Twitter Sentiment & Cryptocurrencies

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Background

Bitcoin: the first implementation of cryptocurrency. It is the consensus network and uses completely digital money. It is a completely free and unregulated system that, essential, works as a mobile wallet. As of 3:50PM on 12/4/2021, 1 BTC = $49,274.80 ($1 =~ 0.000020BTC)[1]

Dogecoin: created as a joke by two software engineers in late 2013, using a meme that misspelled the word 'dog' as 'doge.' Ironically, it was created to poke fun at Bitcoin. 1 DOGE = $0.18

In 2021, Dogecoin gained cult status, specifically on Reddit's /r/WallStreetBets message board, and became incredibly popular, increasing by more than 5,000% in 2021. Tesla CEO, Elon Musk, often tweeted and spoke about the cryptocurrency, further increasing its popularity and cult status.[2]

Motivation: Due to Elon Musk's influence on Dogecoin, I wanted to see if blue-check verified members on Twitter mentioning either Bitcoin of Dogecoin had any sort of effect on those markets.

Data

➤ Shape: 1332, 34

➤ **Twitter API**: Previous 199 hours (11/29, midnight – 12/07, 5pm), searched for all iterations of the words 'Bitcoin' and 'Dogecoin' while filtering only for verified accounts, excluding retweets, links, and replies[3]

➤ **Dogecoin:** used hourly data (includes open, close, high, low, & volume) from cointelegraph.com[4]. Time spanned 11/29, midnight – 12/07, 4pm

➤ **Bitcoin:** used hourly data (includes open, close, high, low, & volume) from Gemini Exchange Data[5]. Time spanned same as Twitter API.

Nayib Bukele @nayibbukele

El Salvador just bought the dip!
150 coins at an average USD price of ~$48,670
#Bitcoin
12:19 AM · Dec 4, 2021 · Twitter for iPhone
9,753 Retweets 2,060 Quote Tweets 70.8K Likes

[6]

Matt Wallace @MattWallace888

We are only days away from 2022… the year Elon Musk IS GOING TO PUT A #DOGECOIN ON THE MOON!!!
2:14 PM · Dec 5, 2021 · Twitter for iPhone
120 Retweets 531 Likes

[7]

[6]Bukele, N. [@nayibbukele]. (2021, Dec 4). *El Salvador just bought the dip! 150 coins at an average USD price of ~$48,670. #Bitcoin* [Tweet]. Twitter. https://twitter.com/nayibbukele/status/1467000621354135555
[7]Wallace, M. [@MattWallace888]/ (2021 Dec 5). *We are only days away from 2022… the year Elon Musk IS GOING TO PUT A #DOGECOIN ON THE MOON!!!* [Tweet]. Twitter. https://twitter.com/MattWallace888/status/1467573187168845825

Methods

Cleaning: All data was cleaned and analyzed using Python 3 in Jupyter Notebooks. In order to have each Tweet serve as a leading indicator, all times of Tweets were rounded down to nearest hour. All 3 data frames were merged based on date & time accordingly

count	199.000000
mean	5.849246
std	4.408141
min	1.000000
25%	3.000000
50%	5.000000
75%	7.500000
max	38.000000

Table 1: Bitcoin mentions on Twitter by hour

count	95.000000
mean	1.515789
std	0.797111
min	1.000000
25%	1.000000
50%	1.000000
75%	2.000000
max	5.000000

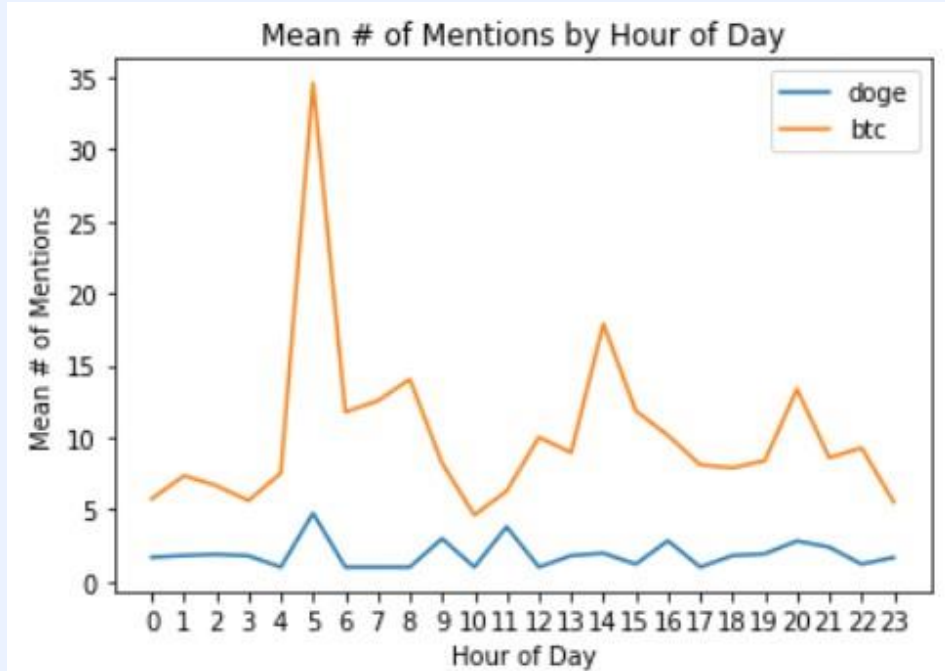**Table 2:** Dogecoin mentions on Twitter by hour

