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Bitcoin Price Prediction using ARIMA and RNN-LSTM

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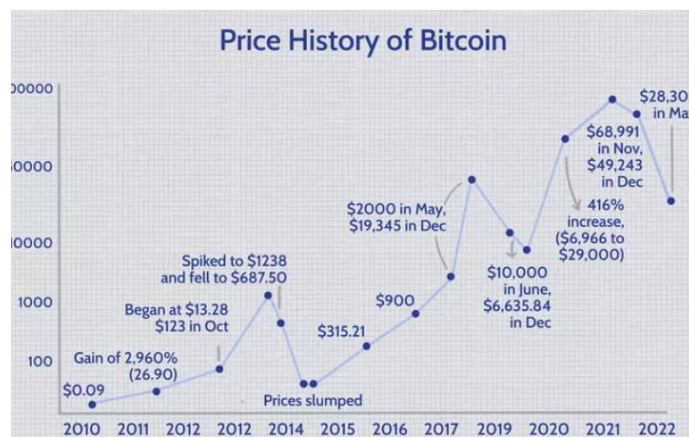
Chhattisgarh, India

ABSTRACT: The world is going digital and new technologies are introduced that will better the world. One such emerging technology is blockchain technology which revolves around cryptocurrencies. The best-known cryptocurrency for which blockchain technology was invented, is Bitcoin. It is a decentralized digital currency that uses peer-to-peer technology to operate with no central authority or banks; managing transactions and the issuing of bitcoins is carried out collectively by the network. Due to price volatility found in decentralized cryptocurrencies there is a need for studying the underlying price model. Moreover, Bitcoin prices show non-stationary behavior, where the statistical distribution of data changes over time. The project aims to predict the price of bitcoin through two different algorithms: **ARIMA and RNN-LSTM**.

KEYWORDS : Bitcoin, Machine Learning, Blockchain, Long Short Term Memory, ARIMA

I. INTRODUCTION

Blockchain Technology is the new emerging technology that will revolutionize the world in several aspects. It increases security and speeds up the exchange of information in a cost-effective way and is more transparent. The most active sector which uses blockchain technology is the banking sector. The rise of blockchain technology and cryptocurrencies has led to the dismantling of central banks. Blockchain uses cryptography in the login process and verifies every transaction and secures them in the form of parameter and transparency. Bitcoin is the long-running and most popular well-known cryptocurrency and also serves as a decentralized medium of digital exchanges. Bitcoin can be obtained by mining or exchanging for products, services, or other currencies. Bitcoin is volatile. Then, in recent years, it has attracted considerable attention in a diverse set of fields, including economics, finance, business, and computer science. Our main objective is to determine the reason behind its price fluctuation and also predict its future price. Cryptocurrencies work on the theory of encryption algorithm to produce unique hashes that are finite in number as well as merge with a network of computers verifying transactions that will ever be generated, preventing an excess and ensuring its rarity. Several factors have influenced bitcoin price based on previous trend obtained so far. These include supply of Bitcoin and its demand in market, cost of producing a bitcoin through the mining process, number of competing cryptocurrencies and regulations governing its sale.



Bitcoin Fluctuation Trend



II. LITERATURE SURVEY

We all know about the cryptocurrency boom, especially bitcoin and the blockchain. We are witnessing a major rise in cryptocurrencies investment. We are heading towards an era where every transaction will take place digitally without the involvement of any third party. We have tracked down the change of bitcoin price for a decade now and we have also witnessed how tremendous benefits are made by some people through buying and selling bitcoin at the right time. One needs to analyze the past data and make a comprehensive summary of all the factors that induces the change in bitcoin price.

Predicting the exact price is very hard. By using the concepts of machine learning and deep learning one can make models which help us to make approximate estimation of trend in cost of bitcoin price. Coming to the algorithms which can be useful for prediction are - time series algorithms which are different from machine learning algorithms as they are time dependent and are variation specific to a particular time frame. Auto regressive integrated moving average (ARIMA) is the most popular statistical method used for time forecasting. Also, LSTM in comparison to the classic statistics linear models is amazing due to the capability to handle multiple input forecasting problems.

Recurrent Neural Network (RNN) model combined Long Short-Term Memory (LSTM) regression algorithm is used on the bitcoin dataset for predicting its price by analyzing the dataset and applying deep learning algorithms. For the purpose of this research the dataset used consists of various parameters of Bitcoins data values and we try to predict whether the price will increase, decrease or stay the same within certain thresholds. The prediction analysis is to be carried out based on the resultant values from the used algorithms.

III. DATASET

The dataset for this project has been extracted into an xlsx file from yahoo.finance.com site and it spans for a duration of 5 years from 7 Jan 2017 to 7 Jan 2022 .

