



Bitcoin Price Prediction

Using Machine Learning

By Giuseppe Colubriale, Terry Nieroukh and Damien Jennings

Our Aim

- To create trading indicators and tools that will help us with our Bitcoin trading.

Method

- We looked for relationships which could help us predict Bitcoin's price/movement.

Damien will present:

A comparison of Bitcoin (Cryptocurrency asset class) against more established asset classes

- Commodities - Gold
- Shares - S&P 500 Index
- Shares - Tech Share - Apple

Joe will present:

Using other cryptocurrencies in the top 20 to predict Bitcoins price.

Both Damien and Joe will also look at some technical indicators - Moving Averages, High Lows.

Terry will present:

The use of non-technical indicators to aid in Bitcoin, Ethereum and Avalanche trading predictions - in particular Sentiment

```
from fbprophet import Prophet
```

```
from tensorflow.keras.models import Sequential  
from tensorflow.keras.layers import LSTM, Dense, Dropout
```

```
import numpy as np  
import matplotlib.pyplot as plt  
import pandas as pd  
import yfinance as yf  
from sklearn.preprocessing import MinMaxScaler
```

```
BTC = yf.download('BTC-USD', start='2016-01-01')[['Close']]
```

Attempting to create a momentum strategy by using

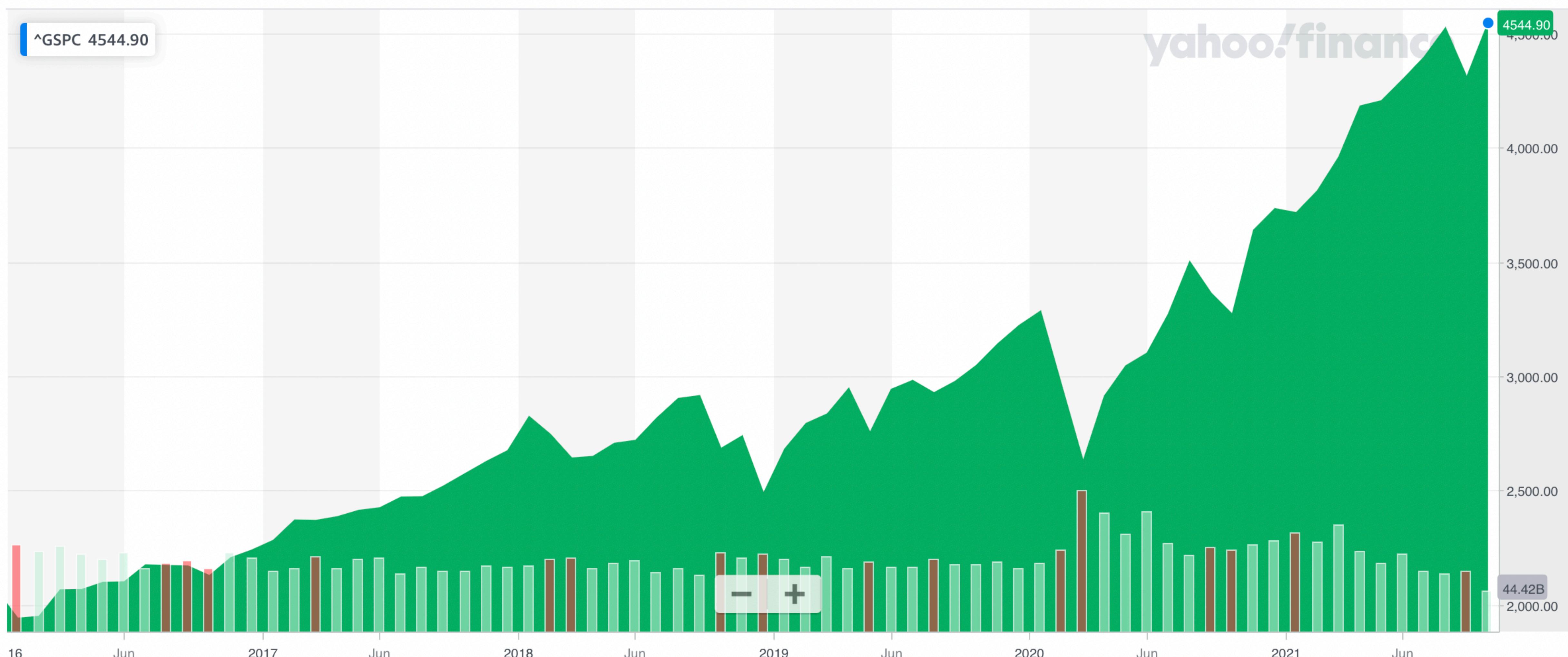
- BTC historical data
- S&P 500 historical data
- Apple historical data
- Gold Historical data

Imported from Yahoo finance

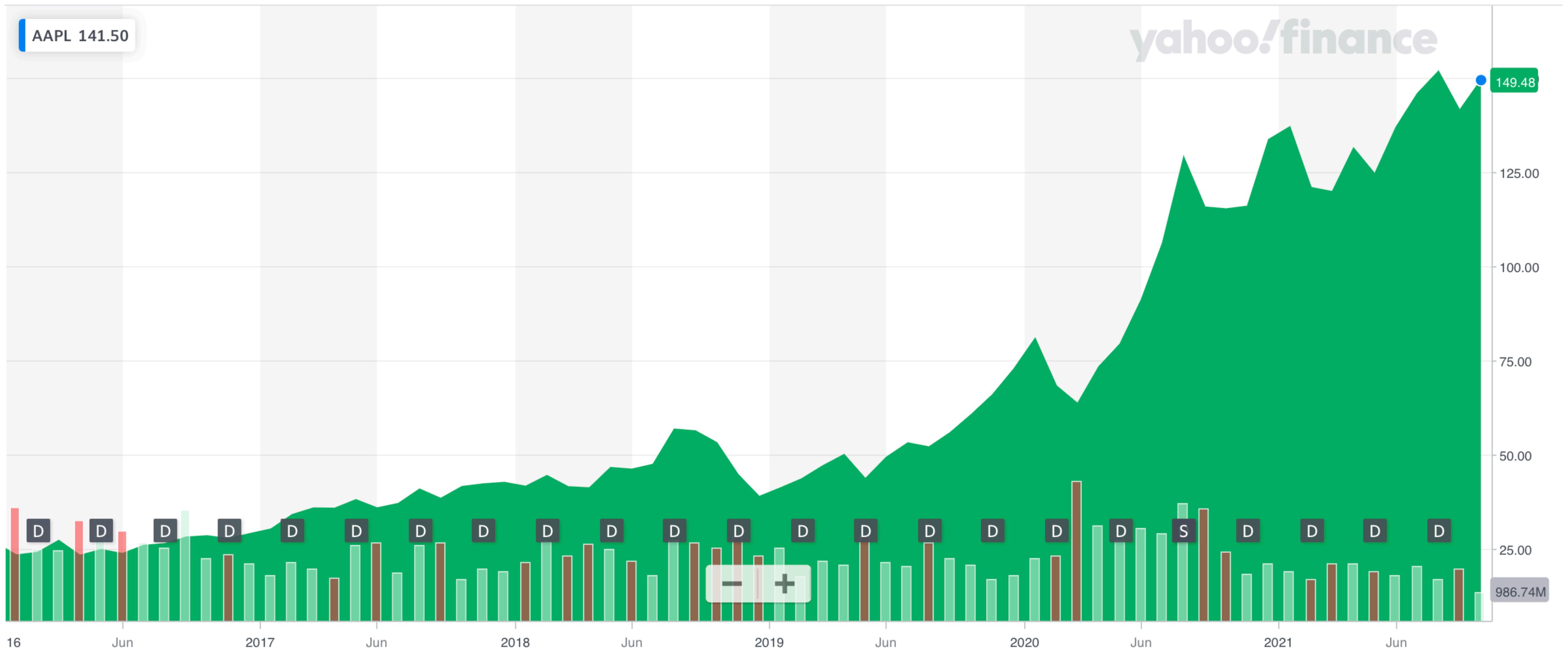
Gold
January 2016 = \$1063
October 2021 = \$1800
= %70 increase



