Bitcoin - The Global Currency

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December 2017

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BITCOIN - THE FUTURE GLOBAL CURRENCY?

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October 2017

Abstract: Globalization has brought along countless innovations that have become crucial to the modern society; amongst these is the introduction of cryptocurrencies. Despite the reservation voiced by many regarding their viability, cryptocurrencies continue to be a strong candidate of what is to become a global currency. This paper examines the probability that Bitcoin, the first decentralized cryptocurrency, becomes the shared currency of the world. The research aims at identifying and analyzing the qualities and conditions of the emergence of the global currency and Bitcoin's potentials as a candidate. The results from this study will shed light on the prospect of Bitcoin becoming the global currency of the future.

Keywords: bitcoin, cryptocurrency, globalization, global currency, gold, financial market

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I/ Introduction

The modern globalization has initiated a remarkable degree of integration, standardization, and uniformity to the world. In the last two hundred years, the world has borne witness to various advancements of mankind, including the foundation of many crucial global organizations, such as the United Nations and World Trade Organization. Representatives from countries gather more often to coordinate policies and eliminate barriers. As the world converges and global trade prospers, the need for a shared global currency should arise as the next deciding stimulation to the world economy, since it will eliminate the risk from fluctuating foreign exchange rates, reduce transaction costs, and promote an even larger volume of foreign goods and services exchange.

II/ Theoretical Framework

1. Global Currency Definition

A global currency can be defined as a medium of exchange that is shared and used globally. As the currency that will be shared by worldwide population, it should possess at least two qualities:

- High liquidity – the ease to exchange such currency for goods and services despite geographical location
- Low risk – low sensitivity towards volatile market movements

Being the regionally shared currency of Europe, the European Euro serves well as a precedence and important case study into the requirements for the establishment of a global currency.

2. A Short Case Study: Euro – The Shared Regional Currency

The success of the regionally shared currency, the European Euro, should set the groundwork for the impending global currency. In the late 1960s, it was decided that the foundation of the European Union (EU) would promise "stability and an environment for growth and development" ("The History of the Euro", 2017). For a whole decade (1990 - 1999), the EU has completed three economic preparatory steps to welcome the newly created shared currency, the Euro: created an internal market with free capital movements within the region, founded the regional central bank to regulate the new currency, and fixed the exchange rate and launched the currency ("The History of the Euro", 2017). Born from a great amount of effort and collaboration, the Euro has offered various disadvantages and advantages to the region. Being the shared currency of 19 out of 28 EU members, the Euro became an unchanging commitment that connects the economies of 19 different countries. Even though the EU has made great effort in the preparatory phase for the Euro to create an initial internal market, those member countries that joined in later sometimes brought along unbridgeable gaps that skewed the balance of the regional economy. Nonetheless, the shared Euro also brought countless advantages that proved to have outweighed those shortcomings previously discussed. These benefits include the elimination of fluctuating exchange rates and exchange costs and the stimulation of free trade on a regional scale.

From this brief history of the Euro, we can establish three conditions for successfully implementing a globally shared currency:

- First, the countries that join the shared currency union must be at the same (or at least similar) levels of economic development.

- Second, the chosen currency must be politically neutral; in other words, the shared currency cannot be the currency of any member countries, or else the economic power balance will be greatly skewed in favor of that one country.
- Third, there should be a collection of entities (governments in this case) to enforce and regulate the working of the new currency.

3. Global Currency Candidates

Currently, there are three candidates for the role of the global currency: the traditional gold standard, one of the prevailing major currencies, or a representative from the emerging cryptocurrencies.

Gold has been the core of all exchange medium since the end of the bartering era. The centuries of its existence have built an unwavering trust in the people regarding its value; and in turns, this unwavering trust lies as the core of gold's persisting value. Consequently, gold possesses the quality of a safe-haven, a traditional first-choice reservoir of wealth whenever there is instability or fluctuation in the financial market. Considering the two required qualities mentioned above of the global currency, gold seems to fit in the bill perfectly. It has great liquidity as its value is acknowledged all over the world (thus can be converted into any currency), and it has the best safety insurance due to people's unchanging trust in its value. Nonetheless, gold fails to satisfy any of the three implementation conditions for the global currency. To be more specific, gold mines are distributed unequally all over the world and major countries tend to have a much greater gold reserves compared to others (the perk of being at the higher position in international trade for centuries). These facts make it impossible for gold, although ubiquitous all over

the world, to be adopted as the global currency as gold is not a political neutral currency and thus will tremendously skew the favor gained by the change to the current major countries in the world. In this case, there is also no pre-existing collection of entity that can regulate the use and distribution of gold. Furthermore, the difficulty in its daily usage, management, and distribution is the decisive reason gold becomes obsolete and less favorable to be used as the world's currency. In fact, history has proven that convenient paper money and online credit will eventually replace the needs for gold in daily trade.

Another possible candidate for the role of the global currency is one of the current major currency. Currently, the four strongest currencies are the United States Dollar, the European Euro, the Japanese Yen, and the British Pound. Out of these four currencies, being the previous standard reserve asset in the Bretton Woods system and the current important standard peg of various currencies, the U.S. Dollar is used ubiquitously as an intermediary of foreign exchange and thus the most likely candidate. Consequently, the U.S. dollar holds a considerable political and financial influence on the world market. This power is both the perk and the downfall of the U.S. dollar's candidacy. Choosing the U.S. dollar to be the global currency would mean the ease of implementation since the U.S. dollar has already been widely used as the world intermediary currency; however, it also means even more economical and political power concentrated at the expense of the United States, which will unlikely gain the consensus of other countries.

