Prediction of Bitcoin (BTC) Currency using Kibana

Sushant Burde| Swarnim Jambhule| Kay Mak
Pratik Parmar| Monish Phatarpekar| Smit Shiroya

Department of Information Systems, California State University, Los Angeles

Abstract: Cryptocurrency is considered chaotic, complex, volatile and dynamic. Undoubtedly, its prediction is one of the most challenging tasks in time series forecasting. Moreover existing Artificial Neural Network (ANN) approaches fail to provide encouraging results. Meanwhile advances in machine learning have presented favourable results for speech recognition, image classification and language processing. Methods applied in digital signal processing can be applied to stock data as both are time series. Similarly, the learning outcome of this paper can be applied to speech time series data. Deep learning for Cryptocurrency prediction has been introduced in this paper and its performance is evaluated on Cryptocurrency data from kaggle.

1. Introduction

A cryptocurrency is a digital money designed to work as a medium of exchange in an electronic payment system in which payments are validated by a decentralized network of system users and cryptographic protocols instead of by a centralized intermediary (such as a bank). Bitcoin introduced itself as a system that solved the Double Spend problem (Nakamoto, 2008). Since then, cryptocurrencies have gone from being an academic concept, niche technological curiosities to rapidly proliferating financial instruments that are the subject of intense public interest. Recently, they have been incorporated into a variety of other financial transactions and products. For example, cryptocurrencies have been sold to investors to raise funding through initial coin offerings (ICOs), and the terms of certain derivatives are now based on cryptocurrencies. Some government central banks have examined the possibility of issuing cryptocurrencies or other digital currency. Like any investment, these can carry risk. Media coverage of cryptocurrencies has been widespread, and observers have characterized cryptocurrencies as either the future of monetary and payment systems that will displace cash, government-backed currencies, or a fad with little real value.

1.1. Background

The world of cryptocurrency and blockchain are constantly evolving and fascinating to many. As one of the most valuable virtual currencies that is completely paperless and autonomous, Bitcoin has been the topic of discussion among financial investors, stock traders, software programmers, and the public in general. For centuries in history, people rely on printed money as the major medium of transacting business. Since its first introduction by a Japanese person who uses the pseudonym of Satoshi Nakamoto, Bitcoin and other forms of cryptocurrency open up new spectrum through this form of digital money to provide business transactions that are relatively secure, trusted, reliable. The nature by which cryptocurrency works makes the system less prone to human errors and malicious activities.

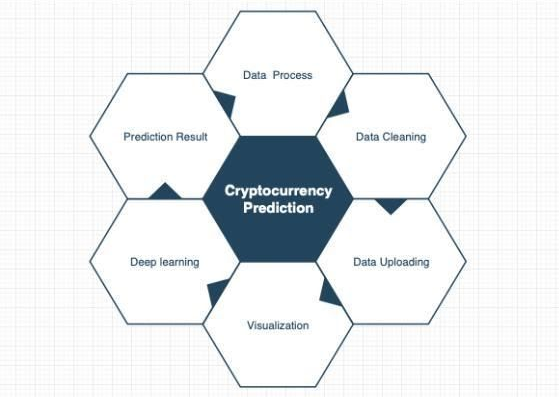
The system of cryptocurrency as a form of digital money is based upon the idea of blockchain, which can be understood as a ledger that is publicly available and can be monitored simultaneously by hundreds of computer users. The information contained within these blockchains can be verified among the public, thus potentially bypassing a centralized system operated by banks and other financial institutions. The Bitcoin, the Ethereum, and other similar cryptocurrencies presented a relatively volatile fluctuation in its face value. Over time, the market favoured a rise in the values of these digital currencies. Although some financial and academic leaders have raised concerns to the reliability of the cryptocurrency system, further research is required to better understand and improve any shortcomings of the cryptocurrency and blockchain system.

1.2 Cryptocurrency Price Prediction

Recently, a lot of interesting work has been done in the area of applying Deep Learning and Machine learning Algorithms for analysing price patterns and predicting cryptocurrency prices. Most traders nowadays depend on Intelligent Trading Systems which help them in predicting prices based on various situations and conditions, thereby helping them in making instantaneous investment decisions.

