, employed in this research. ARIMA was used in this study to estimate the closing price of Bitcoin by analysing the price of Bitcoin from 2015 to 2018.

3. PROPOSED SYSTEM ARCHITECTURE

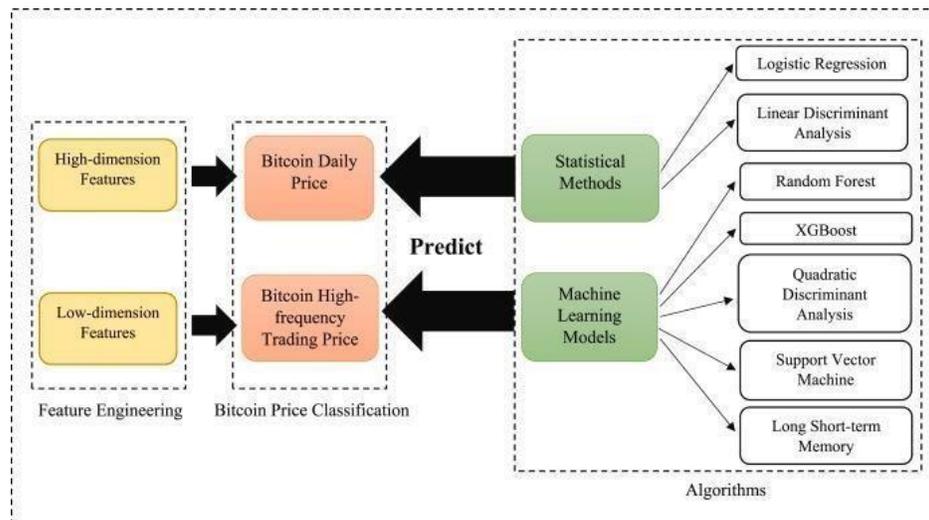
This is the model-building stage. Finding the right model is an art, and it will take several weeks and attempts to find the right layers and hyperparameters for each one. We have analyzed the data using different algorithms and we found that LSTM and Multi LSTM are better than all those algorithms while predicting the bitcoin price accurately.

In this project we have compared these two algorithms to find the better one which identifies the price accurately. We have trained the model using different datasets and our experimental results show that Multi LSTM is better than LSTM.

LSTM: Long Short Term Memory is a kind of recurrent neural network. In RNN output from the last step is fed as input in the current step. LSTM was designed by Hochreiter & Schmidhuber. This is the model-building stage. Finding the right model is an art, and it will take several weeks and attempts to find the right layers and hyperparameters for each one. We have analyzed the data using different algorithms and we found that LSTM and Multi LSTM are better than all those algorithms while predicting the bitcoin price accurately.

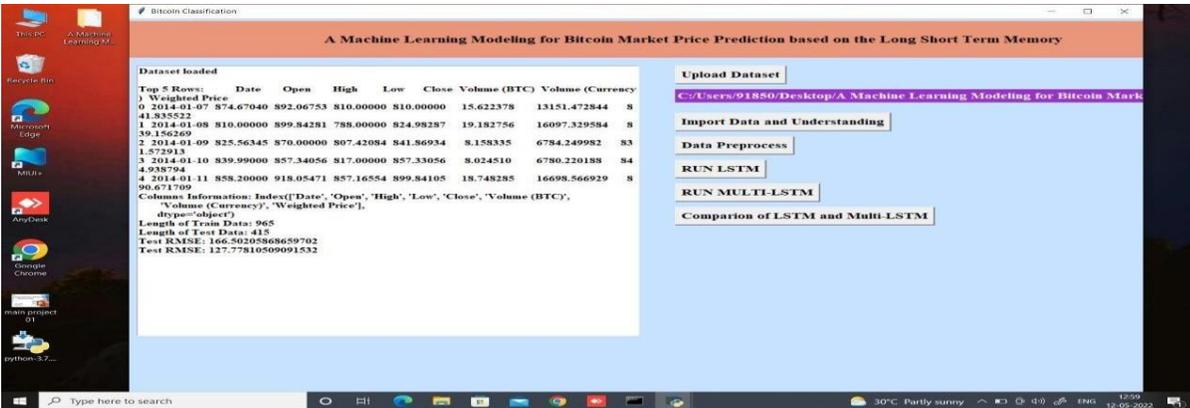
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MULTI LSTM: An LSTM layer above provides a sequence output rather than a single value output to the LSTM layer below. Specifically, one output per input time step, rather than one output time step for all input time steps