As an alternative, this study examines the possibility that cryptocurrencies, represented by Bitcoin, become the global currency. Bitcoin is a good contender for the position because it can satisfy both qualities set above for the future global currency. First, it can be said that Bitcoin has a high level of liquidity because it is widely used as an

intermediary currency between many major currencies (U.S. dollar, Euro, Japanese yen, Chinese RMB and others) due to the ease of conversion and the reduced needs of paperwork and transactional fee. Second, in many researches, Bitcoin has been closely examined and confirmed to share the same characteristics of being able to serve as a safe-haven and wealth storage, similar to gold and the U.S. dollar. In addition, Bitcoin also satisfies the three conditions to be successfully implemented as a global currency. First, since Bitcoin only targets the online payment market segment, the major traders of Bitcoin are developed countries with the similar economic conditions (United States, Japan, European Union, etc.). Second, being a decentralized currency, Bitcoin is the most political neutral out of all three candidates. Bitcoin has no direct affiliations to any central authority; it should help stimulate the free market while creating fair and equal impacts on individual countries when adopted as the global currency. Its emergence since only 8 years ago also ensures that no countries have amassed enough Bitcoin reserve to become the most influential figure in the Bitcoin market. Third, despite being a decentralized currency, Bitcoin does indeed have a collection of entities to regulate its working – the miners. The effect of this regulative group on Bitcoin's decentralization will be further discussed in the literature review below.

III/Literature Review

1. Bitcoin – A Brief History

On October 31st, 2008, Satoshi Nakamoto set the foundation for Bitcoin by publishing a white paper through metzdowd.com, a cryptography mailing list, to introduce the technical framework of Bitcoin and the solution to prevent cryptocurrency's problem of

double-spending ("Bitcoin History"). On January 3rd, 2009, the first Bitcoin block chain, the genesis block, was mined ("Bitcoin History"). From June 2011 until now, Bitcoin prices have experienced a few crashes that creates Bitcoin's notoriety in public opinions ("Bitcoin History"). However, in the article "Anniversary of the Great Bubble of 2011," Buterin, a co-founder of Bitcoin Magazine, claimed that, during the post-bubble period, the "Bitcoin community acquired most of its current members" while the fast recovery shows that the member of the Bitcoin community "are willing to endure hard times for the sake of a brighter long-term future" (2012).

This endurance exhibited by the Bitcoin user community is the deciding factor to Bitcoin's stability and trust-worthiness as a currency. The value of every currency is based on the convention made by people: gold has such strong value due to the longevity of the gold standard convention; the dollar, even though it has become a fiat currency for quite some time, has such strong value because the public believes that the U.S government will vouch for its value through the ups and downs of the economy. Bitcoin is the same: with such staunch trust from the Bitcoin enthusiast community and their experience with various fluctuations in Bitcoin's history, the fact that they voluntarily remain as Bitcoin users proclaims their unwavering trust in the future major role that Bitcoin will play in the global market. This based-on-speculation-only convention may rival, or even surpass, the conventions enforced by central authorities.

2. Groundwork Set by Satoshi Nakamoto's "A Peer to Peer Electronic Cash System" (2008)

In his paper published in 2008, Nakamoto proposes the Bitcoin system that disruptively innovates the way that electronic transactions are initiated and processed. He

argues that the traditional method of processing transactions through a trusted third-party (usually financial institutions) always suffers from the "inherent weaknesses of the trust based model" as the banks cannot offer a completely non-reversible transaction in case dispute occurs. And as reversibility remains, the need for trust increases. He concludes that by providing a cryptographic proof instead of relying on trust, Bitcoin can become the first transactional system that can allow people to make direct electronic exchange without the need of a trusted third party (an independent system for online peer-to-peer transactions). The major setback to the realistic implementation of previous cryptocurrencies is the unresolved problem of possible double spending. Nakamoto directly addresses this problem in his paper and Bitcoin's framework: by implementing a timestamp in each block chain and keeping a public history record of transactions, the honesty of each block will be confirmed or rejected by the control by the majority vote of CPU power (the network of computer power provided by Bitcoin miners and users). He also further states that any future necessary rules or incentives can be decided using the same "consensus system."

3. Characteristics of Bitcoin

3.1. Qualifications

3.1.1. High liquidity

Theoretically, there is no limit to Bitcoin's liquidity. Being a peer-to-peer online payment system, Bitcoin can be exchanged for goods, services, or currencies as long as both traders agree to such transaction. In reality, this ability of Bitcoin is greatly limited because of its low rate of exposure (or popularity). Cryptocurrency is a novel concept; thus, the risk associated with it can be considered unreasonable to those who advocate the use of

traditional currencies. However, Bitcoin's superiority in transactional speed and reduced fee will surely give room for Bitcoin to grow even more popular, ready for people to understand its mechanism more thoroughly and then gradually accept the innovative convenience it brings.

Currently, Bitcoin has been playing a huge role in being the intermediary for various major currencies: Japanese Yen, United States Dollar, Euro, Korean Won, and British Pound. Nonetheless, in the future, as the Bitcoin community grows in number, Bitcoin's potential liquidity should be realized and appreciated.