Cryptocurrency Prices are considered to be very dynamic and susceptible to quick changes because of the underlying nature of the financial domain and in part because of the mix of known parameters (Previous Days Closing Price, P/E Ratio etc.) and unknown factors (like Election Results, Rumors etc.)

An intelligent trader would predict the Cryptocurrency price and buy a Cryptocurrency before the price rises or sells it before its value declines. Though it is very hard to replace the expertise that an experienced trader has gained, an accurate prediction algorithm can directly result in high profits for investment firms, indicating a direct relationship between the accuracy of the prediction algorithm and the profit made from using the algorithm.



1.3 Dataset Specifications

Data size: 82MB
System : MacOs
Processor : 2.5 GHz

Storage : 500Gb
Memory : 8 GB Ram
Kibana : Version 7.1
Jupyter : Version 6.0

2.Visualization

2.1 Trend of Currency

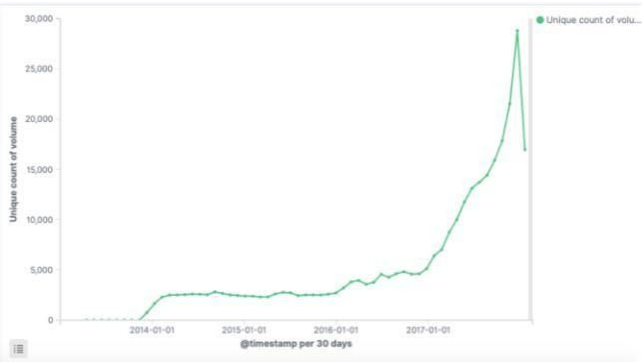


Fig. Illustrates the growth rate of count of volume per year. There was a drastic increase in the amount of the volume for cryptocurrencies during 2014 to 2017. Later, a sudden raise was noticed during 2018, buyers enticed to buy more bitcoins. During 2018, Market crash down which impacts buyers to lose money.

2.2 Currency Based on Rank

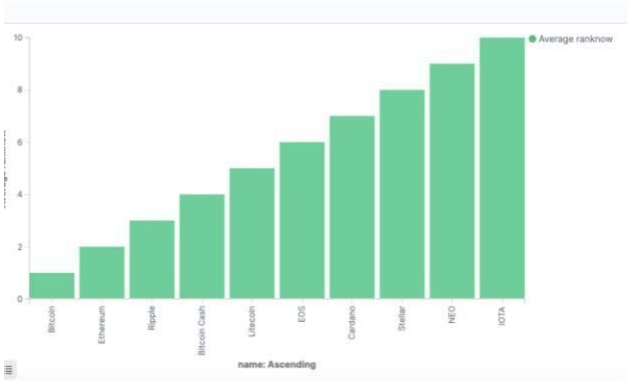
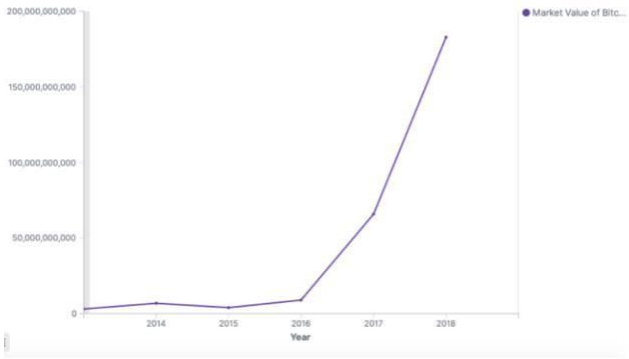