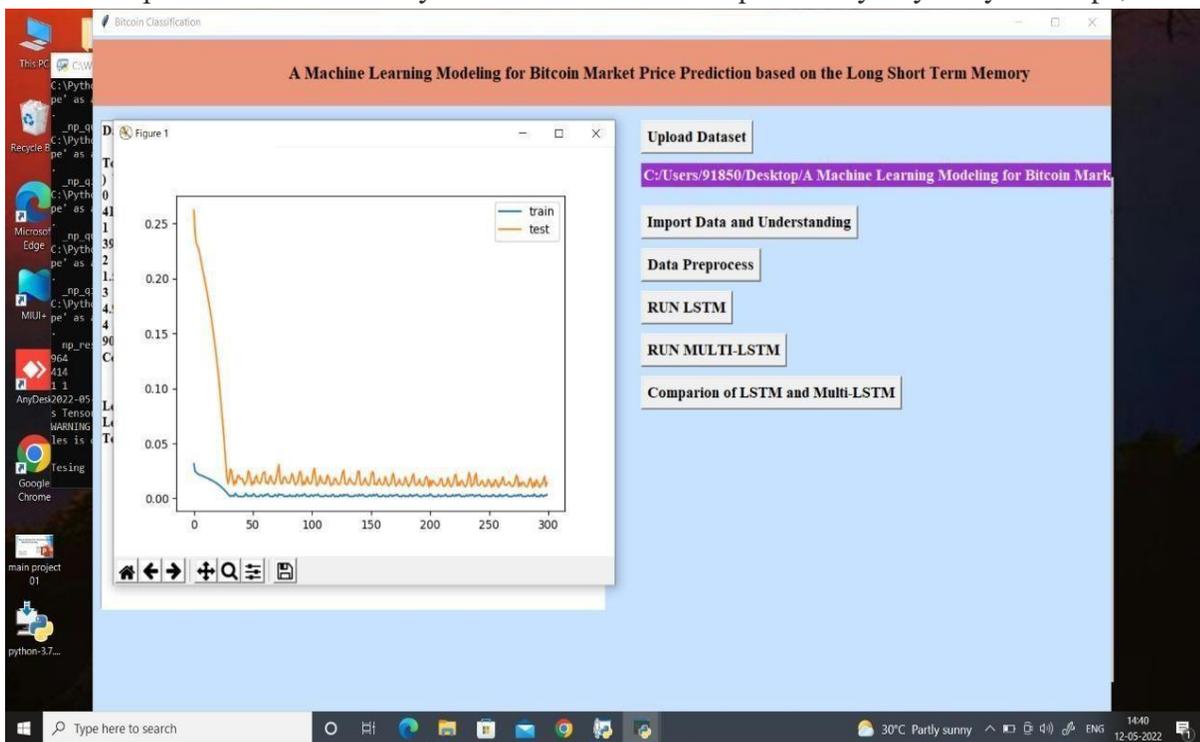


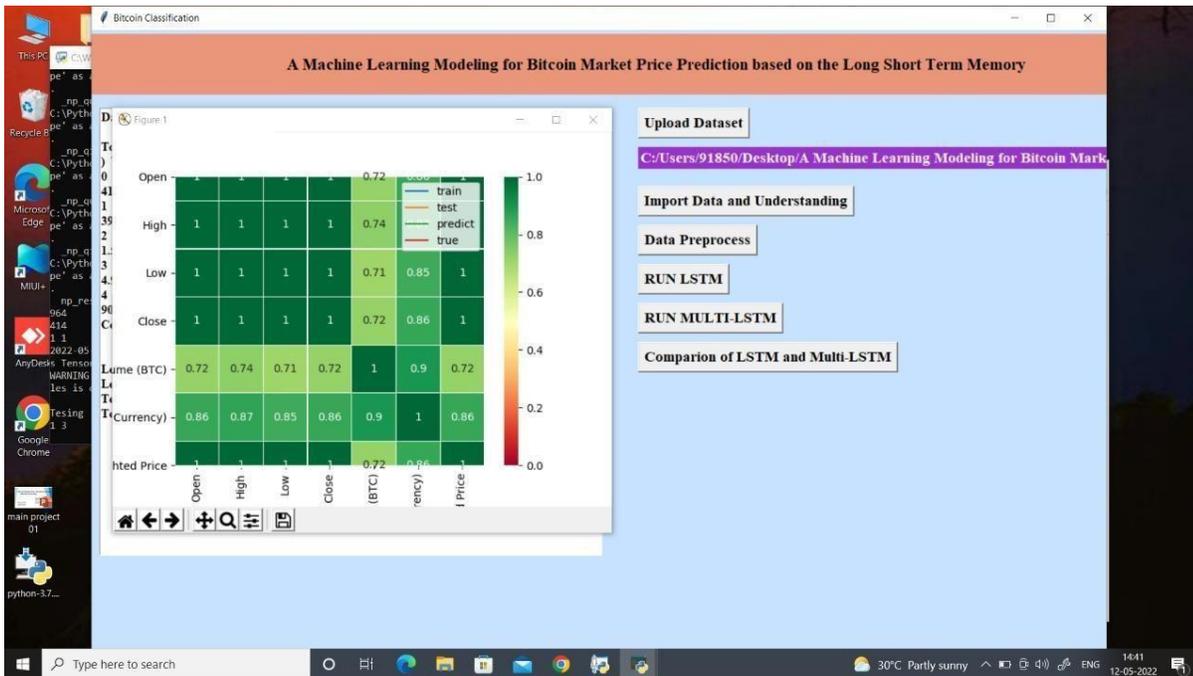
4. RESULTS AND DISCUSSION

Long short-term memory networks are an extension of recurrent neural networks, which basically extend the memory. Therefore it is well suited to learn from important experiences that have very long time lags in between. LSTMs enable RNNs to remember inputs over a long



period of time. This is because LSTMs contain information in a memory, much like the memory of a computer. The LSTM can read, write and In Multi-layer LSTMs we apply multiple RNNs on top of each other. You could regard RNN as deep in some sense because you've unrolled them over potentially very many time steps, and





