

Unit 12 - Tales from the Crypto

1. Sentiment Analysis

Use the [newsapi](#) to pull the latest news articles for Bitcoin and Ethereum and create a DataFrame of sentiment scores for each coin.

Use descriptive statistics to answer the following questions:

- 1. Which coin had the highest mean positive score?
- 2. Which coin had the highest negative score?
- 3. Which coin had the highest positive score?

In [1]:

```
# Initial imports
import os
import pandas as pd
from dotenv import load_dotenv
import nltk as nltk
nltk.download('vader_lexicon')
from nltk.sentiment.vader import SentimentIntensityAnalyzer
analyzer = SentimentIntensityAnalyzer()
from newsapi import NewsApiClient

%matplotlib inline
```

[nltk_data] Downloading package vader_lexicon to
[nltk_data] C:\Users\Luke\AppData\Roaming\nltk_data...
[nltk_data] Package vader_lexicon is already up-to-date!

In [2]:

```
# Read your api key environment variable
load_dotenv()
api_key = os.getenv("NEWS_API_KEY")
```

In [3]:

```
# Create a newsapi client
newsapi = NewsApiClient(api_key=api_key)
```

In [4]:

```
# Fetch the Bitcoin news articles
bitcoin_headlines = newsapi.get_everything(
    q="bitcoin",
    language="en",
    sort_by="relevancy"
)
# bitcoin_headlines

# Show the total number of news
bitcoin_headlines["totalResults"]
```

Out[4]: 7687

In [5]:

```
# Fetch the Ethereum news articles
ethereum_headlines = newsapi.get_everything(
    q="ethereum",
    language="en",
    sort_by="relevancy"
)
# ethereum_headlines

# Show the total number of news
ethereum_headlines["totalResults"]
```

Out[5]: 3797

In [6]:

```
# # Create the Bitcoin sentiment scores DataFrame
def get_sentiment(score):
    """
    Calculates the sentiment based on the compound score.
    """
    result = 0 # Neutral by default
    if score >= 0.05: # Positive
        result = 1
    elif score <= -0.05: # Negative
        result = -1

    return result
```

In [7]:

```
def create_df(news):
    articles = []
    for article in news:
```

```
try:
    title = article["title"]
    description = article["description"]
    text = article["content"]
    date = article["publishedAt"][:10]

    articles.append({
        "title": title,
        "description": description,
        "text": text,
        "date": date
    })
except AttributeError:
    pass

return pd.DataFrame(articles)
```

```
In [8]: # Create the Bitcoin sentiment scores DataFrame
bitcoin_df = create_df(bitcoin_headlines["articles"])
bitcoin_df.head()
```

Out[8]:

	title	description	text	date
0	If you're a Russian YouTuber, how do you get p...	Russian creators are shut off from the global ...	When Russia invaded Ukraine, Niki Proshin was ...	2022-03-17
1	El Salvador turns to Binance for help on bitco...	El Salvador is seeking support from cryptocurr...	SAN SALVADOR, March 23 (Reuters) - El Salvador...	2022-03-23
2	Why Isn't Bitcoin Booming?	"Bitcoin was seen by many of its libertarian-l...	"Bitcoin was seen by many of its libertarian-l...	2022-03-12
3	Cryptoverse: Remember when bitcoin was 'anonym...	Bitcoin just isn't anonymous enough for a grow...	March 22 (Reuters) - Bitcoin just isn't anonym...	2022-03-22
4	Cryptoverse: Bitcoin gains conflict currency c...	Bitcoin has leapt since Russia's invasion of U...	March 1 (Reuters) - Bitcoin has leapt since Ru...	2022-03-01

```
In [9]: # Create the Ethereum sentiment scores DataFrame
ethereum_df = create_df(ethereum_headlines["articles"])
ethereum_df.head()
```

Out[9]:

	title	description	text	date
0	Web3 Threatens to Segregate Our Online Lives	Governance tokens seem like a tantalizing solu...	In February, shit hit the fan in the usual way...	2022-03-01
1	Coinbase earnings show trading of ethereum and...	Ethereum trading volume increased from 15% to ...	Coinbase reported that the share of trading vo...	2022-02-25
2	How Ukrainians are fundraising in cryptocurrency	Millions of dollars of cryptocurrency have flo...	Illustration by James Bareham / The Verge\r\n\r\n...	2022-02-26
3	Vitalik Buterin talks about the problems of cr...	The founder of Ethereum confessed his concerns...	His name is Vitalik Buterin and after dedicati...	2022-03-22
4	How People Actually Make Money From Cryptocurr...	Power traders use "staking" and "yield farming...	If it sounds too good to be true, youre not wr...	2022-03-13

```
In [10]: # Describe the Bitcoin Sentiment
def get_sentiment(score):
    """
    Calculates the sentiment based on the compound score.
    """
    result = 0 # Neutral by default
    if score >= 0.05: # Positive
        result = 1
    elif score <= -0.05: # Negative
        result = -1

    return result
```

```
In [11]: # Bitcoin Sentiment scores dictionaries
title_sent = {
    "title_compound": [],
    "title_pos": [],
    "title_neu": [],
    "title_neg": [],
    "title_sent": [],
}
text_sent = {
    "text_compound": [],
    "text_pos": [],
    "text_neu": [],
    "text_neg": [],
    "text_sent": [],
}

# Get sentiment for the text and the title
for index, row in bitcoin_df.iterrows():
    try:
        # Sentiment scoring with VADER
        title_sentiment = analyzer.polarity_scores(row["title"])
        title_sent["title_compound"].append(title_sentiment["compound"])
        title_sent["title_pos"].append(title_sentiment["pos"])
        title_sent["title_neu"].append(title_sentiment["neu"])
        title_sent["title_neg"].append(title_sentiment["neg"])
        title_sent["title_sent"].append(get_sentiment(title_sentiment["compound"]))
```

```
text_sentiment = analyzer.polarity_scores(row["text"])
text_sent["text_compound"].append(text_sentiment["compound"])
text_sent["text_pos"].append(text_sentiment["pos"])
text_sent["text_neu"].append(text_sentiment["neu"])
text_sent["text_neg"].append(text_sentiment["neg"])
text_sent["text_sent"].append(get_sentiment(text_sentiment["compound"]))
except AttributeError:
    pass

# Attaching sentiment columns to the News DataFrame
title_sentiment_df = pd.DataFrame(title_sent)
text_sentiment_df = pd.DataFrame(text_sent)
bitcoin_df = bitcoin_df.join(title_sentiment_df).join(text_sentiment_df)

bitcoin_df.head()
```

Out[11]:

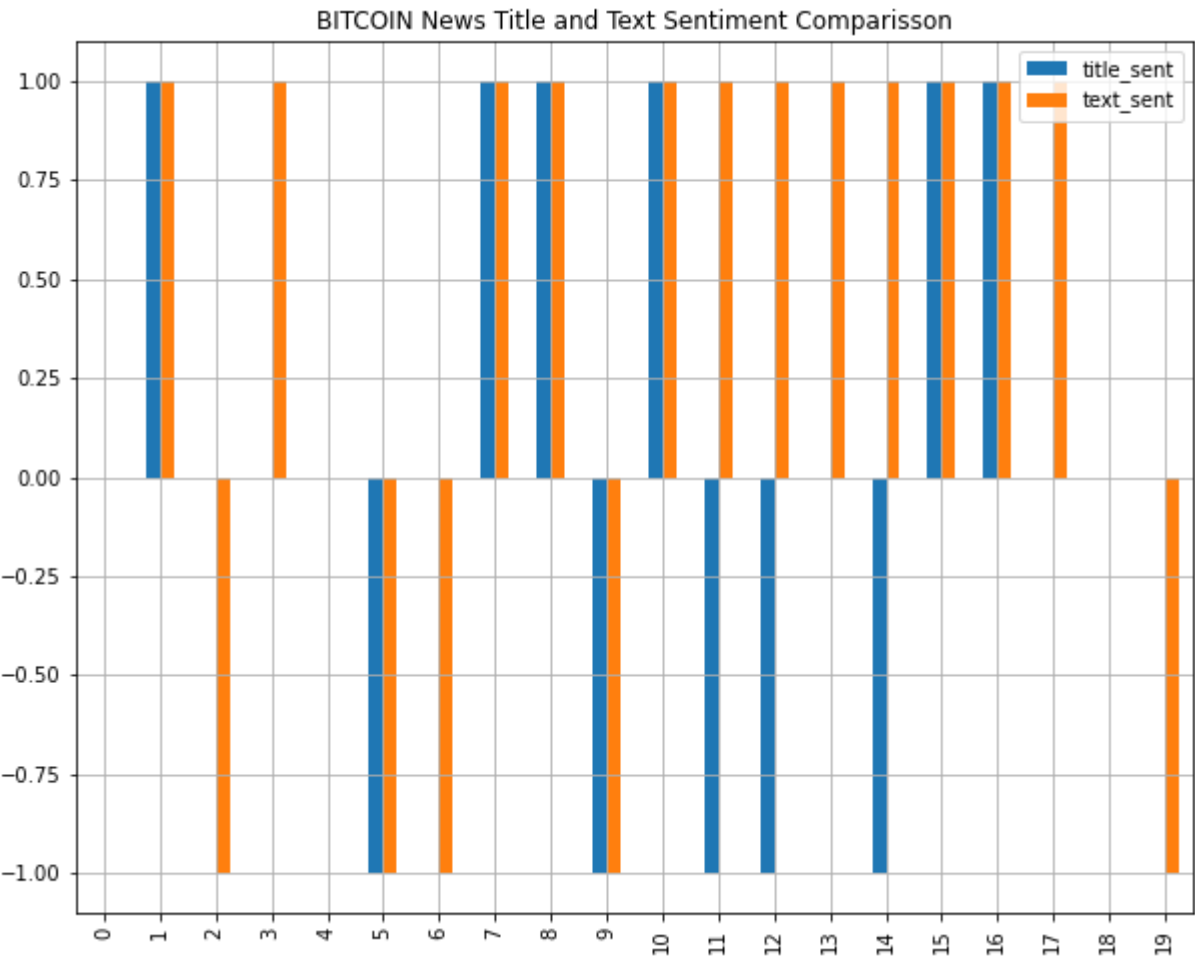
		title	description	text	date	title_compound	title_pos	title_neu	title_neg	title_sent	text_compound	text_pos	text_neu	text_neg	text_sent
0		If you're a Russian YouTuber, how do you get p...	Russian creators are shut off from the global ...	When Russia invaded Ukraine, Niki Proshin was ...	2022-03-17	0.0000	0.000	1.000	0.000	0	0.0000	0.000	1.000	0.000	0
1		El Salvador turns to Binance for help on bitco...	El Salvador is seeking support from cryptocurr...	SAN SALVADOR, March 23 (Reuters) - El Salvador...	2022-03-23	0.4019	0.213	0.787	0.000	1	0.4939	0.123	0.877	0.000	1
2		Why Isn't Bitcoin Booming?	"Bitcoin was seen by many of its libertarian-l...	"Bitcoin was seen by many of its libertarian-l...	2022-03-12	0.0000	0.000	1.000	0.000	0	-0.7713	0.000	0.831	0.169	-1
3		Cryptoverse: Remember when bitcoin was 'anonym...	Bitcoin just isn't anonymous enough for a grow...	March 22 (Reuters) - Bitcoin just isn't anonym...	2022-03-22	0.0000	0.000	1.000	0.000	0	0.6369	0.171	0.829	0.000	1
4		Cryptoverse: Bitcoin gains conflict currency c...	Bitcoin has leapt since Russia's invasion of U...	March 1 (Reuters) - Bitcoin has leapt since Ru...	2022-03-01	0.0258	0.247	0.515	0.237	0	0.0000	0.000	1.000	0.000	0