3.1.2. Low risk

In a research by Bouri, Jalkh, Molnar, and Roubaud (2017), Bitcoin's potential properties as a diversifier, hedge, and safe-haven were examined using the pairwise dynamic conditional correlations (ADCC model) on the relation between Bitcoin and each of the three commodity indices (general commodity index, index for energy commodities and index for non-energy commodities) for the two sub-periods, before and after the December 2013 Bitcoin crash. The result of this analysis shows that Bitcoin has a "time-varying diversification ability" and it can serve as a "strong hedge and safe-haven for energy commodities, but not for non-commodities." At first glance, the result may provide an analogy to the safe-haven property of gold (the main reason to gold's appeal as the global currency); however, there are two facts that undermine the analogy. First, this result only shows a weak tendency for Bitcoin to exhibit such safe-haven properties (considerably weaker than that of gold). Second, this result may have been greatly affected by the fact that, currently, only a small portion of the global financial market participates in the trade of Bitcoin, which is why Bitcoin shows low sensitivity to market volatility. As

more traders take part in the Bitcoin transaction system, Bitcoin should reflect the market volatility more closely as a direct consequence.

Nonetheless, these facts are also insufficient to claim that Bitcoin is an unmanageable risky currency. In the eight-year period of its existence, Bitcoin has been through countless ups and downs and, as a result, the majority public often doubt the safety Bitcoin guarantees. Answering to this issue, there are two facts to be noted. First, Bitcoin is still in its infancy stage when compared with other more "mature" currencies, so it would only be fair to compare Bitcoin with other currencies when it is given more time to grow and stabilize. Even though its growth is quite volatile, Bitcoin always grows back up while gaining more popularity, participation, and faith from the people; actually, the overall trend for Bitcoin is such an exponential growth that some critics are fearfully predicting inflation and speculation bubble. In the section below, the reason why such fear is baseless will be discussed in details.

3.2. Implementing conditions

3.2.1. The shared market

One condition for a successful implementation of shared currency is that the member countries have to share the same degree of economic development. This condition will be automatically satisfied if Bitcoin is chosen as the global currency. Bitcoin is a currency system for online payment only. The history of world economic development can be divided into different periods/stages using the contemporary method of payment: starting from barter, gold, silver, bronze coins, bank notes, paper money, debit/credit to Bitcoin. Currently, all the countries that have housed the major trading of Bitcoin are developed countries with citizens use online payment as the main purchasing method. As a

new union of shared currency (Bitcoin) is founded, these countries (with the same level of economic development stage) will become the first members, the initial internal market that nurtures the shared currency before the other countries can grow enough to also transition to using online payment as the main paying method.

3.2.2. Political neutrality

Bitcoin is a decentralized currency: it does not involve any governments, central of local banks in its working. Consequently, when chosen as the global currency, Bitcoin will not skew the economic balance towards any political powerhouse.

3.2.3. Regulative body

Despite being decentralized, Bitcoin still has a collection of entities to regulate its mechanism: the group of miners and developers. Utilizing the majority consensus method provided by Satoshi Nakamoto when designing, Bitcoin gives the right and power to regulate it in the hand of the people, the community. Bitcoin is rather special in this case: it requires trust from no one and everyone at the same time. There is no need for a centralized trusted authority in the system because everyone in the community has access to the public records, and thus can judge the integrity of all that has been happening. The system took the trust away from one entity and put it in the hand of the community, trusting that with everyone watching and judging, everyone should be honest.

4. Bitcoin User's Profile

The number of current Bitcoin users is estimated to be around 15 million users. From a research by Ermakova et. al., the profile of a typical Bitcoin user has been created. According to the result of the survey, a Bitcoin user would typically be an adult of the

working age from a developed country and possessing some knowledge of the financial market and technology advancements. Considering demographic data of the major countries that trade in Bitcoin (US, Japan, EU), the potential number of Bitcoin users should be at least ten-fold of that amount. One explanation to such disparity between real and potential number of users is Bitcoin's low rate of exposure. Bitcoin news appears more frequently on major and official newspapers and magazines only recently. In addition, one who knows of Bitcoin's existence may not necessarily know of Bitcoin's mechanism. After years of volatility, Bitcoin has gained much notoriety of instability. Newcomers of the Bitcoin community may be prejudiced before thoroughly getting to know Bitcoin.

IV/ The Future of Bitcoin

1. Hypothesis: Bitcoin as the Future Global Currency

There are several pros and cons regarding Bitcoin's hypothesized future as a global currency.

On the one hand, Bitcoin will bring various advantages to the global market. The first advantage lies in its distribution. Bitcoin is distributed in its own mining system: miners will be rewarded with Bitcoin as they commit their CPUs power in mining new Bitcoin. The cost of mining (or mining difficulty) will gradually increase over time so that the mining rate will also slows down until stopping completely when all 21 million Bitcoins, the fixed amount of Bitcoins that will ever be mined and distributed, are available to the market. The purpose of this design is to simulate the rarity, the core value, of gold and to ensure that no inflation resulted from an over-injection of the currency into the money circulation could take place in the long run. The second advantage lies in its ease of

usage. Bitcoin's decentralized property eliminates all unnecessary paperwork, fee and time consumption resulted from the involvement of financial institutions; therefore, Bitcoin users can easily complete a transaction in two steps: exchanging user's currency to Bitcoin and setting up the transfer destination (a wallet address).