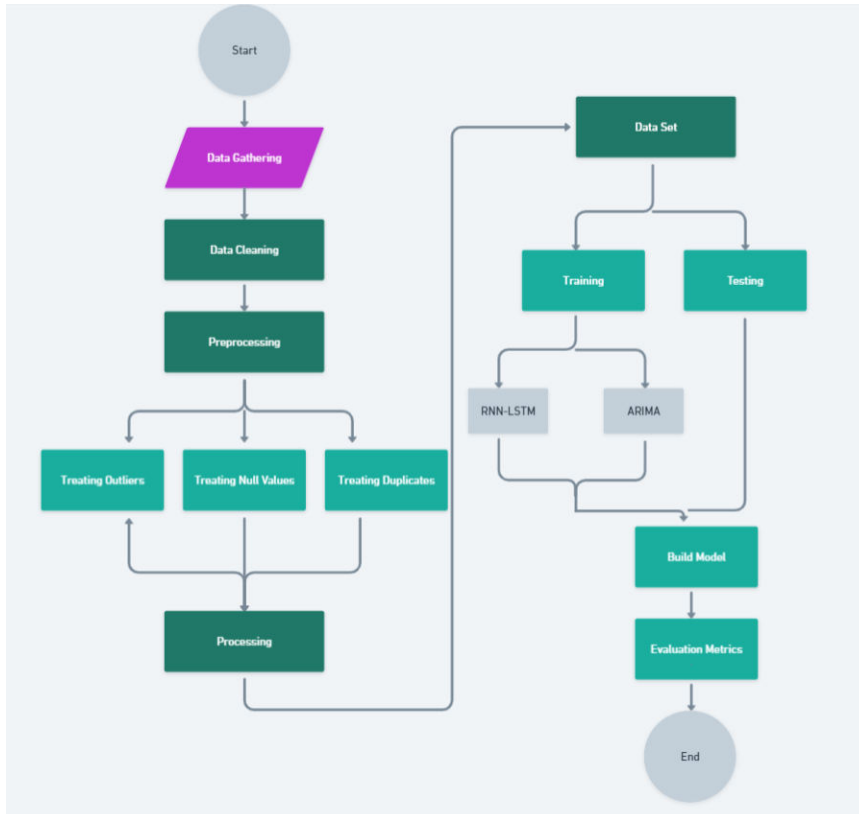
Sample DataSet

	Date	Open	High	Low	Close	Adj Close	Volume
0	07-01-2017	903.487000	908.585022	823.556030	908.585022	908.585022	279550016
1	08-01-2017	908.174988	942.723999	887.249023	911.198975	911.198975	158715008
2	09-01-2017	913.244019	913.685974	879.807007	902.828003	902.828003	141876992
3	10-01-2017	902.440002	914.872986	901.059998	907.679016	907.679016	115808000
4	11-01-2017	908.114990	919.447998	762.765015	777.757019	777.757019	310928992

IV. PROPOSED METHODOLOGY

Steps involved in building our model :-

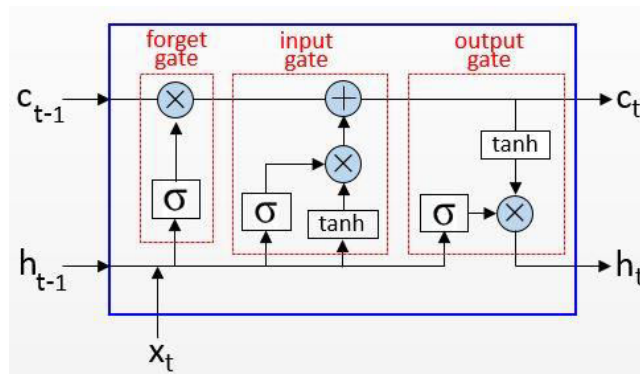
The procedure is depicted through the flowchart mentioned below :-



The following two algorithms were used in the prediction of bitcoin prices :-

A)RNN-LSTM :-Since we have sequential data,we can use a special class of Neural Network models known as Recurrent Neural Networks (RNNs).Here,the output from the model can be used as input for the same model.Hence, the model could run indefinitely.But inability of capturing long-term dependencies in a sequence is a limitation to RNN capabilities.So,we miss out on long term dependencies between the data points.To,avoid it,we can use Long short-term memory (LSTM) variant of RNN.The major benefit of using LSTM is its capability to store information for prolonged period of time.Tensorflow Keras library was used to implement sequential function to build model as it works best on sequential data.when graphs of each of parameters are plotted against date,they prove to be much similar with slight of changes.Also while splitting data into training and testing,data was taken from january 7 and then splitting was done in 3:2 for training and testing model.Fitting the model took a lot of time as the best epoch value was calculated by hit and trial method, as more number of epochs would have resulted in overfitting of model and less number of epochs would have contributed to underfitting of the model.It turned out that 250 epochs were best for model fitting.The RMSE value obtained was lowest at 250 epochs.Also the gap between training and validation loss is less here.The smaller the RMSE, the better the model's performance, after that we used to produce the results.

