

Finance and Investments Team Paper

Predict 455 Sec 55 - Final Paper, March 18, 2018

Introduction

Bitcoin: Fade or New Paradigm; bubble or long term asset? The team explores the growth of Bitcoin and will investigate reasons why it may be viewed as a bubble or a long term asset in consideration of a sustainable role in creating a viable financial infrastructure. This paper aims at summarizing the approach the Finance and Investment team took toward understanding and presenting meaningful visualizations into 'The Show'. We will outline the approach we took to understand what questions might be relevant, outline the sources of our questions and answers, give an overview of our visualization techniques, and finish with some thoughts on how the team could have done better and what we might do next time to complete a collaborative exercise like 'The Show'.

Approach to 'The Show'

It would be an understatement to say that Bitcoin isn't a popular topic in the finance world today, and there are many questions about Bitcoin and its ecosystem. The team knew that there were many dimensions to the Bitcoin phenomenon - investments, currencies, alternative monetary systems. To understand the nuances of Bitcoin with the intent to visualize our research, we started with a collection of questions that we felt would help focus the team. Through these questions we could move into researching and visualizing.

Key Questions About Bitcoin

1. What is the rate of acceptance of Bitcoin with merchants? In other words, is the cryptocurrency making progress as a means of payment? How much of Bitcoin are still speculative transactions?

2. Related to 1, are competitors gaining ground? Regulation aside, is industry going to stay?
3. How sensitive to trading volume is Bitcoin value?
4. Bitcoin and Cryptocurrencies seem to be in a hype cycle. Are there any signs that Bitcoin is in a bubble?
5. Summarizing from data from previous points, are there any signs on how Bitcoin and Cryptocurrencies may settle down in a stage of maturity where value is reflective of some fundamentals?
6. Bitcoin historical market value seems to reflect various phases of growth and adoption. The 'pennies' phase reflects a technology curiosity, in the hundreds of dollars was for early speculators, in the thousands early for investors/ speculators. While price are exorbitantly high from 2009-2011, it might be that the ratio of price/ volume signals that price will stabilize (in relative terms, volatility still expected).

With a solid collection of questions and research topics the team then pivoted to collecting the data and visualizing the information to explore the questions.

References and Sources Used In 'The Show'

Given that Bitcoin is founded on open source and democratic principles, there was no shortage of data. Given the current popularity of Bitcoin, there was also no shortage of exposition and inspiration to be found from a variety of sources.

The following list outlines the references used in our analysis.

- Miller T. W. (2015) Modeling Techniques in Predictive Analytics with Python and R: A Guide to Data Science. Upper Saddle River, N.J.: Pearson. [ISBN-13: 978-0133892062]

The following data sources were used in the plots.

- Google Trends for search popularity: <https://trends.google.com/trends/explore?q=bitcoin>
- Quandl for price data, exchange volumes, and transactions:
<https://www.quandl.com/data/BCHARTS/BITSTAMPUSD-Bitcoin-Markets-bitstampUSD>
<https://www.quandl.com/data/BCHAIN/NTRAN-Bitcoin-Number-of-Transactions>
<https://www.quandl.com/data/BCHAIN/TRVOU-Bitcoin-USD-Exchange-Trade-Volume>
- CoinMarket for capitalization statistics: <https://coinmarketcap.com/>
- Bitcoinity for hash rate: <https://data.bitcoinity.org/bitcoin/hashrate/all?c=m&q=15&t=a>
- Google Trends for Bitcoin usage growth:
<https://trends.google.com/trends/explore?date=2008-01-01%202018-03-04&q=bitcoin%20usd>
- Companies accept Bitcoin:
<https://99bitcoins.com/who-accepts-bitcoins-payment-companies-stores-take-bitcoins/>