Figure 1: Mean number of mentions by hour of day, with clear increase at around 5AM
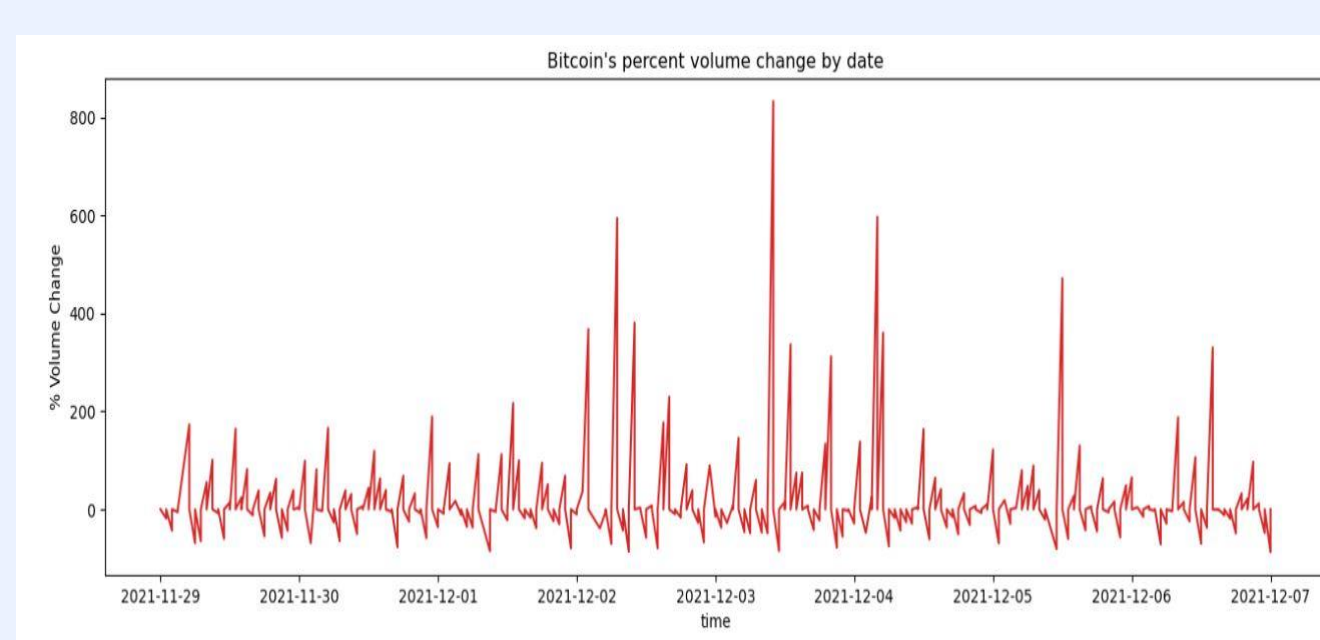

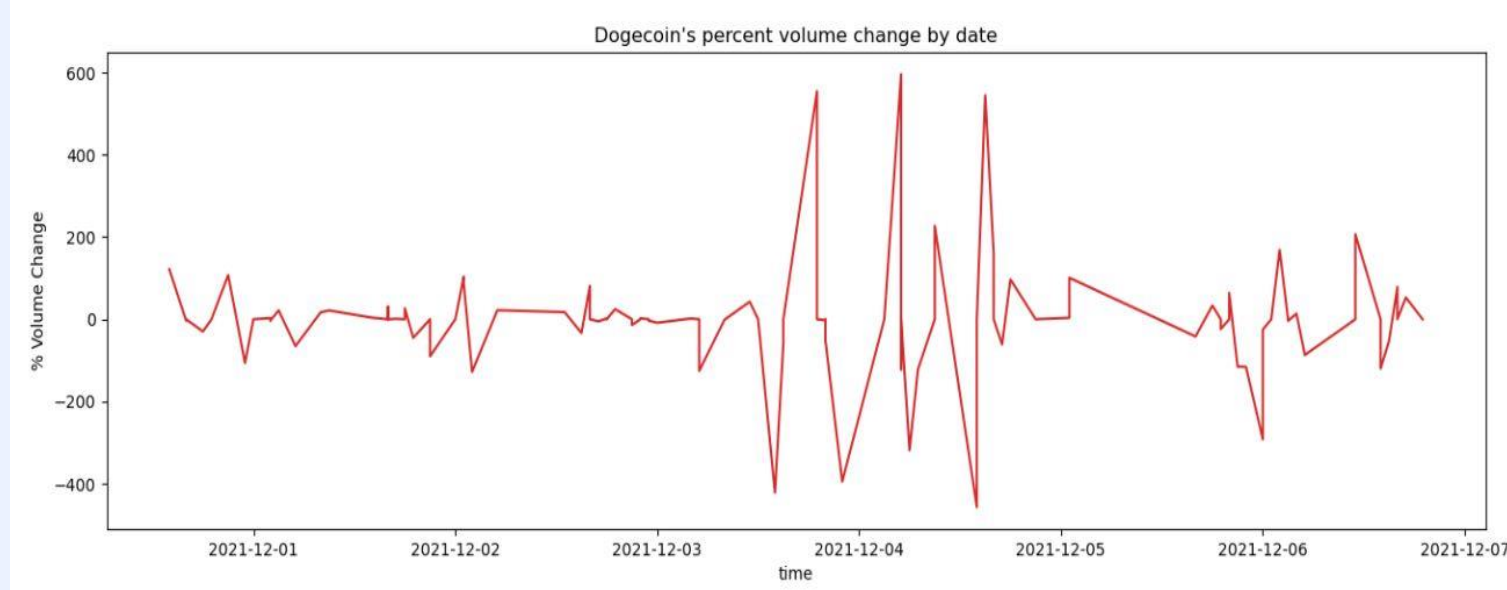**Figure 2:** Percent change in volume by time for Bitcoin