In [12]:

```
# Plot bar chart
bitcoin_df.plot(
    y=["title_sent", "text_sent"],
    kind="bar",
    title="BITCOIN News Title and Text Sentiment Comparisson",
    figsize=(10, 8),
    grid=True,
)
```

Out[12]:

<AxesSubplot:title={'center': 'BITCOIN News Title and Text Sentiment Comparisson'}>



In [13]:

```
bitcoin_df.describe()
```

Out[13]:

	title_compound	title_pos	title_neu	title_neg	title_sent	text_compound	text_pos	text_neu	text_neg	text_sent
count	20.000000	20.000000	20.000000	20.000000	20.000000	20.000000	20.000000	20.000000	20.000000	20.000000
mean	-0.027750	0.081450	0.814550	0.103950	0.050000	0.136485	0.071500	0.889750	0.038800	0.350000
std	0.271373	0.105278	0.184348	0.144677	0.759155	0.423909	0.051528	0.070043	0.060936	0.875094
min	-0.599400	0.000000	0.515000	0.000000	-1.000000	-0.771300	0.000000	0.739000	0.000000	-1.000000
25%	-0.019300	0.000000	0.615000	0.000000	-0.250000	-0.032000	0.036000	0.852500	0.000000	-0.250000
50%	0.000000	0.000000	0.823000	0.000000	0.000000	0.318200	0.077500	0.879500	0.000000	1.000000
75%	0.165400	0.213750	1.000000	0.210000	1.000000	0.458800	0.099500	0.937000	0.052000	1.000000
max	0.401900	0.247000	1.000000	0.438000	1.000000	0.636900	0.171000	1.000000	0.187000	1.000000

In [14]:

```
# Describe the Ethereum Sentiment
def get_sentiment(score):
    """
    Calculates the sentiment based on the compound score.
    """
    result = 0 # Neutral by default
    if score >= 0.05: # Positive
        result = 1
    elif score <= -0.05: # Negative
        result = -1

    return result
```

In [15]:

```
# Ethereum Sentiment scores dictionaries
title_sent = {
    "title_compound": [],
    "title_pos": [],
    "title_neu": [],
    "title_neg": [],
    "title_sent": [],
}

text_sent = {
    "text_compound": [],
    "text_pos": [],
    "text_neu": [],
    "text_neg": [],
    "text_sent": [],
}

# Get sentiment for the text and the title
for index, row in ethereum_df.iterrows():
    try:
        # Sentiment scoring with VADER
        title_sentiment = analyzer.polarity_scores(row["title"])
        title_sent["title_compound"].append(title_sentiment["compound"])
        title_sent["title_pos"].append(title_sentiment["pos"])
        title_sent["title_neu"].append(title_sentiment["neu"])
        title_sent["title_neg"].append(title_sentiment["neg"])
        title_sent["title_sent"].append(get_sentiment(title_sentiment["compound"]))

        text_sentiment = analyzer.polarity_scores(row["text"])
        text_sent["text_compound"].append(text_sentiment["compound"])
        text_sent["text_pos"].append(text_sentiment["pos"])
        text_sent["text_neu"].append(text_sentiment["neu"])
        text_sent["text_neg"].append(text_sentiment["neg"])
        text_sent["text_sent"].append(get_sentiment(text_sentiment["compound"]))
    except AttributeError:
        pass

# Attaching sentiment columns to the News DataFrame
title_sentiment_df = pd.DataFrame(title_sent)
text_sentiment_df = pd.DataFrame(text_sent)
ethereum_df = ethereum_df.join(title_sentiment_df).join(text_sentiment_df)

ethereum_df.head()
```