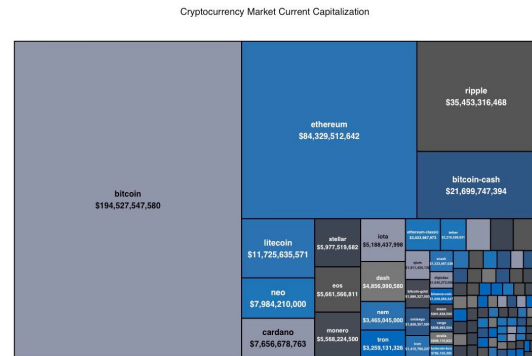
Visualization Technology and Design Overview

Early on the team decided to focus ‘The Show’ on the visualization which means focusing on the core graphics while leaving the complexity of interactivity behind. The team primarily leveraged R along with appropriate plotting packages to generate static graphics of the sourced information. These were collected into google slides for collaboration within the team. The team also hosted their code where they felt comfortable such as github or canvas. Finally, to render the ‘The Show’ we leveraged html, css, and js programming languages. Specifically, the css code was derived from Owen Versteeg, <https://github.com/StereotypicalApps> and it is MIT licensed. As well as the reveal.js was developed by Hakim El Hattab, <http://hakim.se>. This package comes with a number of utilizations for ‘The Show’: reveal.js, simple.css, and Finance.html drive are the primary coding files.

The team used a variety of visualization methods in ‘The Show’. While majority of the analysis was on time series data (i.e. transactions and price over time), there were opportunities to construct aggregate and network views. The following explores four of our favorite plots.

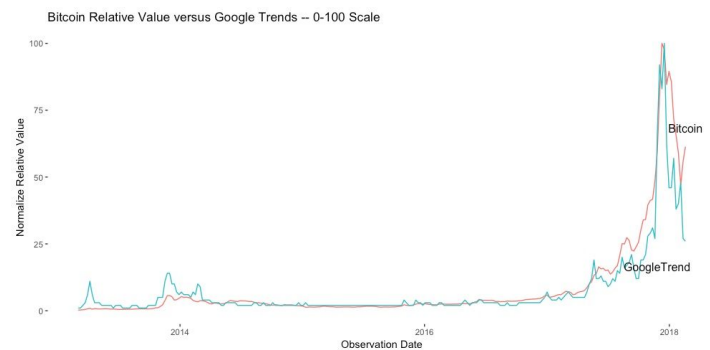
Favorite Plot: Heat Maps

Heat Maps provide referential context when something is part of a larger whole. While we collectively know that Bitcoin is the most popular cryptocurrency, just how popular is it relative to the over 150 other currencies? This plot allows views to understand that by Market Capitalization that Bitcoin is a very large portion (currently around 43%) of the overall market.



Favorite Plot: Time Series Correlation

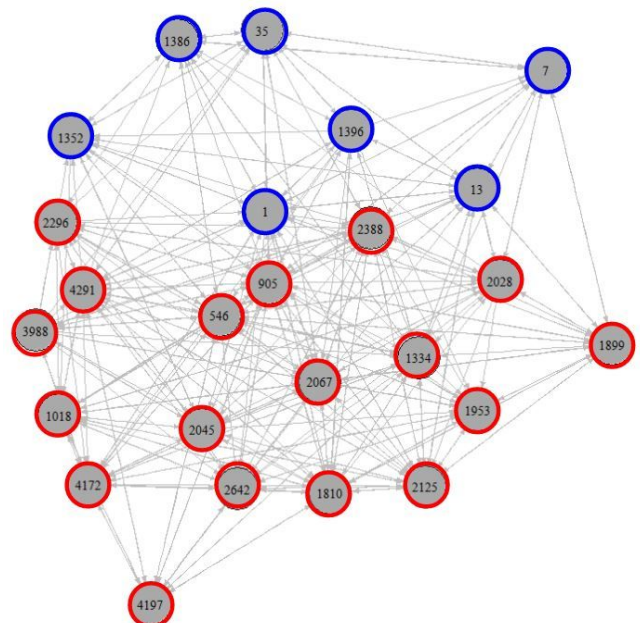
Time series plots were a natural favorite when looking at Bitcoin and all visuals generally showed little interest and market action until the start of 2017 when the Bitcoin price started to take off. In this



highlighted plot we did something a little unique whereby we used google trends along with the Bitcoin price scaled together. Consumers of this visual can clearly see a connection between searching for Bitcoin on google versus the price. It does have an correlation of 0.94.

