# The Impact and Trend of Virtual Currency

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**ABSTRACT**[1]

Cryptocurrency, which falls into the category of virtual currency, has become increasingly popular in recent years. There are zero or very minimal transaction fees and the transactions are anonymous. In this report, we will discuss the impact of adopting the virtual currency in our society. We will investigate virtual currency by analyzing and comparing some top cryptocurrency stocks to see the trend and try to predict their futures. Specifically, Python Jupyter Notebook will be the tool to analyze the data. Data will be preprocessed and explored. Machine learning modules will be used to learn the datasets and the moving trends will be predicted.

**Keywords**: Virtual Currency, Cryptocurrency, Machine Learning, LSTM.

## 1. INTRODUCTION

There are more than a thousand virtual currency stocks on the market which have a market cap of more than ten million dollars [1]. Cryptocurrency, which falls into the category of virtual currency, has become increasingly popular in recent years. Is there a possibility that cryptocurrency will cause fiat currency — currency that is regulated and issued by a government — to be outdated? What are the impacts of cryptocurrency to society? We plan to analyze some of the top cryptocurrency stocks to predict the trend of this currency. We will also estimate the risks of this increasingly popular financial product to the individual, community, and government.

Due to the recent unprecedented rise in the prices of raw materials all over the world and because of the Covid pandemic, many governments around the world have developed stimulus programs to distribute money to their citizens. A majority of the money has gone into the stock market and many stock prices, even that of traditional stocks, have skyrocketed as a result. We have seen this increase in stock prices and a greater volume of trading activity in recent days, especially as the US and Europe are starting to reopen. The question is, can we use the traditional machine learning approach to find the pattern of the stock market in order to predict its trend? Since the virtual currency markets are relatively young and there is not much data to gather, how we can use machine learning approach to predict it? Unlike other stocks, virtual currency stock does not have a product or any new product to evaluate their value, and therefore it is not easy to predict its trend and price. Will it dominate the world or will it eventually be wiped out? This is something that only time will tell. Some governments have already banned virtual currency; for example, the Indian Supreme Court banned virtual currency in March 2020 [3] and the USA banned trading of Binance [2].

If a government cannot control the currency on its own territory, it will lose a great control power to govern its people. Consider what would happen if the world stopped using the US dollar as the global currency to trade – this would be a detriment to the US government and people. Countries would no longer need to keep reserves of the US dollar in order to buy goods, which means a large amount would eventually come back to US territory and result in an excess of the US dollar circulating in the USA. Therefore, governments will seriously regulate this market. It is unknown if the virtual currency will be legalized and widely used.

When one considers a stock, one can usually evaluate and analyze certain aspects, such as a company's quarterly financial report, its new products (if any), its corresponding supply chains, its stock values and moving trends. It is well known that geopolitics and government policies will also affect the stock market in certain ways. Yet for virtual currencies, if there are no governmental regulations, then the only things are the stock market trend and rumors. Among virtual currencies, Bitcoin is one that is most widely discussed [4, 9, 10, 11, 12]. For a recent survey of cryptocurrencies, one can refer to [8].

The technologies used in virtual currency are either centralized or decentralized. The well-known decentralized technology is Blockchain [6, 7]. Blockchain technology not only used in cryptocurrency application, it can also be used in things like storing legal documents such as insurance contracts [5]. In this report, we will investigate virtual currency by analyzing and comparing some top cryptocurrency stocks to see the trend and try to predict their futures.

## 2. DATA PROCESSING AND ANALYSIS

The Python Jupyter Notebook will be our tool to analyze the data. Data will be preprocessed and explored. Machine learning Python modules will be used to learn the datasets. The following are some of the preliminary results that we have gathered so far. The moving averages over a 20-day range and 50-day range were used to allow us to better observe the trend of these stocks.