Out[15]:

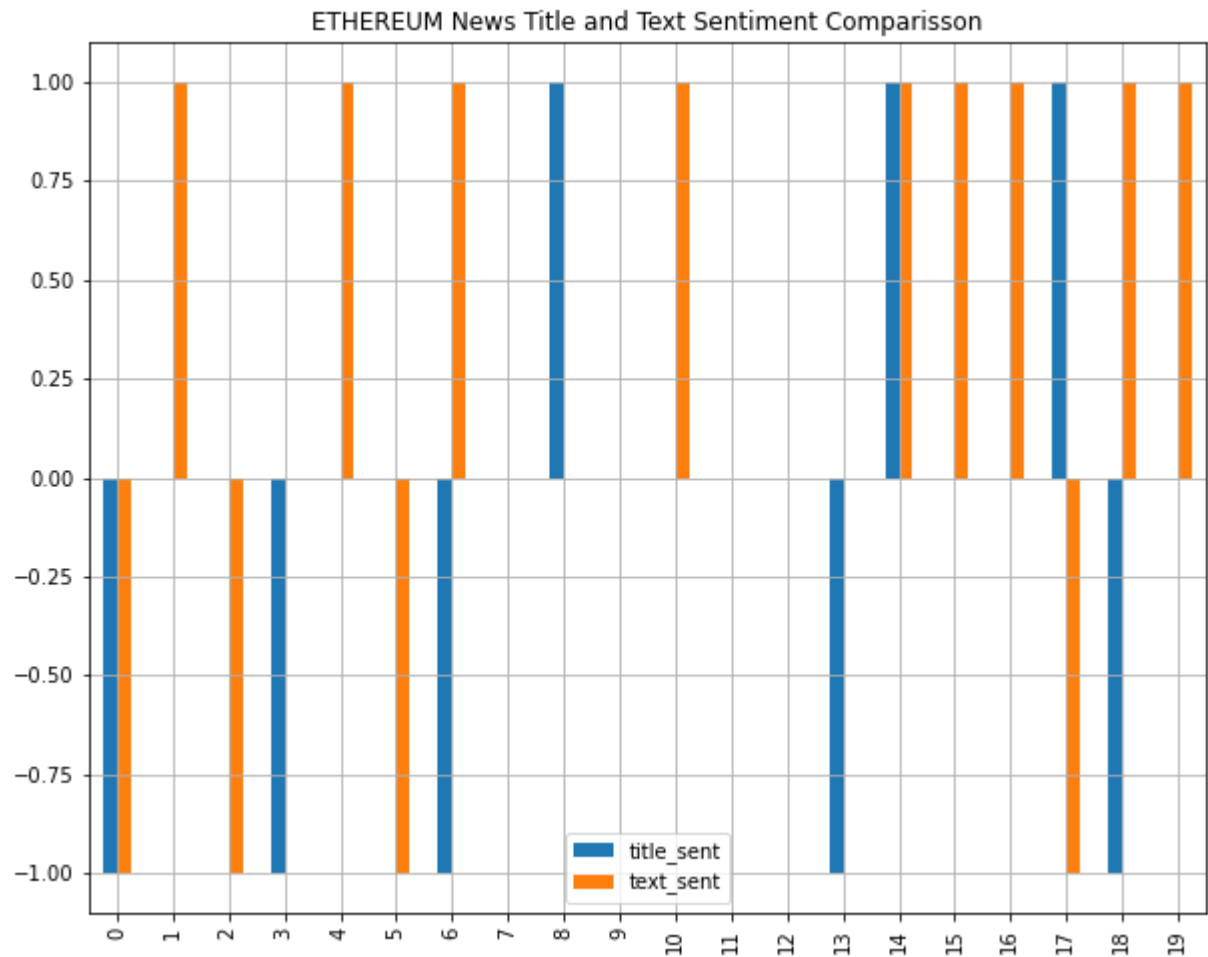
		title	description	text	date	title_compound	title_pos	title_neu	title_neg	title_sent	text_compound	text_pos	text_neu	text_neg	text_sent
0	Web3 Threatens to Segregate Our Online Lives	Governance tokens seem like a tantalizing solu...	In February, shit hit the fan in the usual way...	2022-03-01	-0.3818	0.00	0.698	0.302	-1	-0.3182	0.059	0.848	0.093	-1	
1	Coinbase earnings show trading of ethereum and...	Ethereum trading volume increased from 15% to ...	Coinbase reported that the share of trading vo...	2022-02-25	0.0000	0.00	1.000	0.000	0	0.6705	0.188	0.812	0.000	1	
2	How Ukrainians are fundraising in cryptocurrency	Millions of dollars of cryptocurrency have flo...	Illustration by James Bareham / The Verge\r\n\r\n...	2022-02-26	0.0000	0.00	1.000	0.000	0	-0.4588	0.000	0.917	0.083	-1	
3	Vitalik Buterin talks about the problems of cr...	The founder of Ethereum confessed his concerns...	His name is Vitalik Buterin and after dedicati...	2022-03-22	-0.1027	0.11	0.762	0.129	-1	0.0000	0.000	1.000	0.000	0	
4	How People Actually Make Money From Cryptocurr...	Power traders use “staking” and “yield farming...	If it sounds too good to be true, youre not wr...	2022-03-13	0.0000	0.00	1.000	0.000	0	0.8340	0.236	0.713	0.050	1	