Favorite Plot: Network

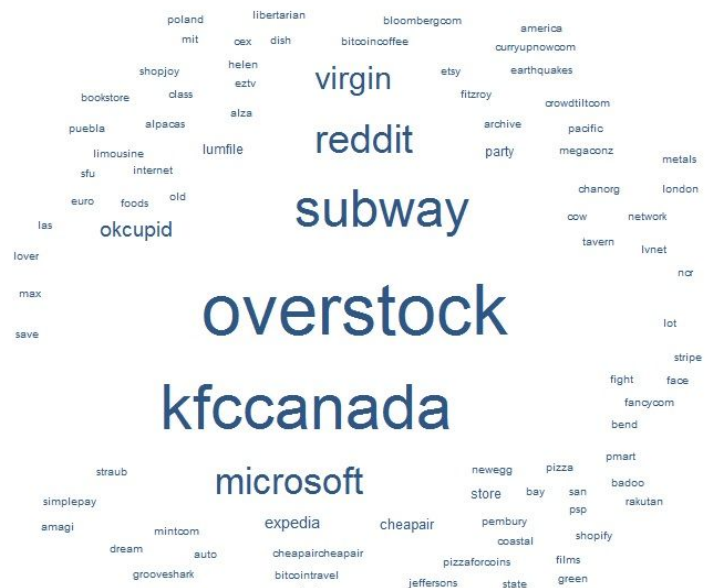
Bitcoin OTC is a platform that serves as a vehicle to understand who-trusts-whom among the network of people who trade using Bitcoin. Bitcoin users are anonymous, so there is a need to maintain a record of users' reputation to prevent transactions with fraudulent and risky users.



Members of Bitcoin OTC rate other members in a scale of -10 (total distrust) to +10 (total trust) in steps of 1. Shown here is a Kamada Kawai network graph of the top 25 most rated Bitcoin users. The network is very dense and interconnected, with only a few users at the periphery. When running a cluster walktrap algorithm, two distinct communities emerge, revealing that smaller cliques exist among the top 25 Bitcoin users.

Favorite Plot: Word Cloud

Many large companies are accepting bitcoins as a legitimate source of funds. There are total 86 companies allow their online products to be bought with bitcoins. The larger the word, the earlier the company accept Bitcoin as a payment method.



Lessons Learned and Doing it Better

The team could not have chosen a more timely investment topic which made the assignment very interesting and relevant. The largest challenge was to focus on specific topics within the Bitcoin phenomenon. The team did face some challenges; while our schedules were very aligned, unfortunately we were only able to coordinate deliverables over the weekends. This had two effects; on the positive we were hyper-collaborative during the two-day period to execute toward the final deliverables; on the negative, we had to move rapidly to hit our deliverables. The team also leveraged email for most communication whereas a slack channel or other collaborative solution might have been more productive.

<Assignment Background>

The Paper:

The Paper is a formal academic paper (maximum 5 pages double-spaced) that describes the methods used in creating The Show. Include a discussion of all software systems used to develop The Show. The paper should list references, including the work (book, journal, or white paper) that inspired The Show. It should cite data sources. What visualizations were employed and why? If you had a chance to do it again, how would you do it differently?

Grading:

The Paper: Discussion of Production Methods (25 points). Clear, concise discussion of methods, data, and documentation used in developing The Show.

The Paper: Exposition (25 points). The paper is a formal written report. Both will be graded for exposition.

I will be applying strict standards in this regard. Everything you present should be written using correct English grammar, punctuation, and spelling. Have each member of the team proofread The Show and the paper. Have friends proofread as well.