Figure 3: Percent change in volume by time for Dogecoin

Multiple Regression: Regression run on change variables (price & volume), while controlling for hour of day, number of mentions, and interaction between Dogecoin & Bitcoin (if one exists). Several models were fit to find best one. The median of each column was imputed for NA scores (although mean could have also been potentially used)

Results

VARIABLE	Definition
Btc_mentions	**Integer -** The number of mentions of any iteration of 'bitcoin' by a verified Twitter user at any given hour
Doge_mentions	**Integer -** The number of mentions of any iteration of 'dogecoin' by a verified Twitter user at any given hour
hour	The hour of day (0-23)
Btc_price_perc	**Float** – the percent increase (or decrease) in price for the given hour from previous hour for bitcoin
Doge_price_perc	**Float** – the percent increase (or decrease) in price for the given hour from previous hour for dogecoin
Btc_vol_per	**Float** – the percent increase (or decrease) in volume for the given hour for bitcoin
Doge_vol_per	**Float** – the percent increase (or decrease) in volume for the given hour for dogecoin

Combined regression analysis: Nothing to see here! Too many collected NAs (and not much correlation with interaction term) for any decent results!

Results -- BTC

% Change in Price (Hourly)

	coef	std err	t	P>|t|	[0.025	0.975]
const	-0.0312	0.023	-1.335	0.182	-0.077	0.015
btc_mentions	-0.0014	0.001	-1.062	0.288	-0.004	0.001
hour	0.0027	0.001	1.984	0.048	3.02e-05	0.005

$R^2 = 0.004$

% Change in Volume (Hourly)

	coef	std err	t	P>|t|	[0.025	0.975]
const	9.0900	3.458	2.629	0.009	2.306	15.874
btc_mentions	-0.0972	0.201	-0.483	0.629	-0.492	0.297
hour	-0.2680	0.204	-1.313	0.190	-0.669	0.133

$R^2 = 0.001$

Results -- DOGE

% Change in Price (Hourly)

	coef	std err	t	P>|t|	[0.025	0.975]
const	-0.0777	0.084	-0.924	0.356	-0.243	0.087
doge_mentions	0.0178	0.039	0.453	0.650	-0.059	0.095
hour	0.0045	0.002	1.906	0.057	-0.000	0.009

$R^2 = 0.003$

% Change in Volume (Hourly)

	coef	std err	t	P>|t|	[0.025	0.975]
const	-27.3967	5.831	-4.698	0.000	-38.836	-15.957
doge_mentions	14.2981	2.728	5.240	0.000	8.946	19.650
hour	-0.0969	0.164	-0.589	0.556	-0.419	0.226

$R^2 = 0.020$

Conclusions

Not much statistical significance, however, lots of volatility! Statistical significance existed just a day before!

Volatility is attractive to scalpers/day traders!

Hard to say definitively whether there is a correlation between volume of Twitter mentions and market movement.

Future Work

So much more can be done with this incredibly robust data set, including an even more extensive deep-dive into the data!

- Sentiment Analysis
- Deeper dive into Twitter users
- Time precision – how precise can we make an indicator
- Ways to mine for iterations of the two cryptocurrencies that are less obvious
- Time Series Analysis
- Find more up-to-date data on Dogecoin

Works Cited

[1]*FAQ - Bitcoin.* (2009). Bitcoin.Org. https://bitcoin.org/en/faq
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[4]C. (2021, December 5). *Dogecoin | DOGE Price Index & Live Chart by.* Cointelegraph. Retrieved December 5, 2021, from https://cointelegraph.com/doge-price-index
[5]*Crypto Data Download.* (n.d.). Gemini Exchange Data. Retrieved December 5, 2021, from https://www.cryptodatadownload.com/data/gemini/