### Explore the Datasets

Data for Bitcoin, Ethereum & Dogecoin is taken from Yahoo Finance website [18, 19, 20], Bitcoin & Dogecoin for the period

[1] I would like to express my gratitude to Prof. Katrina Kao for her careful and comprehensive peer-editing and proofreading of this paper.

2015-01-01 to 2021-05-25 & Ethereum for the period 2015-08-08 to 2021-05-25. These datasets were preprocessed using Python to look for nulls and blank values and these types of rows with nulls were dropped from the dataset for better accuracy. Fig 1 shows the dataset and the attributes of the record.

| | Date | Open | High | Low | Close | Adj Close | Volume |
|---|---|---|---|---|---|---|---|
| 0 | 2015-01-01 | 320.434998 | 320.434998 | 314.002991 | 314.248993 | 314.248993 | 8.036550e+06 |
| 1 | 2015-01-02 | 314.079010 | 315.838989 | 313.565002 | 315.032013 | 315.032013 | 7.860650e+06 |
| 2 | 2015-01-03 | 314.846008 | 315.149994 | 281.082001 | 281.082001 | 281.082001 | 3.305440e+07 |
| 3 | 2015-01-04 | 281.145996 | 287.230011 | 257.612000 | 264.195007 | 264.195007 | 5.562910e+07 |
| 4 | 2015-01-05 | 265.084015 | 278.341003 | 265.084015 | 274.473999 | 274.473999 | 4.396280e+07 |
| ... | ... | ... | ... | ... | ... | ... | ... |
| 2332 | 2021-05-21 | 40596.949219 | 42172.171875 | 33616.453125 | 37304.691406 | 37304.691406 | 8.205162e+10 |
| 2333 | 2021-05-22 | 37371.031250 | 38831.054688 | 35383.683594 | 37536.632813 | 37536.632813 | 5.737727e+10 |
| 2334 | 2021-05-23 | 37531.449219 | 38289.218750 | 31227.339844 | 34770.582031 | 34770.582031 | 7.846927e+10 |
| 2335 | 2021-05-24 | 34700.363281 | 39835.140625 | 34551.082031 | 38705.980469 | 38705.980469 | 6.735958e+10 |
| 2336 | 2021-05-25 | 38994.089844 | 39769.582031 | 36613.289063 | 38214.316406 | 38214.316406 | 5.998984e+10 |

Fig 1. Preprocessed dataset for Bitcoin

The following diagrams are some of the visual results of the datasets that we explored. The moving averages over a 20-day range and 50-day range were used to allow us to better observe the trend of these stocks.

Bitcoin launched in 2009, its price crossed $1 in 2011, reached $200 in 2013, by mid 2017 its highest price was about $19,650, then fell tremendously and raised exponentially surprisingly reached $23,000 during pandemic times [20]. It can be visualized in Fig 2.

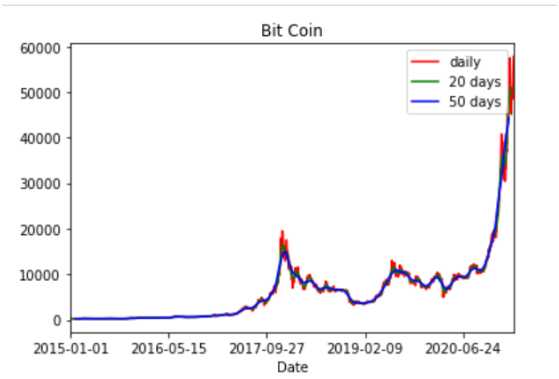


Fig 2. Bitcoin growth price chart from 2015 to 2020

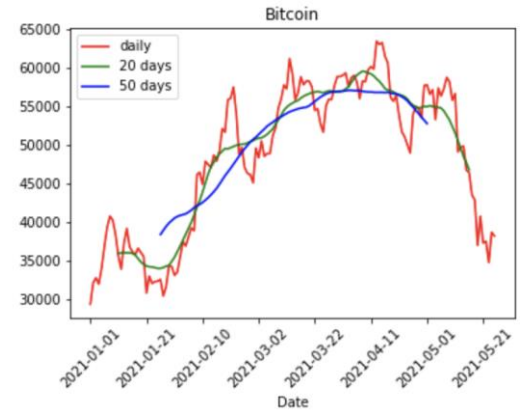


Fig 3. Bitcoin predicted growth chart from 2021-01-1 to 2021-05-21

Bitcoin predicted growth chart for the period 2021-01-01 to 2021-05-21for daily, 20-day range and 50-day range is depicted in Fig 3.