In Multi-layer LSTMs we apply multiple RNNs on top of each other. You could regard RNN as deep in some sense because you've unrolled the mover potentially very many time steps, and you could regard that as a kind of depth. The reason why you would want to do this is because this might allow the network to compute more complex representations. This is the logic behind deep networks in general. If you're familiar with the idea of why deeper is better for let's say convolutional networks, then this is kind of the same logic.

5. FUTURE SCOPE AND CONCLUSION

This paper proposes Artificial Neural Networks so as to forecast the next day price of Bitcoin, worthy of about \$20,000 per a piece in December 2017, on the basis of the past prices. This project shows the Recurrent Neural Network Learning Model on the basis of LSTM, which analyzes the previous prices of a crypto currency, Bitcoin and predicts then ext price by using best algorithm. Finally after checking all the algorithms, we are choosing best two algorithms those are LSTM and Multi LSTM. after the execution Multi LSTM is the best algorithms it contains less errors it is best to predict the bitcoin price. The result of our research is, all models have same accuracy, but Linear Regression model has best execution time. However, there are several other factors like twitter sentiment analysis, gold price analysis, economic crisis, setting parameters, different policies and laws of different countries which can affect the results. Therefore, to obtain the best results always collect the updated data. In future, there is further scope in our research like "the accuracy of various models can be increased" by applying new models, by using more features to predict the bitcoin price.

REFERENCES

- [1] D. Kuo, C. Lee, and Y. Wang, "Cryptocurrency: A new investment opportunity? Cryptocurrency : A New Investment Opportunity?," vol. 20, no. 3, pp. 16–40, 2018.
- [2] Y. Sovbetov, "M P RA Factors Influencing Cryptocurrency Prices: Evidence from Bitcoin, Ethereum, Dash, Litecoin, and Monero Factors Influencing" J. Econ. Financ. Anal., vol. 2, no. 2, pp. 1–27, 2018.
- [3] J. Chiu and T. V. Koepl, "The Economics of Cryptocurrencies – Bitcoin and Beyond," Ssrn, pp. 1–40, 2017.
- [4] J. Kamalakannan, I. Sengupta, and S. Chaudhury, "Stock Market Prediction using Time Series Analysis," pp. 1–5.
- [5] A. A. Ariyo, A. O. Adewumi, and C. K. Ayo, "Stock Price Prediction Using the ARIMA Model," 2014 UKSim-AMSS 16th Int. Conf. Comput. Model. Simul., pp. 106–112, 2014.
- [6] J. J. Wang, J. Z. Wang, Z. G. Zhang, and S. P. Guo, "Stock index forecasting based on a hybrid model," Omega, vol. 40, no. 6, pp. 758–766, 2012.
- [7] Angadi, M., Kulkarni, A.: Time Series Data Analysis for Stock Market Prediction using Data Mining Techniques with R. International journal of advance research in computer science. 6(6), 1–5, (2015).

- [8] J. Osterrieder, S. Chan, J. Chu, and S. Nadarajah, "A Statistical Analysis of Cryptocurrencies," *Ssrn*, no. February, pp. 1–23, 2017.
- [9] E. Pärilstrand and O. Rydén, "Explaining the market price of Bitcoin and other Cryptocurrencies with Statistical Analysis," 2015.
- [10] A. Phillip, J. Chan, and S. Peiris, "A new look at Cryptocurrencies," *Econ. Lett.*, vol. 163, no. November, pp. 6–9, 2018.
- [11] Y. Zhu, D. Dickinson, and J. Li, "Erratum to: Analysis on the influence factors of Bitcoin's price based on VEC model," *Financ. Innov.*, vol. 3, no. 1, p. 7, 2017.
- [12] P. D. Devries, "An Analysis of Cryptocurrency, Bitcoin, and the Future," *Int. J. Bus. Manag. Commer.*, vol. 1, no. 2, pp. 1–9, 2016.
- [13] T. E. D. J. May, "A Detailed SWOT Analysis Example (Applicable To All Industries)," 2018.
- [14] G. Kavvadias, "What Drives the Value of Cryptocurrencies? A Time Series Analysis of Bitcoin," no. November, 2017.
- [15] Poyser&Perdiguero, "Exploring the determinants of Bitcoin's price: an application of Bayesian Structural Time Series," June, 2017