LSTM Architecture :-LSTM is an updated version from RNN with differences in the connection between the hidden layers of RNN.Also the other difference is the memory cell structure of hidden layers and design of three special gates effectively solve the gradient problems.Unlike the RNN, LSTM, by using memory cells and gate units can manage the memory at each input.



The architecture of lstm contains 3 gates mainly –

- Input gate:-It depicts information will be updated in the cell
- Forget gate :-It means information should be dropped from the cell.
- Output gate :-It depicts how much information should be output.

Also there is a sigmoid function which ranges from 0 to 1 and the function is used to put the value between -1 and 1.

The forget gate filters out the useless information from the memory.Thus creating space in the memory section.

B) ARIMA :- Autoregressive Integrated Moving Averages is a simplest machine learning model which is widely used in forecasting BTC prices.

Trend : varying over time duration

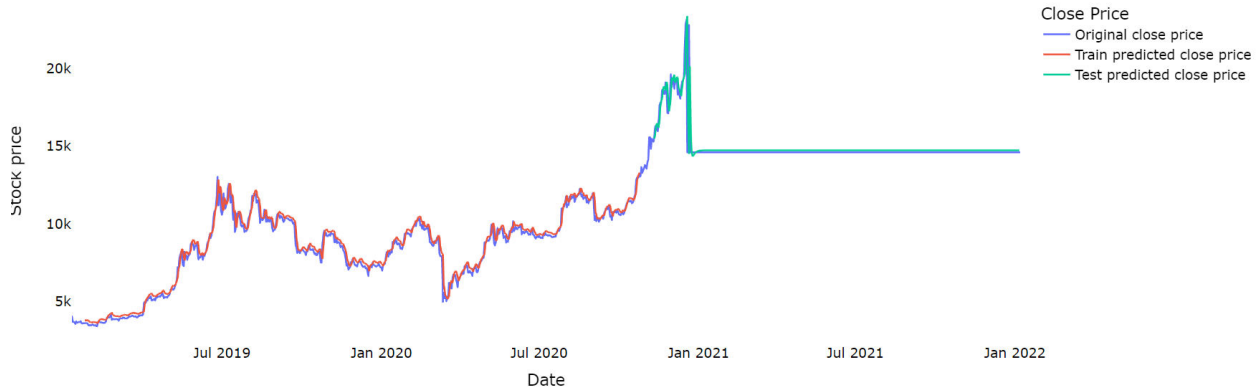
Variation : time frame variations

Time series forecasting models are mostly used to predict the demand in real world scenario.Under an autoregressive moving averages hypothesis, calculated the variant of demand by using the historical data and validated the models by examining the forecast performance.In arima model we have to fit an ARIMA model that assumes stationary characteristics , we must use our dataset to determine the three important parameters of ARIMA :p,d and q respectively.Firstly using ARIMA models require dataset to be stationary and also look at the dataset shows trends in the chart of the dataset.

V. CONCLUSION

We applied the forecasting and recurrent neural network algorithm on the same dataset and tried to predict the trend of bitcoin price for next days.The following observations are made-ARIMA performs well for next few days predictions but gives poor performance for longer terms.RNN combined with LSTM on the other hand, perform consistently for long duration.The accuracy obtained for LSTM model is 67% and of ARIMA is 53%.

Comparison between original close price vs predicted close price



VI. ACKNOWLEDGEMENT

With the successful accomplishment of this research, we would like to express our sincere thanks to our research supervisor Prof. Sanchita Chourawar (Assistant Prof. Department of Computer Science Engineering) under whose guidance and constant support we were able to complete this project.

REFERENCES

- [1] S. Nakamoto (2008) "Bitcoin: A peer-to-peer electronic cash system," -<https://bitcoin.org/bitcoin.pdf> (bitcoin.org)
- [2] Bitcoin price prediction using time forecasting algorithms:- <https://towardsdatascience.com/bitcoin-price-prediction-using-time-series-forecasting-9f468f7174d3>
- [3] Internshala Training Machine Learning Notes:-https://trainings.internshala.com/machine-learning-course/?tracking_source=trainings-dropdown-data-science
- [4] <https://www.kaggle.com/code/meetnagadia/bitcoin-price-prediction-using-lstm>
- [5] Bitcoin Price Fluctuations :-<https://zipmex.com/learn/bitcoin-price-prediction/>
- [6] <https://www.investopedia.com/articles/forex/121815/bitcoins-price-history.asp>
- [7] <https://www.sciencedirect.com/science/article/pii/S2405918821000027>

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