On the other hand, Bitcoin also brings many concerns to the potential users regarding its safety, regulation, and possibility of deflation. In Ermakova et. al.'s paper, safety has been identified as leading challenge to the adoption of Bitcoin. Due to Bitcoin's notoriety in public opinion, many have failed to recognize its improvement from the earlier years. Evidently, the number of theft attacks and price crashes have significantly decreased with time. Another concern that many have is the inflation resulting from Bitcoin's speculative bubble. The editors from the Economist have discussed this problem at great length in the article "What if the bitcoin bubble bursts?" and reached the conclusion that Bitcoin generated a "healthy bubble," as the system is still fairly "self-contained" and unlikely to spread contagion to the rest of the economy (2017). In addition, as discussed above, the Bitcoin community is comprised of staunch believers; this characteristic adds to the non-contagious property of Bitcoin. As they are a community built on trust, the trust in the community and the risk endurance that they have accumulated up till now prevents the possibility of uniform withdrawals from the system. The third often voiced concern is the fear of deflation. As the amount of Bitcoin is fixed at 21 million Bitcoin, when the number of Bitcoin reaches the ceiling limit, a deflation is bound to happen: the price of Bitcoin will be raised continuously in relation to commodities, increase the incentive for savings and decrease motivation for investment in the market. However, this criticism fails to take into consideration the divisibility of Bitcoin. As Cawrey mentions in his article on Coindesk,

"Bitcoin is currently dividable down to 0.00000001 of one BTC" (2013). This ability will become useful should the need arise to fight against future deflation.

2. Bitcoin – A Closer Future

Despite all redeeming features that Bitcoin possesses to become the shared currency of the world, the possibility remains a prediction for years to come so that Bitcoin can further mature or better means of forecasting are devised. There is one thing, however, that can be predicted with much better precision – Bitcoin's short-term future. In the short-term, along with the recent Bitcoin's craze and trend and newspaper exposure, Bitcoin should gain more and more new users and even higher market capitalization.

V/ Bitcoin Future Prediction – Neural Network Model

1. Purpose

In order to learn and forecast the trend of the change in number of Bitcoin transactions (or Bitcoin's popularity) in the coming year (2018), a machine learning neural network model has been chosen to make a general forecast using the data collected during the 8 years that Bitcoin has been in circulation.

2. Data source

Data in this research has been obtained from blockchain.info, a bitcoin cryptocurrency wallet and block explorer service. The studied dataset is number of confirmed Bitcoin transactions for the period from 03 January 2009 to 15 November 2017 (from the issuance of the first Bitcoins until now) ("Number of Confirmed Bitcoin

Transactions Daily"). The total number of observation is 1620. The data is collected and recorded every two-days.

3. Data statistics

Considering the great skewness of data (1.076) for the whole period 2009 - 2017, the dataset will be divided into two subsets for two different forecasting trials: one is the full dataset, the other is a sample of data from 02 January 2015 to 15 November 2017 (525 observations).

Statistics	*Full dataset (2009 - 2017)*	*Sample (2015 - 2017)*
Mean	83928.75494	206155.9295
Standard Error	2408.650596	3150.962024
Median	51240.5	216812
Mode	125	203165
Standard Deviation	96946.31638	72197.60992
Sample Variance	9398588260	5212494879
Kurtosis	-0.129945494	-1.054788011
Skewness	1.07589616	-0.086754969
Range	367710	295476
Minimum	0	72234
Maximum	367710	367710
Sum	135964583	108231863
Number of observations	1620	525

4. The Model

The model is a machine learning neural network that has been tailored using Python, various machine learning libraries (sklearn, pandas, numpy, mathplotlib, and tensorflow) and the source code from Aymeric Damien's Neural Network Example. The

input dataset will be read from file, normalized and scaled (values 0 - 1) before any prediction is made. The parameters of the program are set as shown below:

Parameters	Value
Number of epochs	4000
Learning rate	0.01
Batch size	100
Hidden layer 1	30
Number of input (number of data for 1 year)	183
Number of output (number of data for 1 year)	183

The model will be used on the datasets two times. In the first trial, the full dataset will be used as the training set to help predict data on the number of Bitcoin transactions in 2018. This trial is expected to produce poor forecasting performance due to the great skewness in the dataset. In the second trial, the sample dataset will be used as the training set to help predict data on the number of Bitcoin transactions in 2018. This trial is expected to produce better and more realistic results compared to the first trial since the outlier data from the first few years have been cut off from the training set.

The model will report the training loss and testing loss (mean square error of the data), a color-coded chart (blue line for the training data and orange line for predicted data) and an array of predicted data at the end of the Python program.

5. Result

The first trial produces a prediction with the train loss of 0.023035. Taking the whole dataset into consideration, the model predicts that the number of Bitcoin transactions the year of 2018 (183 observations) will be increase to a number greater than the current maximum. However, the dataset is already normalized and scaled, thus the prediction results in a straight orange line aligning the maximum data points.

The second trial seems to produce a better prediction with the train loss of 0.0034763. With the sample of the full dataset (data from 2015 - 2017) as input for the training set, the model predicts the same result but with clearer view of the trend compared to the first trial: the number of Bitcoin transactions will increase in the year of 2018; however, it will experience a sudden dip in number in the middle of the year.

6. Result Interpretation and Limitations

This paper is still lacking due to the limitation of Bitcoin's dataset (only eight years of data) and the simple model of the neural network used to make predictions. Due to the different input datasets, the model gives two considerably different predictions on the exact number of Bitcoin transactions in the year of 2018; however, a predicted trend persists through both trials: the overall number of Bitcoin transactions will increase but it is likely to experience a dip in amount in the middle of the year. This dip is the direct result from the volatility in the infancy period of Bitcoin as a currency; however, as many times before, the market will once again put its trust on Bitcoin's future as Bitcoin's popularity continue to increase over time.

VI/ Conclusion

Due to the infancy of Bitcoin, its long-term future is still shrouded in mystery. Nevertheless, the paper has discussed in length the potentials (advantages and shortcomings) of Bitcoin in its development to become the global currency. Currently, these aforementioned potentials are mainly theoretically based, but in the short run, Bitcoin's trend to gain popularity and market share should be more apparent through the result of the neural network predictions.