Dogecoin, started in 2013, which does not have a limit to the number of coins that can be produced in the system, mostly used as tipping, had an initial value of $0.000264, moved to $0.0131219 by 2018, slipped to $0.001 in 2019 and with the effect of social media and tweets by influential people, its price reached $0.079696 in 2020 [21] (See Fig 4).

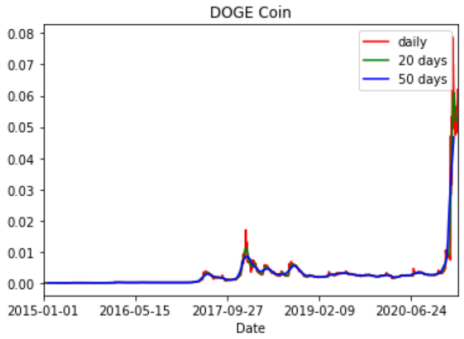


Fig 4. Dogecoin growth price chart from 2015 to 2020

Dogecoin predicted growth chart for the period 2021-01-01 to 2021-05-21for daily, 20-day range and 50-day range is depicted in Fig 5.

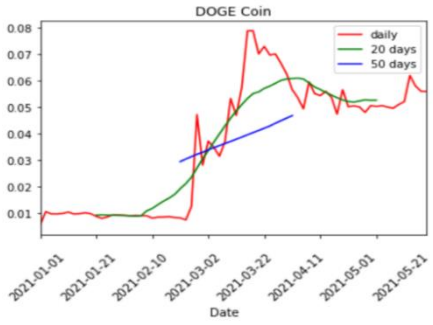


Fig 5. Dogecoin predicted growth chart from 2021-01-1 to 2021-05-21

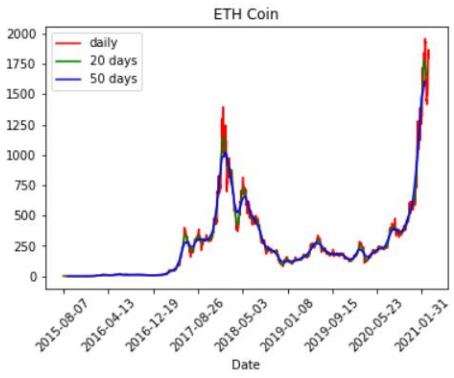


Fig 6. Ethereum growth price chart from 2015 to 2020

Ethereum, launched in 2015, costed just under 67 cents, after a slow and steady climb it reached $343.2, cryptocurrency rush

made big spike in 2017 to $1,405.21, and it dropped to $379.75 in 2018 [23] (See Fig 6).

Ethereum predicted growth chart for the period 2021-01-01 to 2021-05-21for daily, 20-day range and 50-day range is depicted in Fig 7.