S&P 500
January 2016 = \$2038
October 2021 = \$4550
= %123 increase

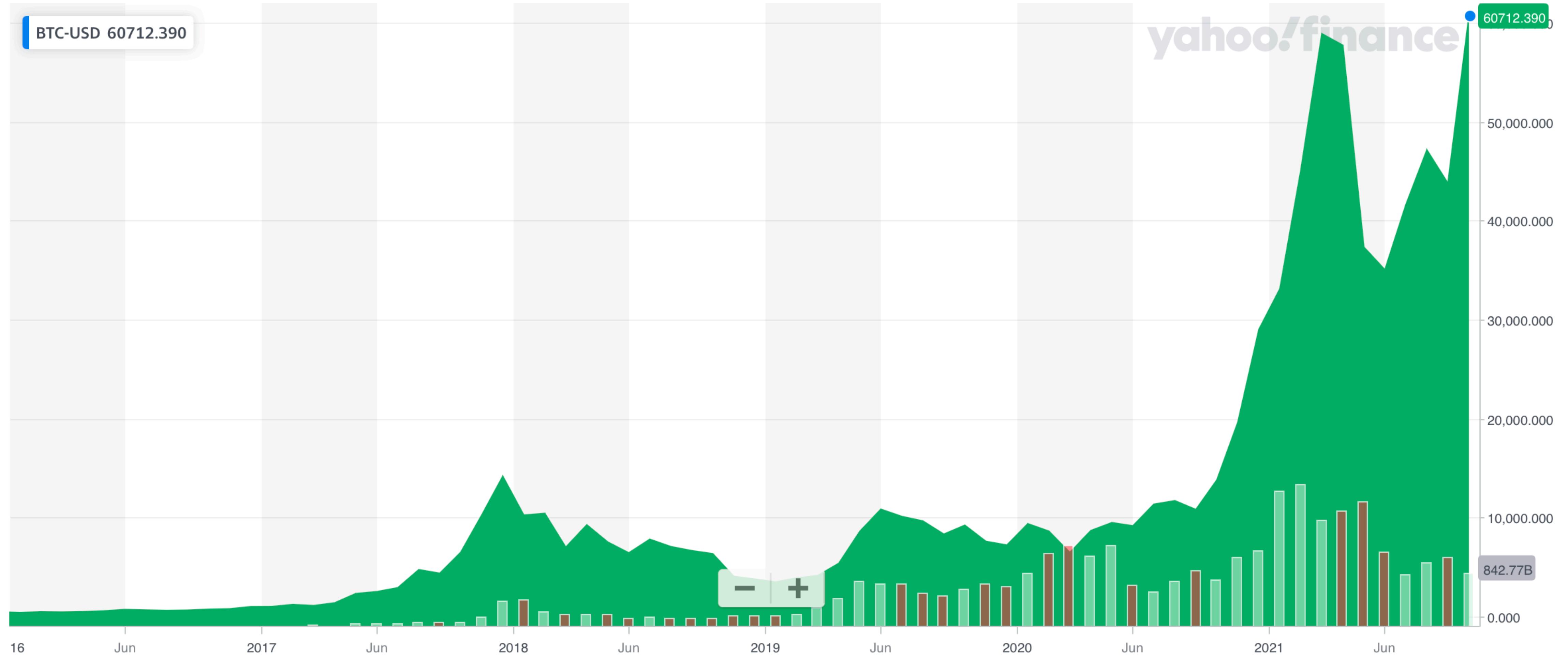


Apple
January 2016 = \$25
October 2021 = \$150
= %500 increase



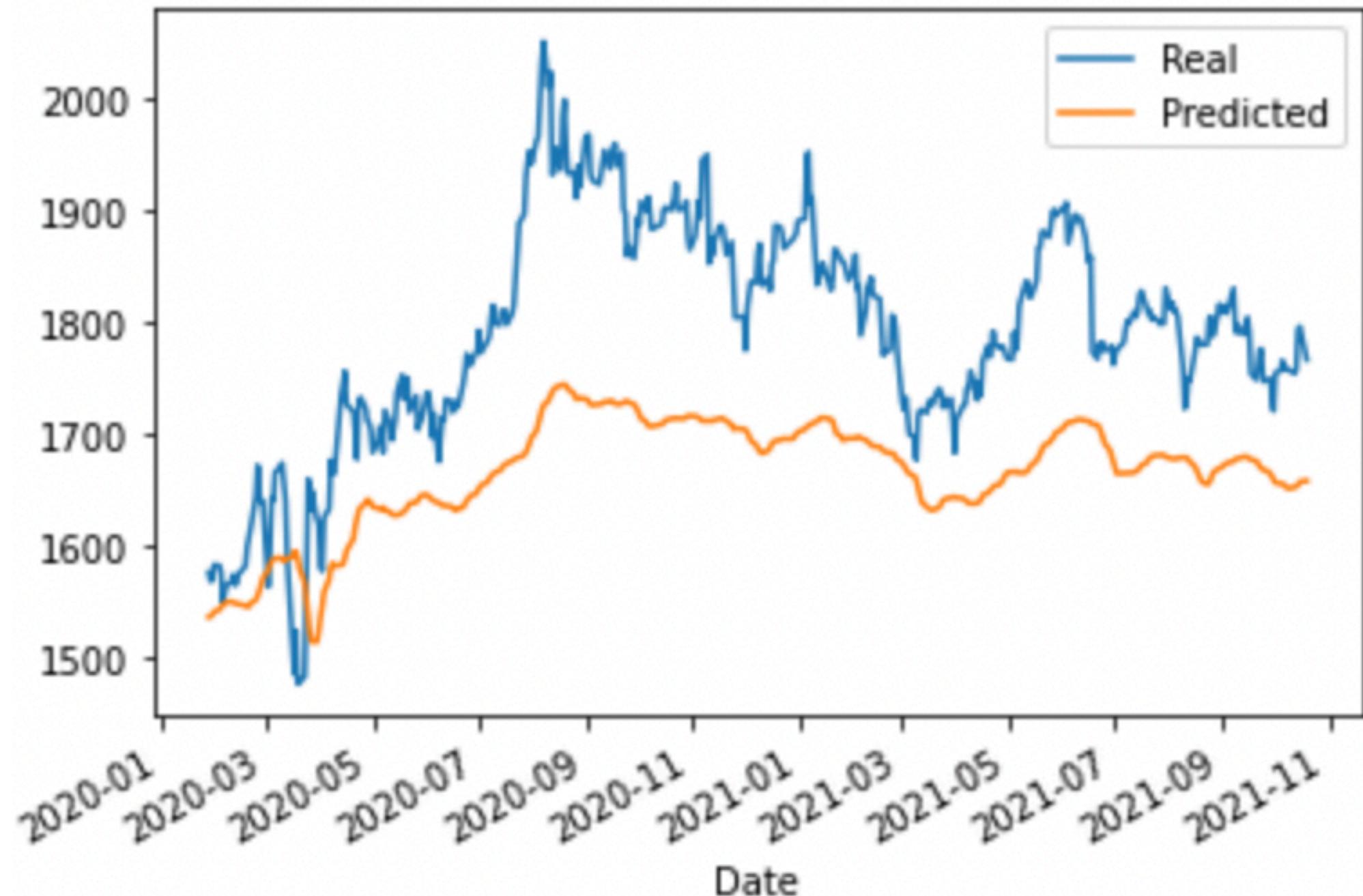
Bitcoin

January 2016 1 BTC = \$430
October 2021 = \$65,000
= %15,016 increase

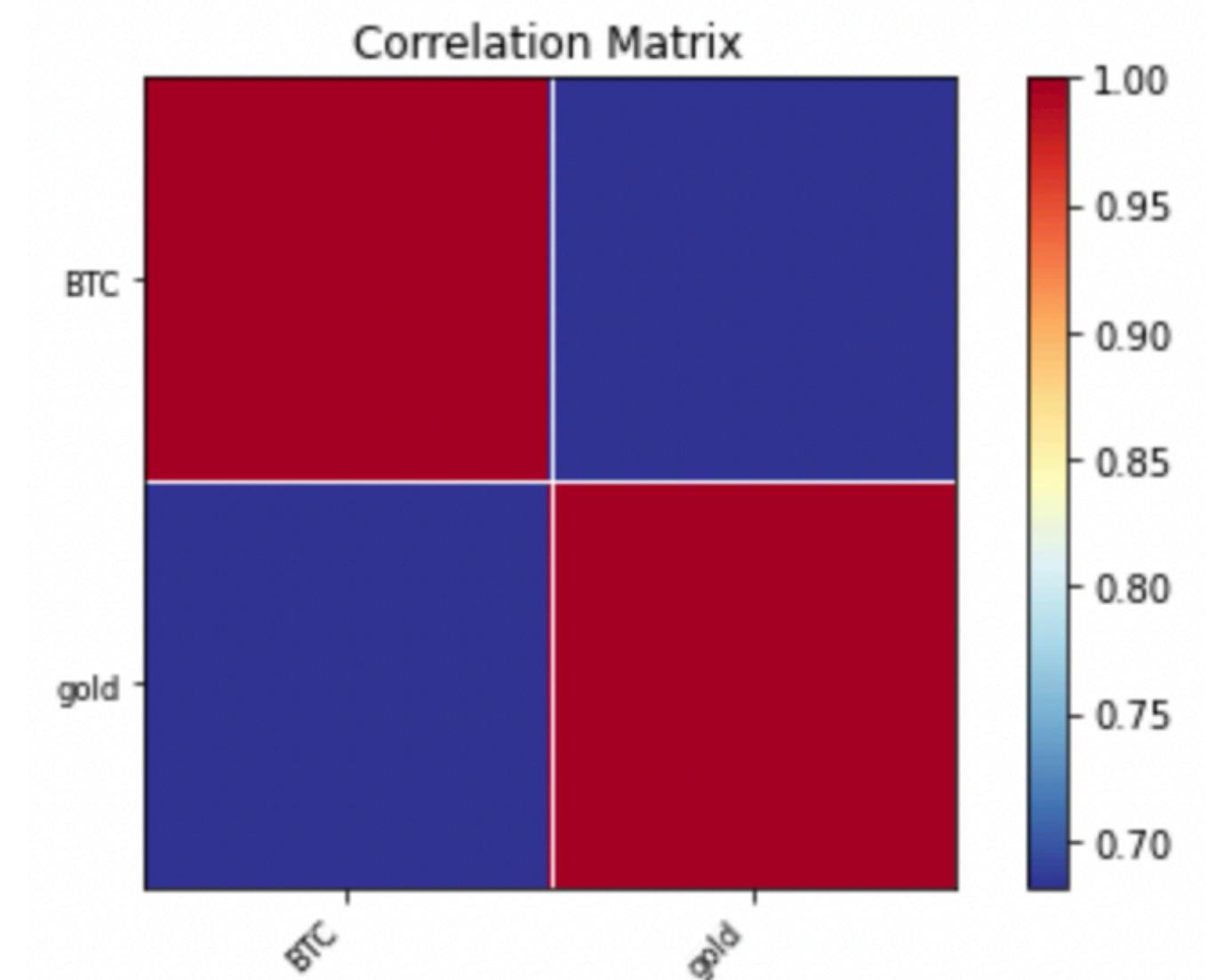


Here are GOLD and Bitcoin prices related to each other

| | BTC | gold |
|------------|--------------|-------------|
| Date | | |
| 2016-01-04 | 433.091003 | 1075.099976 |
| 2016-01-05 | 431.959991 | 1078.400024 |
| 2016-01-06 | 429.105011 | 1091.900024 |
| 2016-01-07 | 458.048004 | 1107.699951 |
| 2016-01-08 | 453.230011 | 1097.800049 |
| ... | ... | ... |
| 2021-10-12 | 56041.058594 | 1758.300049 |
| 2021-10-13 | 57401.097656 | 1793.699951 |
| 2021-10-14 | 57321.523438 | 1796.699951 |
| 2021-10-15 | 61593.949219 | 1767.199951 |
| 2021-10-19 | 62300.406250 | 1777.800049 |