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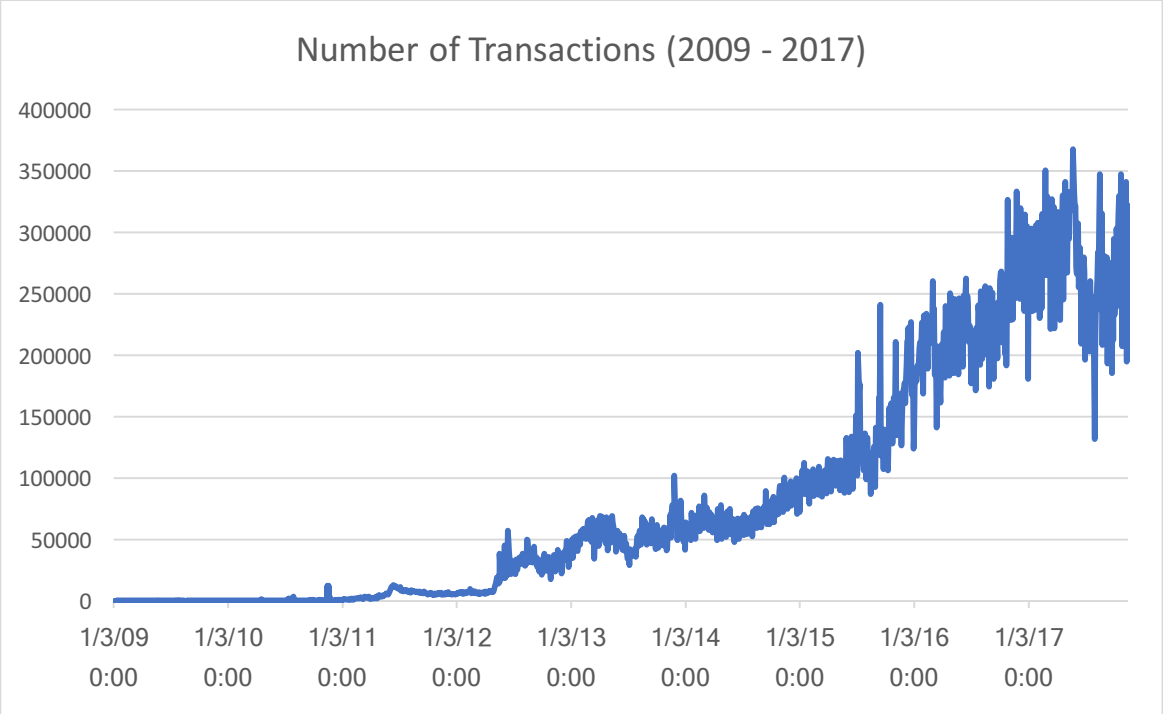
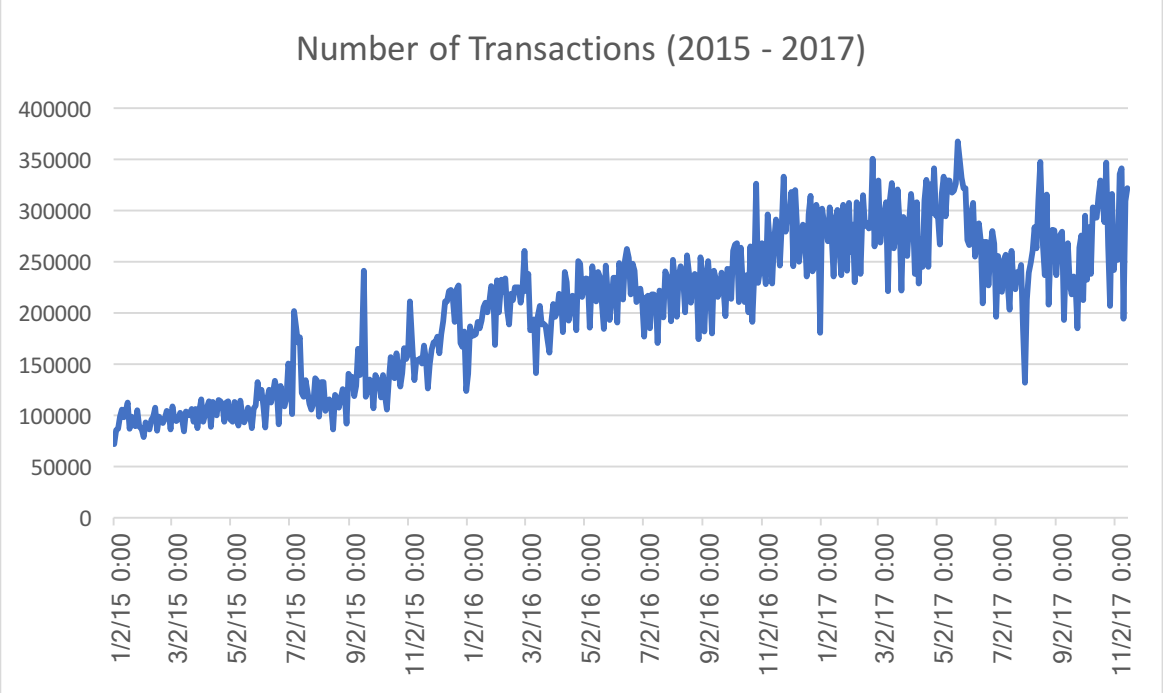
APPENDIX