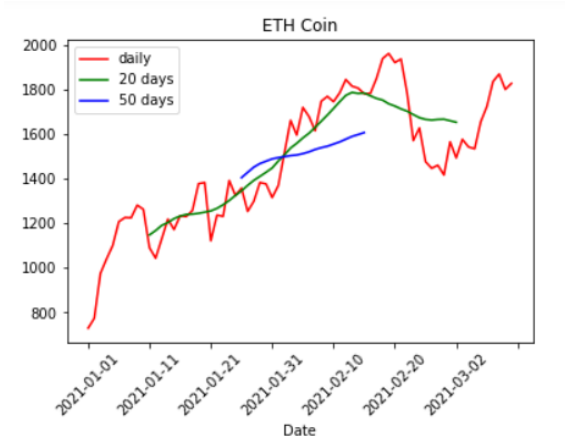


Fig 7. Ethereum predicted growth chart from 2021-01-1 to 2021-03-2

According to the data diagram shown above, Dogecoin stock volumes from 2015-01-01 to 2021-01-01 reached 228,961,515 from 306,913 with a ratio > 31. The adjusted closing price reached 0.005685 from 0.000183 with a growth rate of 74601%. That means that a $1000 investment in 2015 would yield a return of $746,000 this year. The Bitcoin volume grew 5068 times and the adjusted closing price had a growth rate of 9347%. The Bitcoin and Dogecoin data were calculated from 1/1/2015 to 1/1/2021. The Ethereum volume grew to 13,652,004,358 from 164,329, while the adjusted closing price had a growth rate of 26346% and grew to 730.367554 from 2.772120. These numbers were computed based on the earliest data found 8/7/2015 to 1/1/2021.

Based on the speed and momentum of growth, this suggests that the growth of the virtual currency stock market might continue to soar. But it is unlikely that governments will allow it to continue growing without regulation. So for those who hold such stocks, the question would be when they should sell the stocks.

## 3. PREDICTIONS OF STOCK TREND

To analyze the trend of crypto currency prices and to predict the stock price, Long Short-Term Memory (LTSM) machine learning method is used. It is an artificial recurrent neural network (RNN) architecture used in the field of deep learning. LSTM networks are well-suited to classifying, processing and making predictions based on time series data [13]. LTSM has feedback connections. It can process single data points as well as entire sequences of data. A LTSM unit consists of an input, an input gate, an output gate and a forget gate. The input remembers values over arbitrary time intervals and the three gates regulate the flow of information in and out.

Deep learning is a class of machine learning algorithms that uses multiple layers to progressively extract higher level features from the input. Recurrent neural network (RNN) has connections between nodes forming a directed graph along a temporal sequence. This allows it to exhibit temporal dynamic behavior. RNNs can use their memory to process variable length sequences of inputs.

Time series forecasting is a technique of using the time series data values and using it to predict future values on data.

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 [14].

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 the iterative process of making guesses, backpropagation error, and adjusting weights via gradient descent [14].

Fig.8 shows the layout of LSTM. It displays the interconnections of gates and how sigmoid activation functions were applied in different neurons.

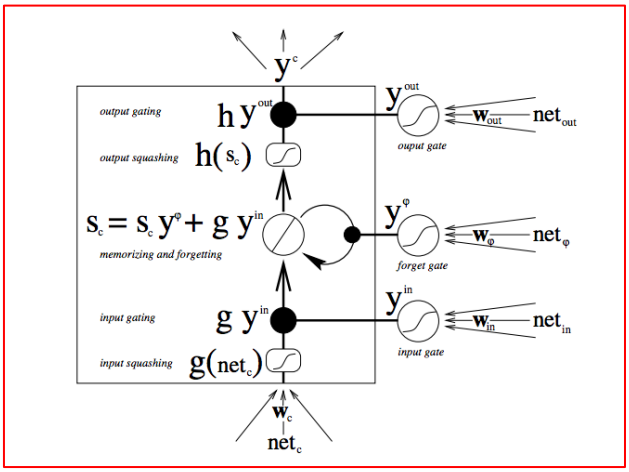


Fig 8. LSTM gradients and gates

LSTM has been implemented using Python, Pandas and Keras. Fig9. Gives a snap shot of Python coding on Jupyter notebook.

```
model = Sequential()
model.add(LSTM(50, return_sequences=True, input_shape= (x_train.shape[1], 1)))
model.add(LSTM(50, return_sequences=False))
model.add(Dense(25))
model.add(Dense(1))
```

Fig 9. Python code snippet

Bitcoin, Ethereum & Dogecoin trend graph for actual values and predicted values from 2015 to 2021 shown in Fig. 10, 11, 12.