In [16]:

```
# Plot bar chart
ethereum_df.plot(
    y=["title_sent", "text_sent"],
    kind="bar",
    title="ETHEREUM News Title and Text Sentiment Comparisson",
    figsize=(10, 8),
    grid=True,
)
```

Out[16]:

<AxesSubplot:title={'center': 'ETHEREUM News Title and Text Sentiment Comparisson'}>



```
In [17]: ethereum_df.describe()
```

Out[17]:	title_compound	title_pos	title_neu	title_neg	title_sent	text_compound	text_pos	text_neu	text_neg	text_sent
count	20.000000	20.000000	20.000000	20.000000	20.000000	20.000000	20.000000	20.000000	20.000000	20.000000
mean	-0.022455	0.031250	0.925000	0.043800	-0.100000	0.210425	0.080850	0.89450	0.024600	0.250000
std	0.187591	0.070197	0.104953	0.086559	0.640723	0.427857	0.094548	0.10717	0.037614	0.786398
min	-0.381800	0.000000	0.698000	0.000000	-1.000000	-0.526700	0.000000	0.68200	0.000000	-1.000000
25%	-0.025675	0.000000	0.869500	0.000000	-0.250000	0.000000	0.000000	0.84100	0.000000	0.000000
50%	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.053000	0.91450	0.000000	0.000000
75%	0.000000	0.000000	1.000000	0.028250	0.000000	0.528675	0.141500	1.00000	0.048500	1.000000
max	0.458800	0.250000	1.000000	0.302000	1.000000	0.867600	0.270000	1.00000	0.115000	1.000000

Questions:

Q: Which coin had the highest mean positive score?

A: Bitcoin had the highest title_pos mean of 0.064.

Q: Which coin had the highest compound score?

A: Ethereum has the highest title_compound score of 0.46.

Q: Which coin had the highest positive score?

A: Bitcoin has the highest title_pos score of 0.30.

Note: I used title for all questions as it has more context to the brief.

2. Natural Language Processing

Tokenizer

In this section, you will use NLTK and Python to tokenize the text for each coin. Be sure to:

- 1. Lowercase each word.
- 2. Remove Punctuation.
- 3. Remove Stopwords.

```
In [18]: from nltk.tokenize import word_tokenize, sent_tokenize
from nltk.corpus import stopwords
from nltk.stem import WordNetLemmatizer, PorterStemmer
from string import punctuation
import re
```


In [19]:

```
# Bitcoin Instantiate the Lemmatizer
lemmatizer = WordNetLemmatizer()

article = bitcoin_headlines
print(article)
```