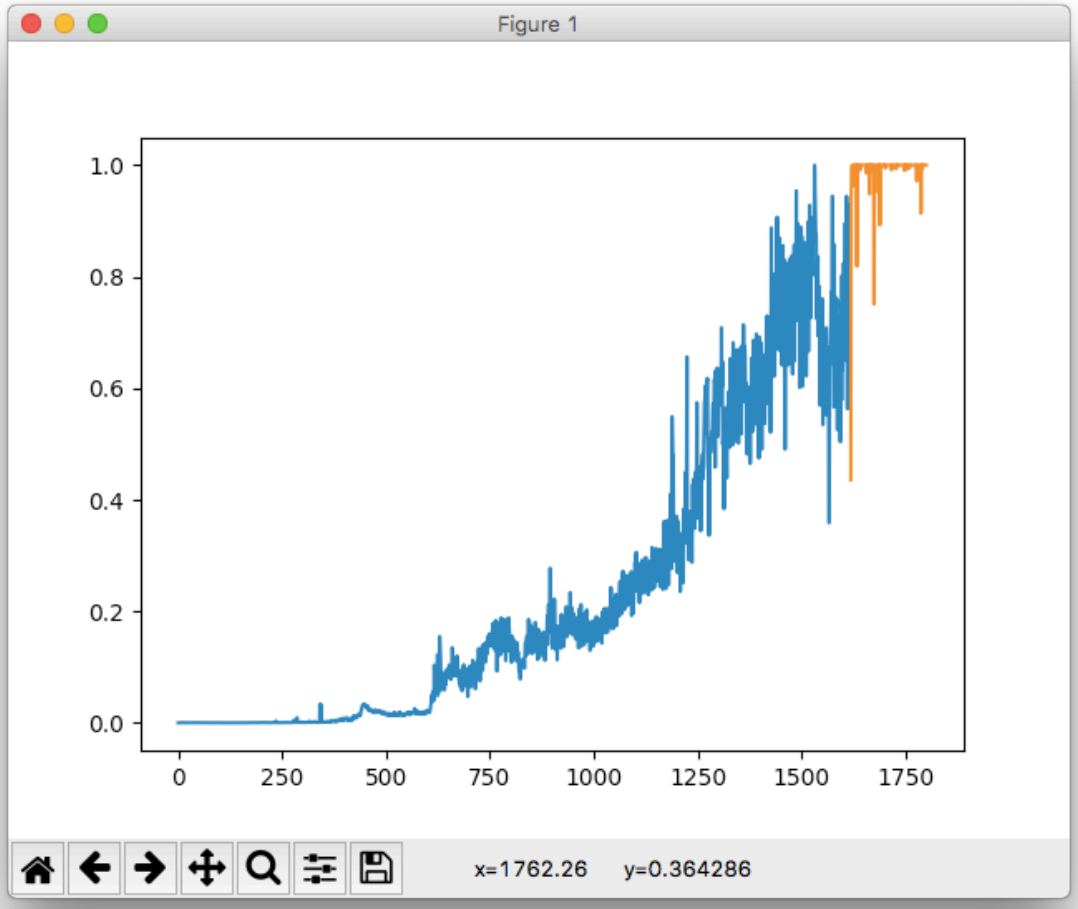
Full dataset for number of Bitcoin transactions in period 2009-2017