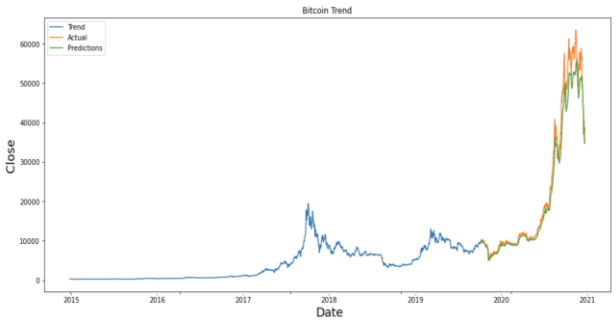

Fig 10. Bitcoin Trend graph

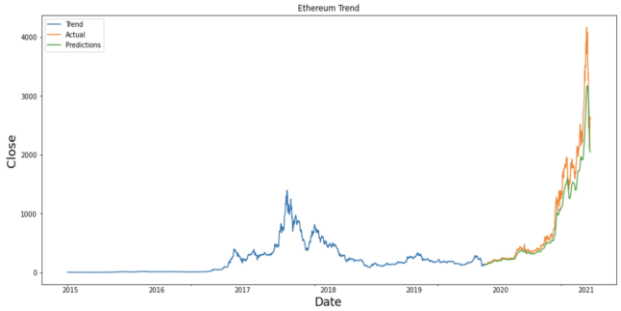

Fig 11. Ethereum trend graph

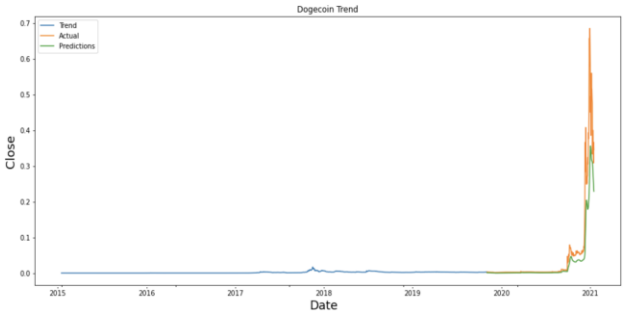

Fig 12. Dogecoin trend graph

## 4. NEWS EFFECT ON STOCK PRICES

Any kind of news impacts stock market one way or another. Depending on a company's growth, new acquisitions, annual earnings reports make a buyer to invest in the stocks there by making the stock price increase. Stock prices get effected by natural calamities as recently as COVID pandemic. Because of hype given as part of company's marketing strategy, impacts the stock price. Sometimes, a highly influential person or. A social media personality makes a statement about the stock, that effect on the stock price cannot be predicted. Recently, Elon Musk Tesla CEO, tweeted about Dogecoin making its stock price to jump 56 cents. As per the Coin Metrics data, Dogecoin was up 39.4% at 54 cents per coin, its best day since Apr 2016 [15].

Just a statement or a tweet by a popular person impacts the stock price in a negative way also. When Elon Musk gave a statement that Tesla Inc. may sell or already sold all cryptocurrency holdings, Bitcoin price plummeted to the lowest since Feb 2021 [16]. Dogecoin, Bitcoin & Ethereum charts as per the actual market cap values are shown in Fig.13, 14, 15.

Fig 13. Dogecoin chart

Fig 14. Bitcoin chart

Fig 15. Ethereum chart

## 5. CONCLUSIONS

In this report, we investigate the impact of adopting the cryptocurrencies in our society. Machine learning approaches were used to predict the trends of some top virtual currencies. Because there were no regulation and support from governments except El Salvador on the writing of this report. We consider the widely used of cryptocurrencies has long way to go. However, we do expect more and more people will go for digital currencies due to the conveniences for people and the support from banks and governments.

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