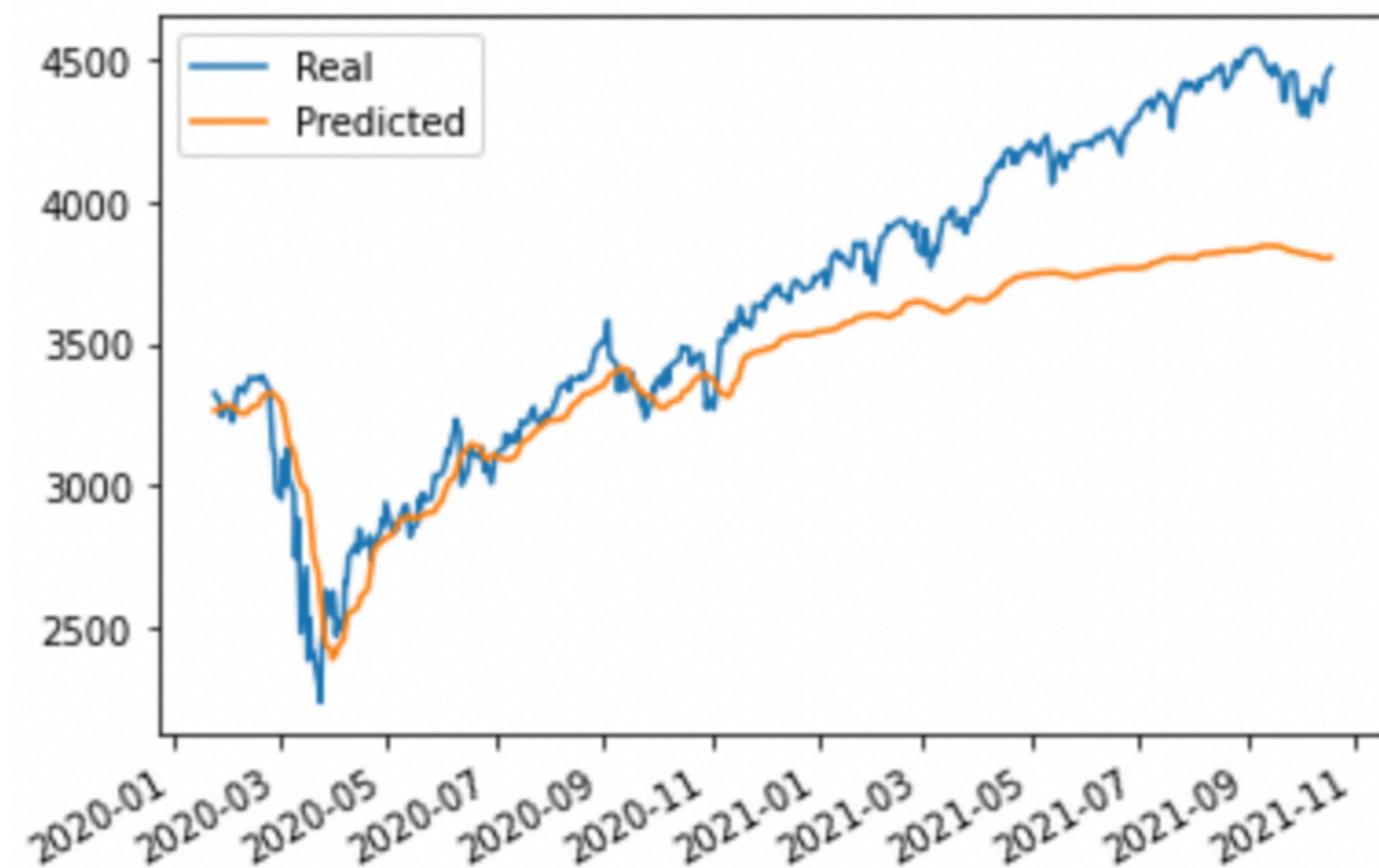


| | | |
|------|----------|----------|
| BTC | 1.000000 | 0.682044 |
| gold | 0.682044 | 1.000000 |