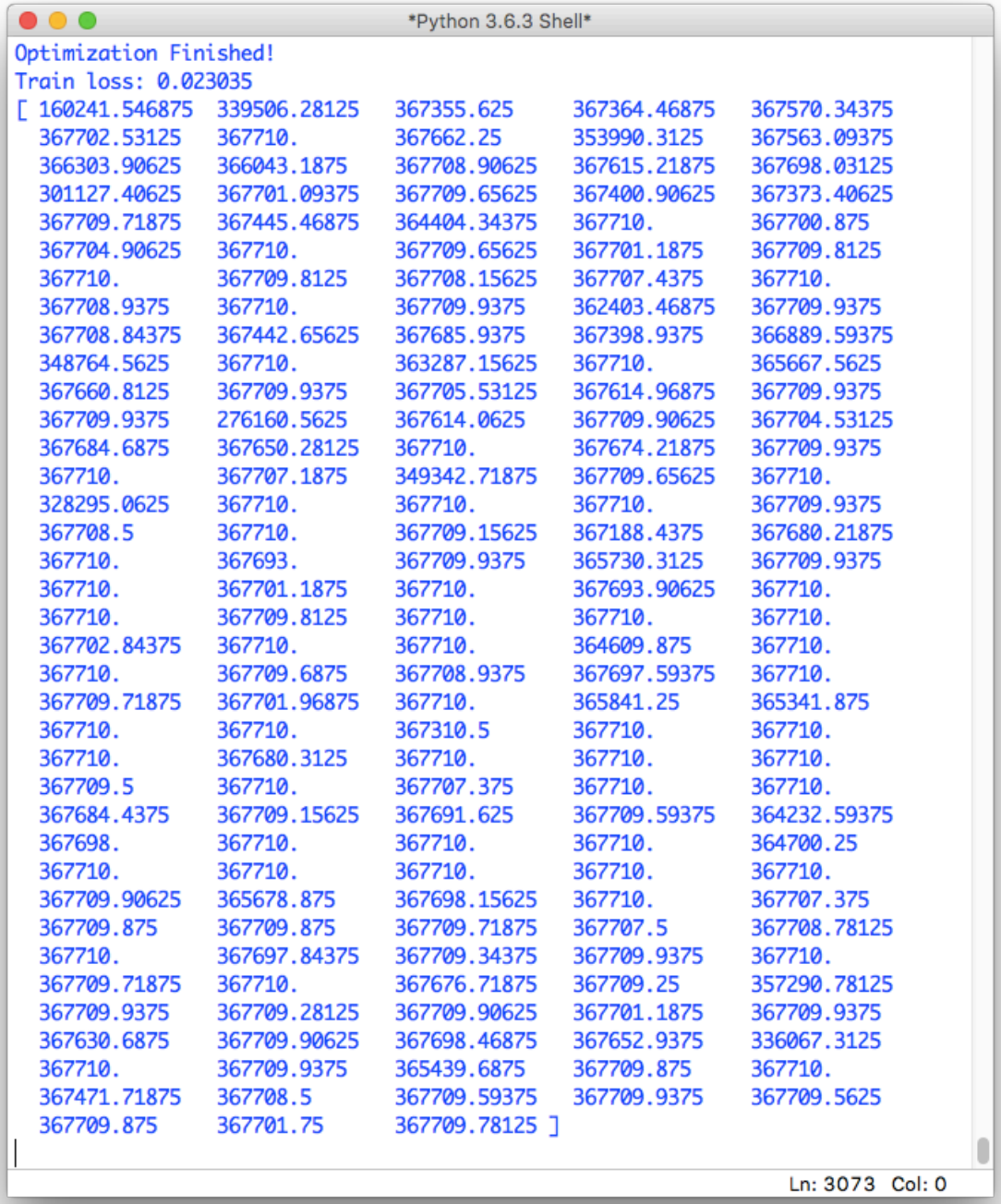


Sample dataset for the number of Bitcoin transactions in period 2015-2017



Result of the first trial




Python 3.6.3 Shell
Optimization Finished!
Train loss: 0.023035
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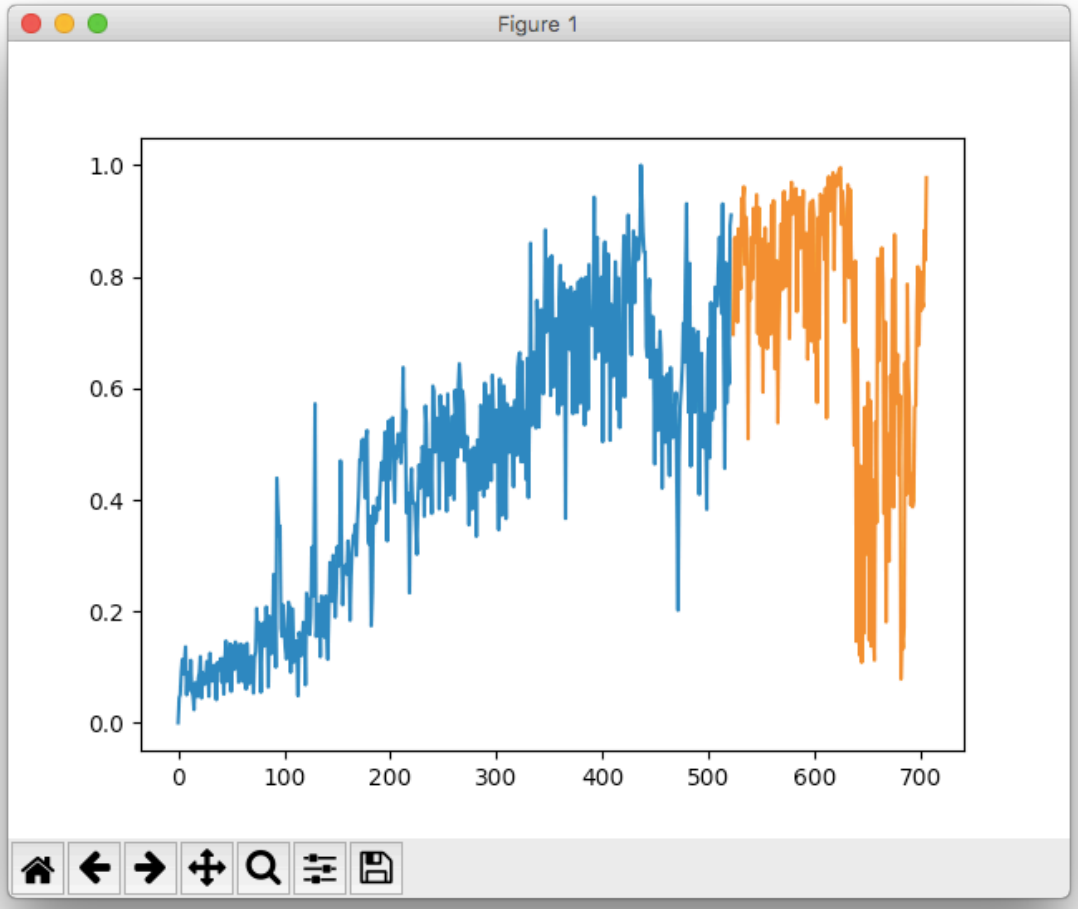
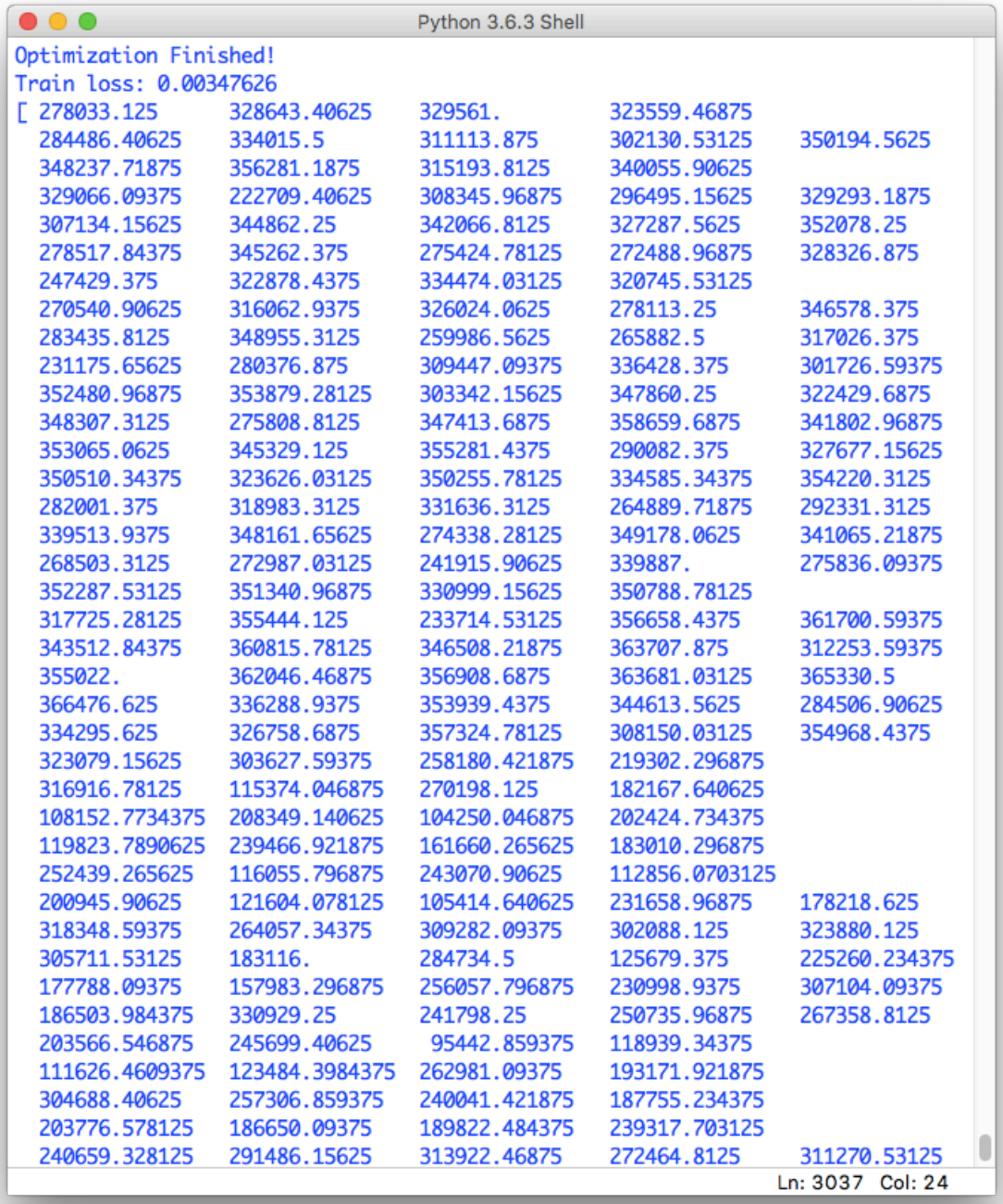
Ln: 3073 Col: 0