{'status': 'ok', 'totalResults': 7687, 'articles': [{'source': {'id': 'the-verge', 'name': 'The Verge'}, 'author': 'Elizabeth Lopatto', 'title': 'If you’re a Russian YouTuber, how do you get paid now?', 'description': 'Russian creators are shut off from the global financial system. Some of them are turning to cryptocurrency.', 'url': 'https://www.theverge.com/2022/3/17/22982122/russia-youtube-crypto-creators-pay-ruble', 'urlToImage': 'https://cdn.vox-cdn.com/thumbor/MG_NhB7wSIBl13S_LG-y-r7iPmg=/0x215:3000x1786/fit-in/1200x630/cdn.vox-cdn.com/uploads/chorus_asset/file/9442221/cryptocurrency_0004_00000_.jpg', 'publishedAt': '2022-03-17T13:33:43Z', 'content': 'When Russia invaded Ukraine, Niki Proshin was already a year into making a living as a vlogger – he had a YouTube channel, a TikTok channel, and an Instagram. He also ran an online Russian club f or a... [+5883 chars]}'], {'source': {'id': 'reuters', 'name': 'Reuters'}, 'author': None, 'title': 'El Salvador turns to Binance for help on bitcoin adoption - Reuters.com', 'description': 'El Salvador is seeking support from cryptocurrency exchange Binance for its implementation of bitco in as legal tender and the issuance of bitcoin bonds, the Central American country’s ambassador to the United States said on Wednesday.', 'url': 'https://www.reuters.com/world/americas/el-salvador-turns-binance-help-bitcoin-adoption-2022-03-23/', 'urlToImage': 'https://www.reuters.com/r esizer/hQufYg89hsElzhlgGfkPIvaoHxbY=/1200x628/smart/filters:quality(80)/cloudfront-us-east-2.images.arcpublishing.com/reuters/IB36Y4ZKDRLJNA3LRDQAH57UGM.jpg', 'publishedAt': '2022-03-23T20:40:00Z', 'content': 'SAN SALVADOR, March 23 (Reuters) - El Salvador is seeking support from cryptoc urrency exchange Binance for its implementation of bitcoin as legal tender and the issuance of bitcoin bonds, the Central... [+1109 chars]}'], {'source': {'id': None, 'name': 'Slashdot.org'}, 'author': 'EditorDavid', 'title': 'Why Isn’t Bitcoin Booming?', 'description': '“Bitcoin was seen by many of its libertarian-leaning fans as a kind of doomsday insurance,” argues a columnist in the New York Times, “a form of \\'digital gold\'' that would be a source of stability as the world grew more chaotic and unpredictable.... \n\n“But Bit...’, ‘url': 'https://news.slashdot.org/stor y/22/03/12/0541251/why-isnt-bitcoin-booming', 'urlToImage': 'https://a.fsdn.com/sd/topics/bitcoin_64.png', 'publishedAt': '2022-03-12T18:34:00Z', 'content': '"Bitcoin was seen by many of its libertarian-leaning fans as a kind of doomsday insurance," argues a columnist in the New York Ti mes, "a form of \\'digital gold\'' that would be a source of stability as ... [+3914 chars]}'], {'source': {'id': 'reuters', 'name': 'Reuters'}, 'author': None, 'title': 'Cryptoverse: Remember when bitcoin was anonymous'? - Reuters', 'description': '“Bitcoin just isn’t anonymous enough for a growing cohort of crypto users who are seeking greater seclusion.”, ‘url': 'https://www.reuters.com/technology/cryptoverse-remember-when-bitcoin-was-anonymous-2022-03-22/', 'urlToImage': 'https://www.reuters.com/resizer/c8l0ZeOwLIRW0T_RNTBsF0F2F6w=/1200x628/smart/filters:quality(80)/clo udfront-us-east-2.images.arcpublishing.com/reuters/T3V4ZRYO6BPIJKJVNY7C6YUJQ.jpg', 'publishedAt': '2022-03-22T06:15:00Z', 'content': 'March 22 (Reuters) - Bitcoin just isn’t anonymous enough for a growing cohort of crypto users who are seeking greater seclusion.\r\nA volatile class of crypto known as privacy coins, created with the p... [+4776 chars]}'], {'source': {'id': 'reuters', 'name': 'Reuters'}, 'author': None, 'title': 'Cryptoverse: Bitcoin gains conflict currency credentials - Reuters', 'description': '“Bitcoin has leapt since Russia’s invasion of Ukraine, bolst ered by people in those countries looking to store and move money in anonymous and decentralised crypto.”, ‘url': 'https://www.reuters.com/markets/europe/cryptoverse-bitcoin-gains-conflict-currency-credentials-2022-03-01/', 'urlToImage': 'https://www.reuters.com/pf/resources/images/reut ers/reuters-default.png?d=75', 'publishedAt': '2022-03-01T06:10:00Z', 'content': 'March 1 (Reuters) - Bitcoin has leapt since Russia’s invasion of Ukraine, bolstered by people in those countries looking to store and move money in anonymous and decentralised crypto.\r\nBitcoin tradin... [+3955 chars]}'], {'source': {'id': 'wired', 'name': 'Wired'}, 'author': 'Gian M. Volpicelli', 'title': 'War Is Calling Crypto’s ‘Neutrality’ Into Question', 'description': 'War in Ukraine and Western sanctions against Russia have made cryptocurrency a hot potato for international politic s.', ‘url': 'https://www.wired.com/story/crypto-russia-ukraine-sanctions/', 'urlToImage': 'https://media.wired.com/photos/6226a83bd53a49d05c483fa6/191:100/w_1280,c_limit/business-crypto-war-1130490519.jpg', 'publishedAt': '2022-03-08T12:00:00Z', 'content': 'Whose side is cryptocurrency on? If you had asked Satoshi Nakamoto, the pseudonymous person (or persons) who created the Bitcoin platform in 2008, he/they likely would have rejected the question. The... [+3643 chars]}'], {'source': {'id': None, 'name': 'CNET'}, 'author': 'Julian Dossett', 'title': 'Cryptocurrency Dona tions Pour Into Ukraine. This Week in Bitcoin and Crypto News - CNET', 'description': 'Nonfungible Tdibits: All the bitcoin, cryptocurrency and NFT news for the week ending March 6.', ‘url': 'https://www.cnet.com/personal-finance/crypto/cryptocurrency-donations-pour-into-ukraine-this-we ek-in-bitcoin-and-crypto-news/', 'urlToImage': 'https://www.cnet.com/a/img/ZqMWuhVOx38FqLi8Vs9ihQDjzPc=/1200x630/2022/03/04/c8f8f15b-e257-4dfd-9f64-a53be254530b/gettyimages-1320502852.jpg', 'publishedAt': '2022-03-05T14:45:07Z', 'content': 'Getty\r\nWelcome to Nonfungible Tdibits. Our f ocus this week: Russia’s war in Ukraine.\xa0\r\nIn addition to uprooting the lives of Ukrainians and throwing the international order into chaos, the Russian in... [+3275 chars]}'], {'source': {'id': None, 'name': 'CNET'}, 'author': 'Julian Dossett', 'title': 'Is the US Developing a Digita l Dollar? This Week’s Top Bitcoin & Crypto News - CNET', 'description': 'Nonfungible Tdibits: All the bitcoin, cryptocurrency and NFT news for the week ending March 18.', ‘url': 'https://www.cnet.com/personal-finance/crypto/is-the-us-developing-a-digital-dollar-this-weeks-top-bitcoin-cr ypto-news/', 'urlToImage': 'https://www.cnet.com/a/img/resize/e4de87a14a5ecf108a98c5c482fbcfc2c36906c6/2022/02/04/c5b1979c-a2d6-412c-9866-e1545badf003/gettyimages-1305088166.jpg?auto=webp&fit=crop&height=630&width=1200', 'publishedAt': '2022-03-19T13:15:02Z', 'content': 'Here’s what hap pened this week in the crypto world.\r\nGetty\r\nWelcome to Nonfungible Tdibits, a weekly roundup of news in crypto, NFTs and their related realms.\r\nOur lead story this week is the possibi... [+2860 chars]}'], {'source': {'id': None, 'name': 'CNET'}, 'author': 'Daniel Van Borm', 'title': 'Bitcoin and Ether Are Helping Fund Ukraine’s Resistance - CNET', 'description': 'Nearly \$20 million has been raised in cryptocurrencies like bitcoin and ether since Russian forces invaded Ukraine last week.', ‘url': 'https://www.cnet.com/personal-finance/crypto/bitcoin-and-ether-are-he lping-fund-ukraines-resistance/', 'urlToImage': 'https://www.cnet.com/a/img/BH4MgY2j-pnCGoz05WyrZ0BIJkw=/1200x630/2022/02/28/042f54db-c4aa-4894-a501-e01666835ed9/gettyimages-1234061349.jpg', 'publishedAt': '2022-02-28T12:45:00Z', 'content': 'Nurphoto/Getty\r\nAs Russia launched an invas ion into his home country last Thursday, Ukrainian photographer Vitaliy Raskalov found himself a world away in Mexico City. When I spoke with him over Telegr... 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In [20]:

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article = ethereum_headlines
print(article)
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[+2322 chars]'}, {'source': {'id': None, 'name': 'Slashdot.org'}, 'author': 'msmash', 'title': 'Stanford Cryptography Researchers Are Building Espresso, a Privacy-focused Blockchain', 'description': 'An anonymous reader shares a report: If blockchain technology is to reach true mass adoption, it will have to become cheaper and more efficient. Low transaction throughput on some of the most popular blockchains, most notably Ethereum, has kept gas fees high ...', 'url': 'https://tech.slashdot.org/story/22/03/07/1534233/stanford-cryptography-researchers-are-building-espresso-a-privacy-focused-blockchain', 'urlToImage': 'https://a.fsdn.com/sd/topics/technology_64.png', 'publishedAt': '2022-03-07T16:05:00Z', 'content': 'If blockchain technology is to reach true mass adoption, it will have to become cheaper and more efficient. Low transaction throughput on some of the most popular blockchains, most notably Ethereum, ... [+1852 chars]'}, {'source': {'id': 'business-insider', 'name': 'Business Insider'}, 'author': 'insider@insider.com (Will Paige)', 'title': 'ConsenSys bags \$450M in megaround as investors flock to back blockchain', 'description': 'Blockchain specialist ConsenSys scooped \$450 million in a Series D round that values the US-based firm at over \$7 billion.', 'url': 'https://www.businessinsider.com/crypto-infrastructure-builder-consensys-raises-450-million-2022-3', 'urlToImage': 'https://i.insider.com/62334615de66860018291167?width=1200&format=jpeg', 'publishedAt': '2022-03-17T14:31:33Z', 'content': 'The news:\xa0Blockchain specialist\xa0ConsenSys\xa0scooped \$450 million\xa0in a Series D round that values the US-based firm at over \$7 billion, per a press release. Its valuation has more than doubled since its... [+2949 chars]'}, {'source': {'id': None, 'name': 'Kitco NEWS'}, 'author': 'http://www.facebook.com/kitconews', 'title': 'Is crypto winter over? Bitcoin price jumps toward \$45k as safe-haven appeal returns to digital assets - Kitco NEWS', 'description': "Is crypto winter over? Bitcoin price jumps toward \$45k as safe-haven appeal returns to digital assets\xa0\xa0Kitco NEWS\r\nSome big cryptocurrency exchanges won't bar Russians, raising fears of sanctions backdoor\xa0\xa0The Globe and Mail\r\nBitcoin.", 'url': 'https://www.kitco.com/news/2022-03-01/Is-crypto-winter-over-Bitcoin-price-moves-toward-45k-as-safe-haven-appeal-returns-to-digital-assets.html', 'urlToImage': 'https://www.kitco.com/news/2022-03-01/images/shutterstock_1012491031-min.jpg', 'publishedAt': '2022-03-01T1722:03:00Z', 'content': '(Kitco News) The escalating Russia-Ukraine crisis, new sanctions, and surging oil prices have investors fleeing risk-on assets. And the crypto space is getting its safe-haven appeal back as more peop... [+3790 chars]'}, {'source': {'id': None, 'name': 'Slashdot.org'}, 'author': 'msmash', 'title': 'NFT's Run-Up Rekindles Chatter About Manipulation Ahead of Deal', 'description': 'An online commotion around seemingly irregular trading of a NFT collection prior to the acquisition of the project is shining light again on a perceived lack of regulatory clarity in one of the most explosive corners of crypto. From a report: During the days ...', 'url': 'https://slashdot.org/story/22/03/17/141217/nfts-run-up-rekindles-chatter-about-manipulation-ahead-of-deal', 'urlToImage': 'https://a.fsdn.com/sd/topics/business_64.png', 'publishedAt': '2022-03-17T14:01:00Z', 'content': 'During the days leading up to the March 11 purchase by Yuga Labs of the intellectual property of the Meebits collection from Larva Labs, more than a dozen addresses on the Ethereum blockchain purchas... [+556 chars]'}, {'source': {'id': 'business-insider', 'name': 'Business Insider'}, 'author': 'rhouston@businessinsider.com (Rickie Houston, CEPF)', 'title': 'OpenSea vs. Rarible: How the NFT marketplaces compare', 'description': 'OpenSea is best for those who want more NFT options, but Rarible best suits NFT creators who want higher royalties earnings.', 'url': 'https://www.businessinsider.com/personal-finance/opensea-vs-rarible', 'urlToImage': 'https://i.insider.com/622283c4dcce010019a6ee0c?width=1200&format=jpeg', 'publishedAt': '2022-03-04T23:16:19Z', 'content': 'Personal Finance Insider writes about products, strategies, and tips to help you make smart decisions with your money. We may receive a small commission from our partners, like American Express, but ... [+5248 chars]']}]}