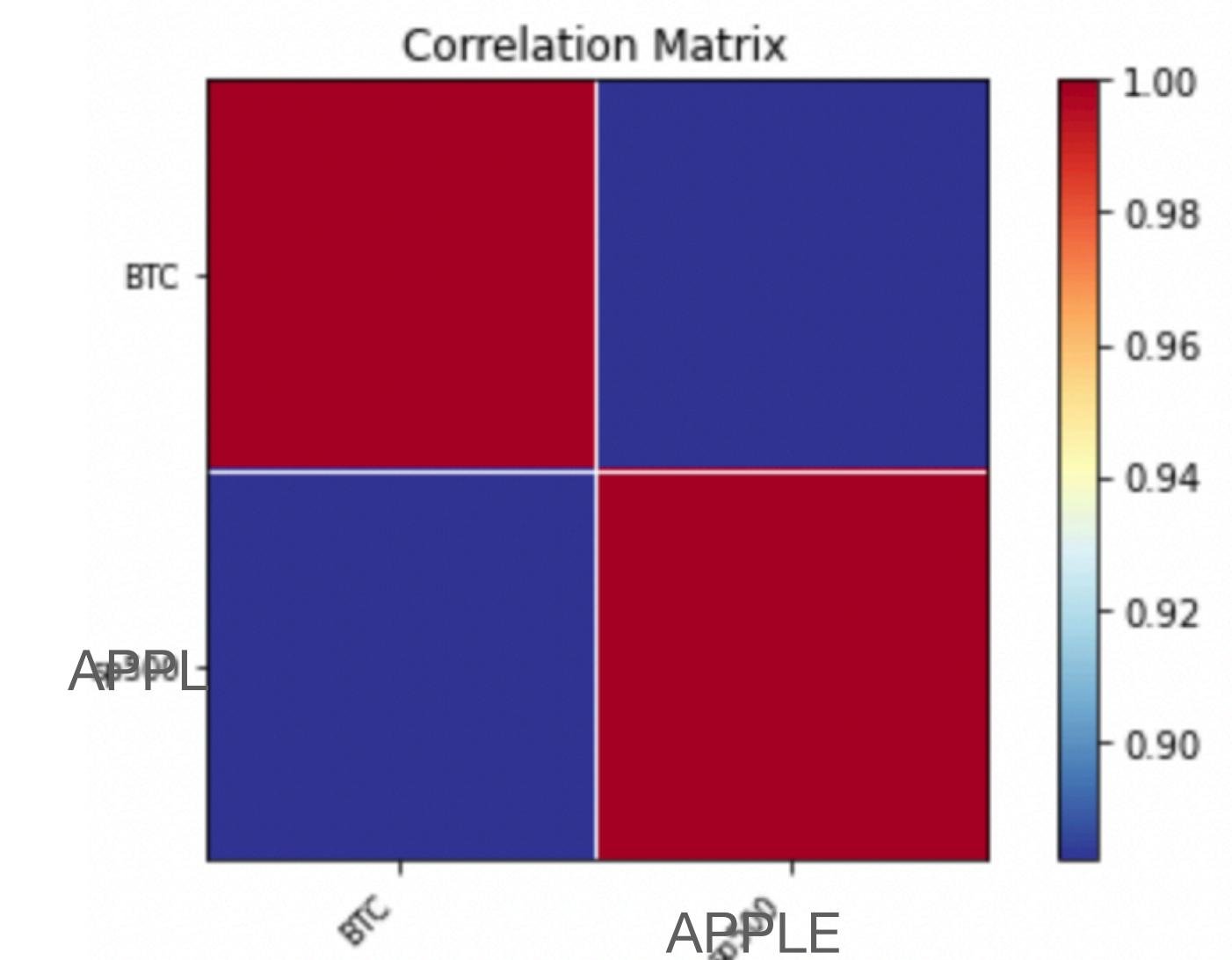


Here are AAPL and Bitcoin prices related to each other

| | BTC | aapl |
|------------|--------------|------------|
| Date | | |
| 2016-01-04 | 433.091003 | 26.337500 |
| 2016-01-05 | 431.959991 | 25.677500 |
| 2016-01-06 | 429.105011 | 25.174999 |
| 2016-01-07 | 458.048004 | 24.112499 |
| 2016-01-08 | 453.230011 | 24.240000 |
| ... | ... | ... |
| 2021-10-12 | 56041.058594 | 141.509995 |
| 2021-10-13 | 57401.097656 | 140.910004 |
| 2021-10-14 | 57321.523438 | 143.759995 |
| 2021-10-15 | 61593.949219 | 144.839996 |
| 2021-10-18 | 62026.078125 | 146.550003 |

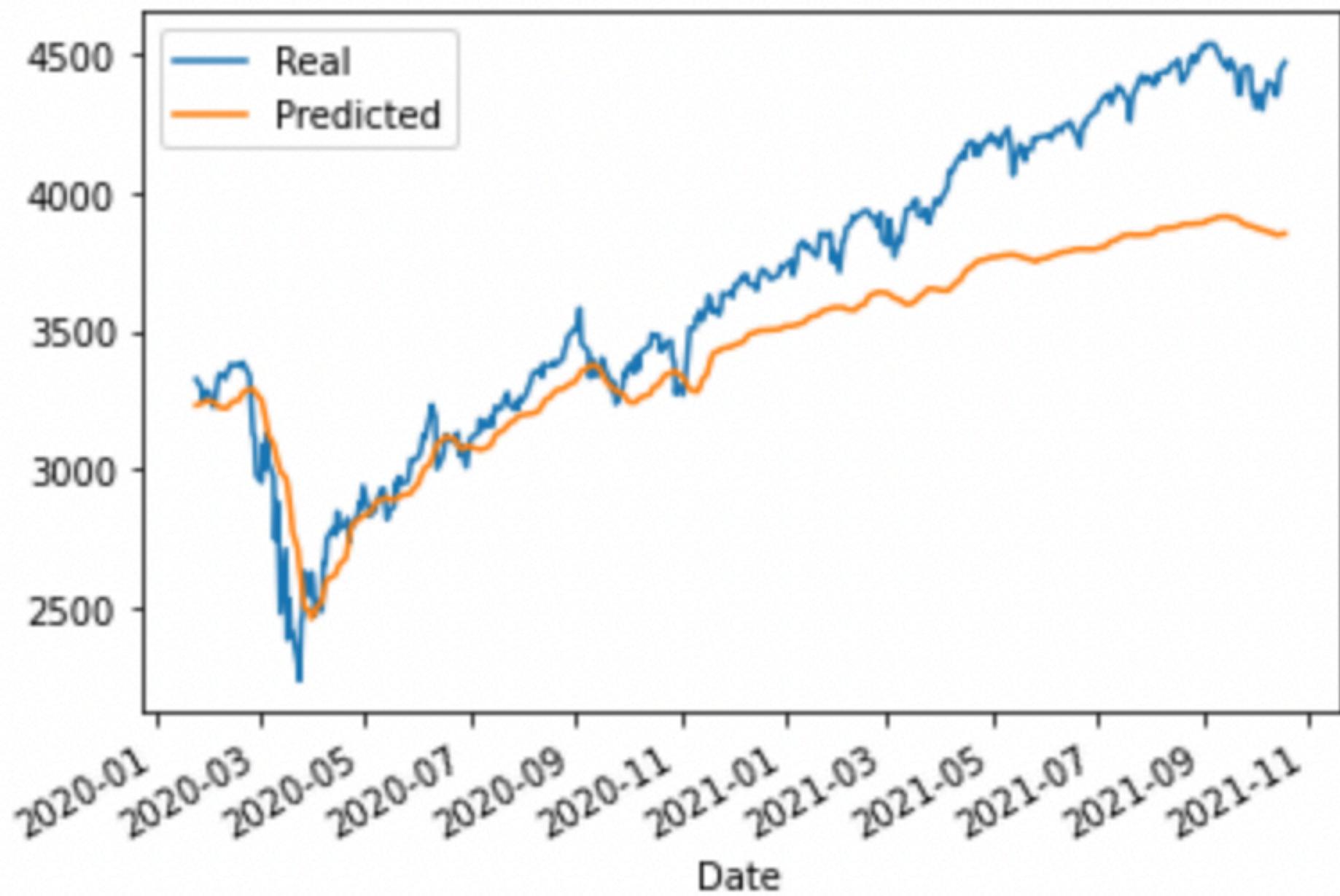


| | | |
|------|---------|---------|
| BTC | 1.00000 | 0.85424 |
| aapl | 0.85424 | 1.00000 |