Result of the second trial




Python 3.6.3 Shell
Optimization Finished!
Train loss: 0.00347626
[278033.125 328643.40625 329561. 323559.46875
284486.40625 334015.5 311113.875 302130.53125 350194.5625
348237.71875 356281.1875 315193.8125 340055.90625
329066.09375 222709.40625 308345.96875 296495.15625 329293.1875
307134.15625 344862.25 342066.8125 327287.5625 352078.25
278517.84375 345262.375 275424.78125 272488.96875 328326.875
247429.375 322878.4375 334474.03125 320745.53125
270540.90625 316062.9375 326024.0625 278113.25 346578.375
283435.8125 348955.3125 259986.5625 265882.5 317026.375
231175.65625 280376.875 309447.09375 336428.375 301726.59375
352480.96875 353879.28125 303342.15625 347860.25 322429.6875
348307.3125 275808.8125 347413.6875 358659.6875 341802.96875
353065.0625 345329.125 355281.4375 290082.375 327677.15625
350510.34375 323626.03125 350255.78125 334585.34375 354220.3125
282001.375 318983.3125 331636.3125 264889.71875 292331.3125
339513.9375 348161.65625 274338.28125 349178.0625 341065.21875
268503.3125 272987.03125 241915.90625 339887. 275836.09375
352287.53125 351340.96875 330999.15625 350788.78125
317725.28125 355444.125 233714.53125 356658.4375 361700.59375
343512.84375 360815.78125 346508.21875 363707.875 312253.59375
355022. 362046.46875 356908.6875 363681.03125 365330.5
366476.625 336288.9375 353939.4375 344613.5625 284506.90625
334295.625 326758.6875 357324.78125 308150.03125 354968.4375
323079.15625 303627.59375 258180.421875 219302.296875
316916.78125 115374.046875 270198.125 182167.640625
108152.7734375 208349.140625 104250.046875 202424.734375
119823.7890625 239466.921875 161660.265625 183010.296875
252439.265625 116055.796875 243070.90625 112856.0703125
200945.90625 121604.078125 105414.640625 231658.96875 178218.625
318348.59375 264057.34375 309282.09375 302088.125 323880.125
305711.53125 183116. 284734.5 125679.375 225260.234375
177788.09375 157983.296875 256057.796875 230998.9375 307104.09375
186503.984375 330929.25 241798.25 250735.96875 267358.8125
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111626.4609375 123484.3984375 262981.09375 193171.921875
304688.40625 257306.859375 240041.421875 187755.234375
203776.578125 186650.09375 189822.484375 239317.703125
240659.328125 291486.15625 313922.46875 272464.8125 311270.53125
Ln: 3037 Col: 24