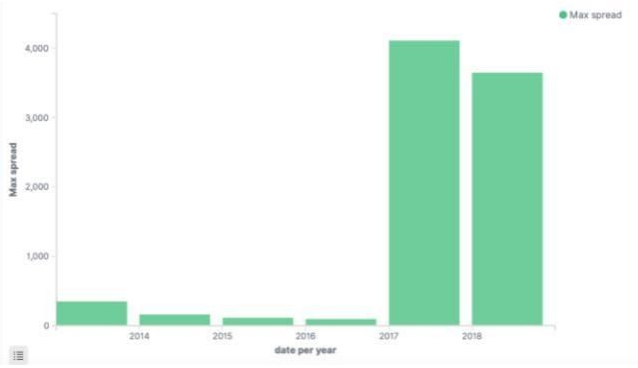
Chart illustrates the stock market ranking of various bitcoins available in the market. As per the record, bitcoin led the market with a significant jump in stock market makes buyers to entice more during the time period. The average price for bitcoin jumped over 10K dollars which makes it difficult for other stock to increase their prices. The IOTA and NEO are still struggling to achieve the spot in the marketplace. Bitcoin and Ethereum popularity make them continue to stay at the top spot.

2.3 Market Value of Bitcoin 2013 - 2018



Industry sectors are emerging with rapid growth rate producing scalable and flexible products and providing quality services. This attracts more customers and partners to get interest. People nowadays buy many stocks and make a lot of money out of it. Similarly, Bitcoin is attracting many people to buy its stock. As per the chart, over 17B market value of bitcoin was recorded during 2018. The growth rate was over 90% since 2016.

2.4 Max Speed out of Bitcoin 2013 - 2018



While no one is entirely sure how Bitcoin will continue to spread to the larger financial world, it seems likely that a limited supply of the currency may cause prices to continue to increase. During 2017, Max spread was nearly 4k and supply of currency fell during 2018 which made the spread fall to 75%.

2.5 Currency Based on Volume

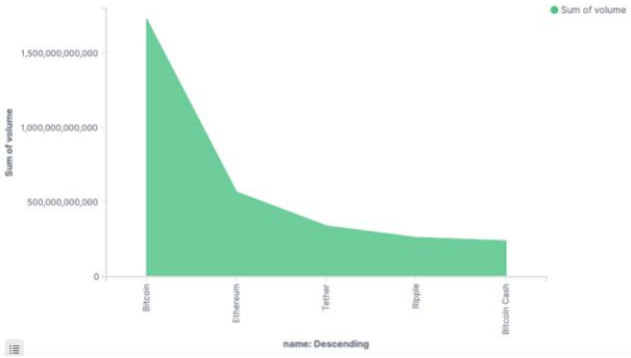


Fig shows the overall volume of stock market leading cryptocurrencies. The bitcoin price rising heavily makes buyers buy more stock. There were over 1.5B stock recorded for FY 2013 to 2018. Ripple and bitcoin cash struggles to make above average. The volume rate changes according to bitcoin price changes which affects others to increase their prices as well. Probably, the prices for bitcoin was predicted to cross over 13K/ per stock which would crash the stock market.

3. LSTM

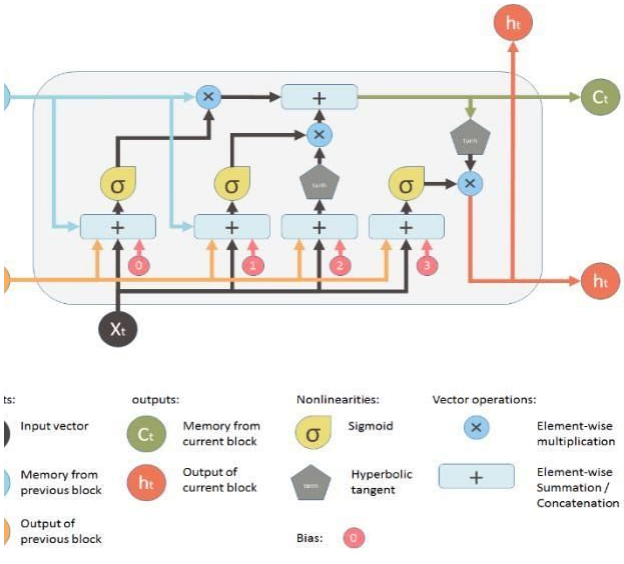
In the mid-90s, a variation of recurrent net with so-called Long Short-Term Memory units, or LSTMs, was proposed by the German researchers Sepp Hochreiter and Juergen Schmid Huber as a solution to the vanishing gradient problem.