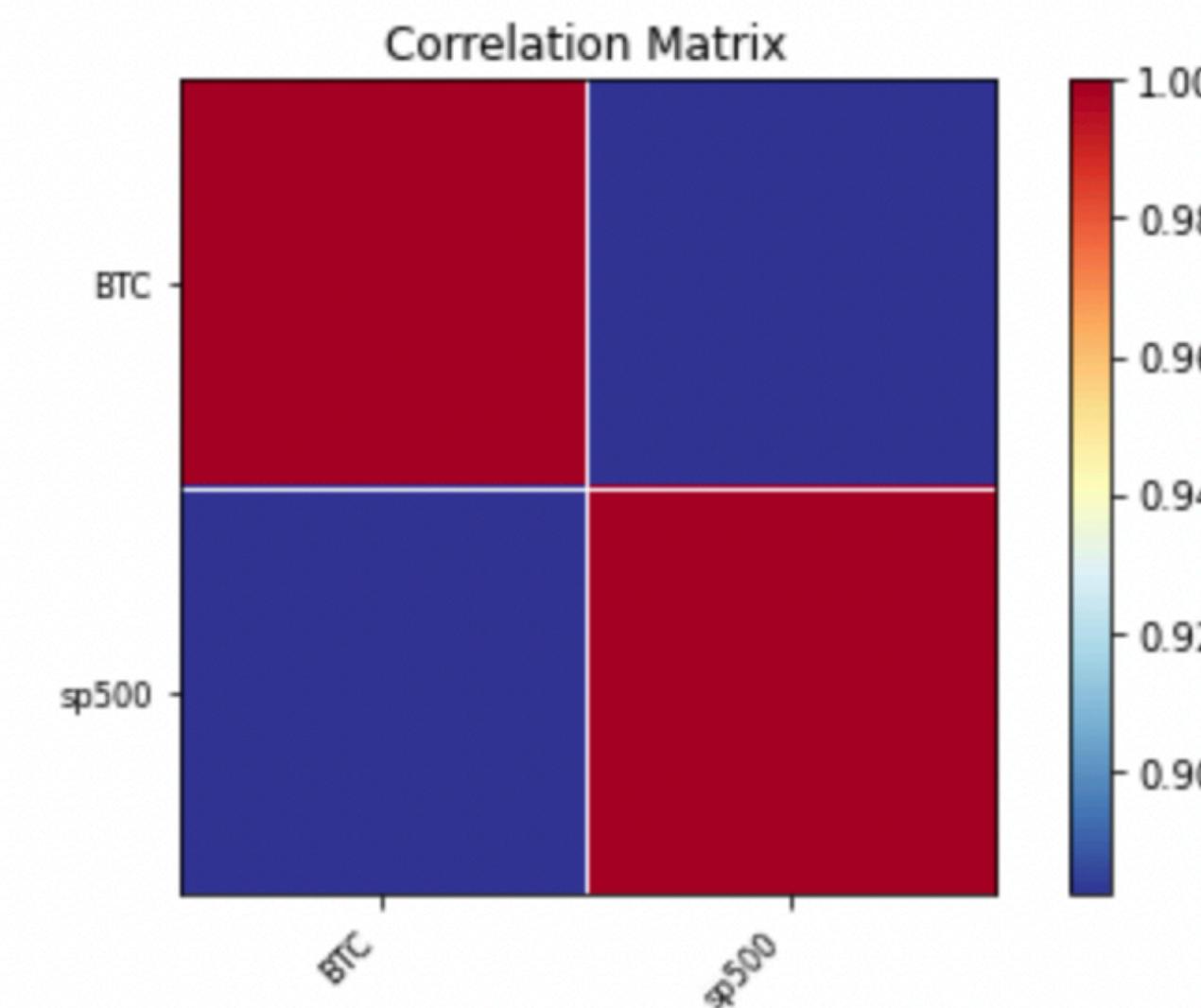


Here are S&P500 and Bitcoin prices related to each other

| | BTC | sp500 |
|-------------------|--------------|--------------|
| Date | | |
| 2016-01-04 | 433.091003 | 2012.660034 |
| 2016-01-05 | 431.959991 | 2016.709961 |
| 2016-01-06 | 429.105011 | 1990.260010 |
| 2016-01-07 | 458.048004 | 1943.089966 |
| 2016-01-08 | 453.230011 | 1922.030029 |
| ... | ... | ... |
| 2021-10-12 | 56041.058594 | 4350.649902 |
| 2021-10-13 | 57401.097656 | 4363.799805 |
| 2021-10-14 | 57321.523438 | 4438.259766 |
| 2021-10-15 | 61593.949219 | 4471.370117 |
| 2021-10-18 | 62026.078125 | 4486.459961 |



| | BTC | sp500 |
|--------------|------------|--------------|
| BTC | 1.000000 | 0.881932 |
| sp500 | 0.881932 | 1.000000 |



Bitcoin Price and the 200 Day Moving Average

There are various technical indicators which are important for identifying different trends in the movement of the price . A moving average is an average price or a certain asset over a specified period of time. One of the most popular MAs is the 200-day moving average.

```
df[ 'MA200' ] = df[ 'Adj Close' ].rolling(window=200).mean()
```

| | Open | High | Low | Close | Adj Close | Volume | MA200 |
|------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|
| Date | | | | | | | |
| 2015-04-04 | 254.291000 | 255.257996 | 251.100006 | 253.697006 | 253.697006 | 12493500 | 310.843170 |
| 2015-04-05 | 253.761002 | 260.674988 | 251.942001 | 260.597992 | 260.597992 | 19649200 | 309.859490 |
| 2015-04-06 | 260.721008 | 261.798004 | 254.574997 | 255.492004 | 255.492004 | 20034200 | 309.014750 |
| 2015-04-07 | 255.274002 | 255.804993 | 252.205002 | 253.179993 | 253.179993 | 18467400 | 308.306670 |
| 2015-04-08 | 253.063995 | 253.847000 | 244.214996 | 245.022003 | 245.022003 | 30086400 | 307.487260 |
| ... | ... | ... | ... | ... | ... | ... | ... |
| 2021-09-27 | 43234.183594 | 44313.246094 | 42190.632812 | 42235.730469 | 42235.730469 | 30980029059 | 45528.866504 |
| 2021-09-28 | 42200.898438 | 42775.144531 | 40931.664062 | 41034.542969 | 41034.542969 | 30214940550 | 45447.378770 |
| 2021-09-29 | 41064.984375 | 42545.257812 | 40829.667969 | 41564.363281 | 41564.363281 | 30602359905 | 45348.985156 |
| 2021-09-30 | 41551.269531 | 44092.601562 | 41444.582031 | 43790.894531 | 43790.894531 | 31141681925 | 45271.428047 |
| 2021-10-01 | 43816.742188 | 48436.011719 | 43320.023438 | 48116.941406 | 48116.941406 | 42850641582 | 45232.476758 |



Forecast Future Bitcoin Price using Prophet Model



Looking at Facebook's Prophet machine learning package.

Prophet is Facebook's open source forecasting procedure for time series data.

Going by the future data frame.