LSTMs help preserve the error that can be backpropagated through time and layers. By maintaining a more constant error, they allow recurrent nets to continue to learn over many time steps (over 1000), thereby opening a channel to link causes and effects remotely. This is one of the central challenges to machine learning and AI, since algorithms are frequently confronted by environments where reward signals are sparse and delayed, such as life itself. (Religious thinkers have tackled this same problem with ideas of karma or divine reward, theorizing invisible and distant consequences to our actions.)

LSTMs contain information outside the normal flow of the recurrent network in a gated cell. Information can be stored in, written to, or read from a cell, much like data in a computer's memory. The cell makes decisions about what to store, and when to allow reads, writes and erasures, via gates that open and close. Unlike the digital storage on computers, however, these gates are analog, implemented with element- wise multiplication by sigmoids, which are all in the range of 0-1. Analog has the advantage over digital of being differentiable, and therefore suitable for backpropagation.

Those gates act on the signals they receive, and similar to the neural network's nodes, they block or pass on information based on its strength and import, which they filter with their own sets of weights. Those weights, like the weights that modulate input and hidden states, are adjusted via the recurrent networks learning process. That is, the cells learn when to allow data to enter, leave or be deleted through an iterative process of making guesses, backpropagating error, and adjusting weights via gradient descent.

Architecture of LSTM Network:



Classification :
A classification problem is when the output variable is a category, such as “red” or “blue” or “disease” and “no disease”. A classification model attempts to draw some conclusions from observed values. Given one or more inputs a classification model will try to predict the value of one or more outcomes.

For example, when filtering emails “spam” or “not spam”, when looking at transaction data, “fraudulent”, or “authorized”. In short Classification either predicts categorical class labels or classifies data (construct a model) based on the training set and the values (class labels) in classifying attributes and uses it in classifying new data. There are a number of classification models. Classification models include logistic regression, decision tree, random forest, gradient-boosted tree, multilayer perceptron, one-vs-rest, and Naive Bayes.

Classification Methods that we have used to get the accuracy of the predicted price:

1. Linear regression
2. Random Forest regression
3. Gradient Boosting regression

4. Bitcoin Currency Prediction in Kibana

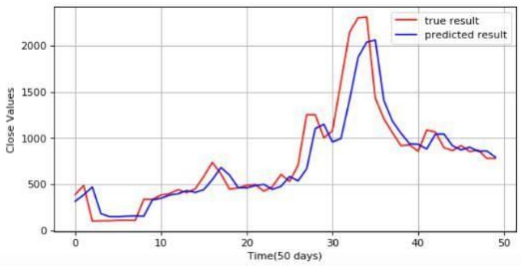


Fig. illustrates the true and predicted results for bitcoin currency in 50 days time span. The x-label considered as Time period and y-label considered as closed values. To perform the accuracy test on predicted, we will perform a regression and classification model. This will give us how accurate the model is performing.

5. Conclusion

Based on the market price from the year 2013 to 2018, we analysed and predicted the cryptocurrency on the past data. Machine learning algorithms help us to identify the accuracy of predicted models. The model was tested and achieved highest accuracy which helped us to determine the future price of any cryptocurrency by building a neural network.

5. Accuracy of Predicted Model

```
LinearRegression
R2: 0.92
MAE: 272.55
MSE: 306675.91

Random Forest Regressor
R2: 0.99
MAE: 59.38
MSE: 39775.02

Gradient Boosting Regressor
R2: 0.98
MAE: 94.01
MSE: 71672.11
```

6. References

[1] A Beginner's Guide to LSTMs and Recurrent Neural Networks. (n.d.). Retrieved from https://skymind.ai/wiki/lstm,

[2]Yan, S. (2017, November 15). Understanding LSTM and its diagrams. Retrieved from https://medium.com/mlreview/understanding-lstm-and-its- diagrams-37e2f46f1714

[3]Statistical classification. (2019, June 11). Retrieved from https://en.wikipedia.org/wiki/Statistical_classification