Bitcoin is on track to hit \$100k

per coin towards the end of 2022



reddit

yahoo!

```
raw_urls = {ticker:search_for_stock_news_urls(ticker) for ticker in monitored_tickers}
raw_urls

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```

'BTC': ['Bitcoin set a record high this week, after the first US futures-based crypto ETF made its debut. But the new fund may not be the smartest, or more profitable, strategy for average retail investors. (Bloomberg) -- It's the go-to place for making crypto wagers on whether Donald Trump retakes the White House and Jennifer Lopez and Ben Affleck get engaged. It's also under scrutiny by a top Wall Street analyst. The ProShares Bitcoin Strategy ETF (BITO) was a smash hit by any measure. Yet it may be that at least part of its success could in part be due to the timing of its launch. Last week's launch of the ProShares Bitcoin Strategy ETF (BITO) was a smash hit by any measure. Yet it may be that at least part of its success could in part be due to the timing of its launch. (Bloomberg) -- Most Read from Bloomberg Why Americans and Britons Are Rushing to Buy Idyllic Homes in Italy Cities' Answer to Sprawl? Go Wild. One of California's Wealthiest Counties Could Run Out of Space. (Bloomberg) -- Deutsche Bank CEO Christian Sewing says he's sorry for the bank's recent technical difficulties. "Thank you for your patience. Our engineers are working quickly to resolve the issue.",

"(Bloomberg) -- Bitcoin's record-breaking week ended on a down note. Most Read from Bloomberg Why Americans and Britons Are Rushing to Buy Idyllic Homes in Italy The Top Money Maker at Deutsche Bank Is a Cryptocurrency. (Bloomberg) -- In a flipping of the script, a leading cryptocurrency project and its co-founder are suing the Securities and Exchange Commission (SEC). The lawsuit was filed on Wednesday. (Bloomberg) -- Bitcoin, BTC to USD, rose by 0.98% on Saturday. Following a 2.40% loss on Friday, Bitcoin ended the day at \$61,302.0. A mixed start to the day saw Bitcoin fall to a late morning intraday low \$59,750. (Bloomberg) -- A milestone week that began with the introduction of the first Bitcoin-based exchange traded fund (ETF) ended just as it began – with a new fund based on the world's second largest cryptocurrency, Ethereum (ETH), trading on the New York Stock Exchange. (Bloomberg) -- "The vibe is palpable. Bitcoin enthusiasts are celebrating its all-time high this week, and Ethereum is close to hitting its own record price of \$4,357. Make no mistake, it's a good time to be holding Ethereum," says a top analyst. (Bloomberg) -- The arrival of a bitcoin futures ETF has investors wondering which cryptocurrency could be next in line. Ethereum, the second-biggest cryptocurrency, is the most likely candidate, according to speculators. (Bloomberg) -- This article originally appeared in Valid Points, CoinDesk's weekly newsletter breaking down Ethereum 2.0 and its sweeping impact on crypto markets. Subscribe to Valid Points here. During Ethereum 2.0's soft launch, the value of each of the two largest cryptocurrencies – bitcoin (BTC-USD) and ethereum (ETH-USD) – fell earlier this week amid an outright ban on cryptocurrency trading in China and indication of further regulatory action. (Bloomberg) -- Bitcoin exploded to a new all-time high Wednesday just one day after the first-ever bitcoin-linked exchange traded fund (ETF) started trading on the New York Stock Exchange. The ProShares Bitcoin Strategy ETF (BITO) was a smash hit by any measure. Yet it may be that at least part of its success could in part be due to the timing of its launch. (Bloomberg) -- Bitcoin, BTC to USD, rose by 12.48% in the week ending 17th October. Following a 13.37% rally from the week prior, Bitcoin ended the week at \$61,504.0. A mixed start to the week saw Bitcoin fall to a late afternoon low \$59,750. (Bloomberg) -- The value of each of the two largest cryptocurrencies – bitcoin (BTC-USD) and ethereum (ETH-USD) – fell earlier this week amid an outright ban on cryptocurrency trading in China and indication of further regulatory action. (Bloomberg) -- Two weeks ago, see here, when Ethereum (ETH) was trading at \$3580s, I anticipated using the Elliott Wave Principle (EWP) that "as long as ETH can stay above ... \$3173 over the next few days, it should continue to move higher." (Bloomberg) -- Investors who want to buy a cryptocurrency ETF don't have to choose between bitcoin (BTC) or ethereum (ETH) and its tokens called ether, because a new fund that holds both started trading today. (Bloomberg) -- Check back at 8:30 a.m. ET for results. Over the past many weeks, see my last article here; I anticipated using the Elliott Wave Principle (EWP) that Ethereum, aka Ether, (ETH) would pull back, rally, and end the month above \$3580s.

```
↳ /usr/local/lib/python3.7/dist-packages/torch/utils/data/dataloader.py:481: U
    cpuset_checked)
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```
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scores
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'BTC': [{'label': 'NEGATIVE', 'score': 0.9965948462486267},
    {'label': 'NEGATIVE', 'score': 0.9558952450752258},
    {'label': 'POSITIVE', 'score': 0.9968835711479187},
    {'label': 'NEGATIVE', 'score': 0.9783180952072144},
    {'label': 'POSITIVE', 'score': 0.9979088306427002},
    {'label': 'NEGATIVE', 'score': 0.999359667301178},
    {'label': 'NEGATIVE', 'score': 0.99298095703125},
    {'label': 'POSITIVE', 'score': 0.9979088306427002},
    {'label': 'NEGATIVE', 'score': 0.6248753666877747},
    {'label': 'NEGATIVE', 'score': 0.9989308714866638}],
'ETH': [{'label': 'POSITIVE', 'score': 0.9979088306427002},
    {'label': 'NEGATIVE', 'score': 0.9992571473121643},
    {'label': 'NEGATIVE', 'score': 0.9974950551986694},
    {'label': 'NEGATIVE', 'score': 0.9726837873458862},
    {'label': 'NEGATIVE', 'score': 0.9987817406654358},
    {'label': 'NEGATIVE', 'score': 0.7049556970596313},
    {'label': 'NEGATIVE', 'score': 0.9987099170684814},
    {'label': 'NEGATIVE', 'score': 0.912875771522522},
    {'label': 'POSITIVE', 'score': 0.986530601978302},
    {'label': 'NEGATIVE', 'score': 0.995140790939331}]}
```

<https://finance.yahoo.com/news/bitcoin-record-breaking-week-ending-175104130.html>

<https://finance.yahoo.com/news/why-bitcoin-related-ethereum-related-155916253.html>

<https://finance.yahoo.com/news/market-wrap-bitcoin-drops-indicators-202423551.html>

<https://finance.yahoo.com/news/bitcoin-next-test-seen-90-055956191.html>

<https://finance.yahoo.com/news/second-u-bitcoin-etf-launches-133837968.html>

<https://finance.yahoo.com/news/bitcoin-etf-demand-so-strong-we-could-bring-2-or-3-new-ones-to-market-valkyrie-ceo-193827132.html>

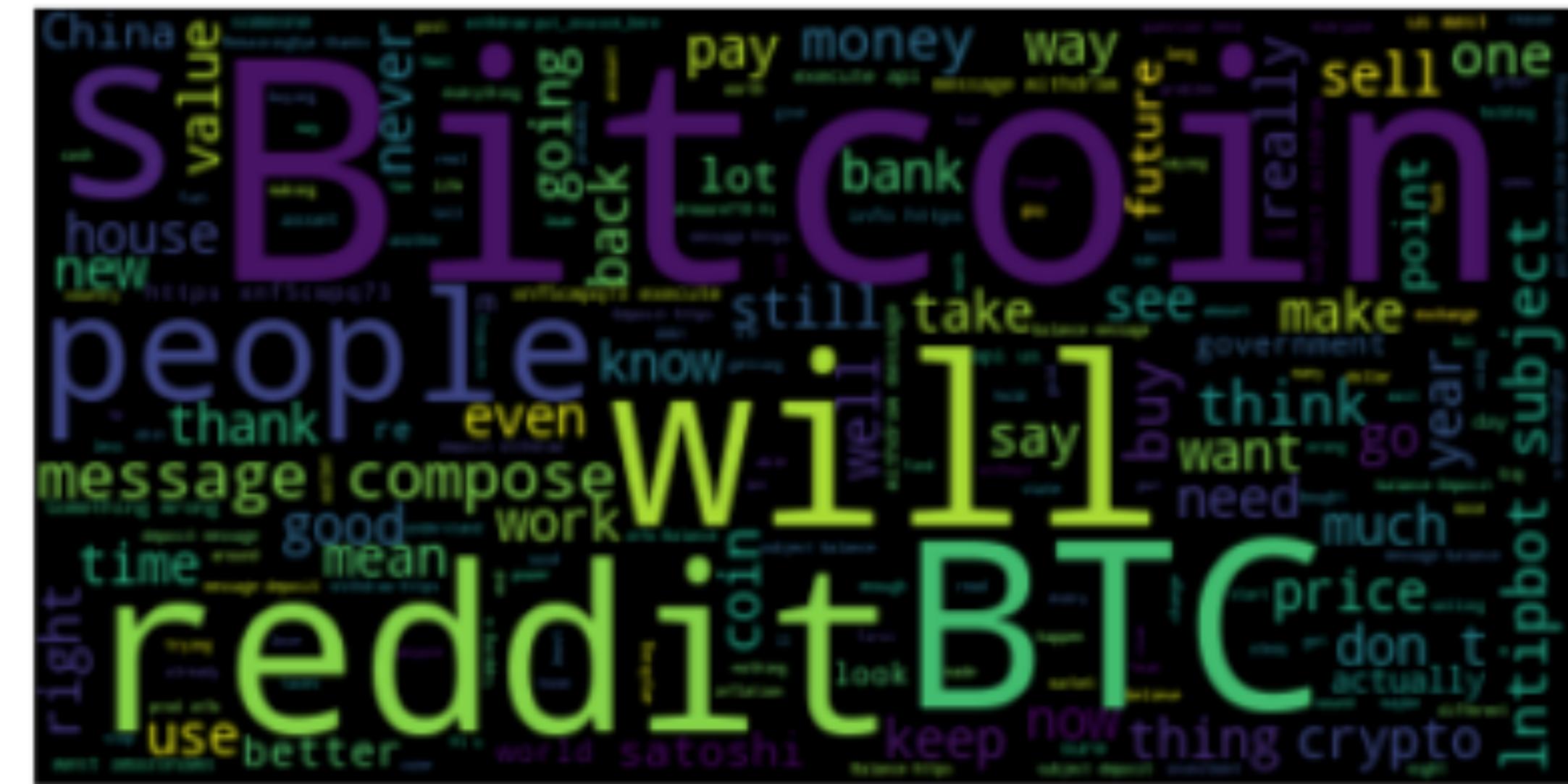
```
your subreddit='Bitcoin'  
subreddit=reddit.subreddit('Bitcoin')
```

POST TITTLE
We are now at ATH
POST TITTLE
BREAKING: Bitcoin CEO to Increase Prices
POST TITTLE
China ban had the opposite effect.
POST TITTLE
why is housing so cheap and affordable when paying with Bitcoin?
POST TITTLE
A fitting time to bring back our anthem.
POST TITTLE
Calculating your profits as Bitcoin reaches new all-time high
POST TITTLE
\$1,200 Stimulus Check Would Now Be Worth \$11,000 If Used To Buy Bitcoin
POST TITTLE
2022: Employers decide to start paying in Bitcoin.
POST TITTLE
Cramer, much regret when he sold at the bottom
POST TITTLE
250k and beyond to infinity 🎯👉🎯
POST TITTLE
Bitcoin & Fiat

```
[19]: word_counter(text)
```

```
[19]:
```

| | word | count |
|----|---------|-------|
| 0 | bitcoin | 3436 |
| 1 | like | 2046 |
| 2 | dont | 1922 |
| 3 | btc | 1834 |
| 4 | people | 1776 |
| 5 | would | 1746 |
| 6 | get | 1583 |
| 7 | wa | 1548 |
| 8 | money | 1337 |
| 9 | buy | 1334 |
| 10 | year | 1257 |
| 11 | think | 1204 |
| 12 | one | 1181 |
| 13 | time | 1098 |
| 14 | know | 1086 |
| 15 | make | 1055 |
| 16 | go | 1052 |
| 17 | ha | 1009 |
| 18 | im | 964 |
| 19 | want | 925 |
| 20 | need | 910 |
| 21 | price | 890 |



```
data=scraper.getTopPostsForSubReddit('BTC',100,'week')
text=scraper.convertToFullText(data,'body')
scraper.visualizeWordFreq(text)
```

POST TITTLE

Joining this sub and learning about the blocksize wars be like:

POST TITTLE

i think we all know how he's feeling tbh

POST TITTLE

The Future of Money – New Comic by Me [OC]

POST TITTLE

While BTC reaches an all-time \$ high, Bitcoin cash quietly mines a 5 and a half Mb block.

POST TITTLE

GoCrypto.com allows you to buy gasoline and just about anything else with your Bitcoin Cash

POST TITTLE

October 4th, 2010, 7:48 PM

POST TITTLE

Tether is being fined for lying during its early days up to 2019. 95% of the \$USDT supply was printed after that, nobody has even investigated that period yet.

POST TITTLE

Litecoin metrics are being faked by one guy spamming many transactions over and over to create the illusion of usage. Last time they faked their volume coinbase got fined \$6.5M by the CFTC.

POST TITTLE

Deserialization Failed for some Object. Dirty [



```
[73]: word_counter(text)
```

73]: word count

| | | |
|----|---------|------|
| 0 | bch | 1138 |
| 1 | btc | 809 |
| 2 | bitcoin | 790 |
| 3 | wa | 610 |
| 4 | like | 560 |
| 5 | people | 521 |
| 6 | dont | 489 |
| 7 | ha | 464 |
| 8 | would | 456 |
| 9 | one | 400 |
| 10 | think | 370 |
| 11 | get | 333 |