In [21]:

```
# Create a List of stopwords
sw = set(stopwords.words('english'))
```

In [22]:

```
# Expand the default stopwords list if necessary
sw_addons = {"said", "sent", "found", "including", "today", "announced", "week", "basically", "also", "...", "'s", 'u'}
```

In [23]:

```
stop = set(list(sw)+list(sw_addons))
```

In [24]:

```
# Complete the tokenizer function
def tokenizer(text):
    """Tokenizes text."""
    ## Define and apply the regex parameters
    regex = re.compile("[^a-zA-Z ]")
    re_clean = regex.sub('', text)

    # Create a tokenized list of the words
    words = word_tokenize(text)

    # Convert the words to lowercase
    words = list(filter(lambda w: w.lower(), words))

    # Remove the punctuation from text
    words = list(filter(lambda t: t not in punctuation, words))

    # Remove the stop words
    words = list(filter(lambda t: t.lower() not in stop, words))

    # Lemmatize words into root words
    tokens = [lemmatizer.lemmatize(word) for word in words]

    return tokens
```

In [25]:

```
# Create a new tokens column for Bitcoin
bitcoin_df["tokens"] = bitcoin_df.text.apply(tokenizer)
bitcoin_df.head()
```

Out[25]:

	title	description	text	date	title_compound	title_pos	title_neu	title_neg	title_sent	text_compound	text_pos	text_neu	text_neg	text_sent	tokens
0	If you're a Russian YouTuber, how do you get p...	Russian creators are shut off from the global ...	When Russia invaded Ukraine, Niki Proshin was ...	2022-03-17	0.0000	0.000	1.000	0.000	0	0.0000	0.000	1.000	0.000	0	[Russia, invaded, Ukraine, Niki, Proshin, alre...

	title	description	text	date	title_compound	title_pos	title_neu	title_neg	title_sent	text_compound	text_pos	text_neu	text_neg	text_sent	tokens
1	El Salvador turns to Binance for help on bitco...	El Salvador is seeking support from cryptocurr...	SAN SALVADOR, March 23 (Reuters) - El Salvador...	2022-03-23	0.4019	0.213	0.787	0.000	1	0.4939	0.123	0.877	0.000	1	[SAN, SALVADOR, March, 23, Reuters, El, Salvad...
2	Why Isn't Bitcoin Booming?	"Bitcoin was seen by many of its libertarian-l...	"Bitcoin was seen by many of its libertarian-l...	2022-03-12	0.0000	0.000	1.000	0.000	0	-0.7713	0.000	0.831	0.169	-1	[, Bitcoin, seen, many, libertarian-leaning,...
3	Cryptoverse: Remember when bitcoin was 'anonym...	Bitcoin just isn't anonymous enough for a grow...	March 22 (Reuters) - Bitcoin just isn't anonym...	2022-03-22	0.0000	0.000	1.000	0.000	0	0.6369	0.171	0.829	0.000	1	[March, 22, Reuters, Bitcoin, n't, anonymous, ...
4	Cryptoverse: Bitcoin gains conflict currency c...	Bitcoin has leapt since Russia's invasion of U...	March 1 (Reuters) - Bitcoin has leapt since Ru...	2022-03-01	0.0258	0.247	0.515	0.237	0	0.0000	0.000	1.000	0.000	0	[March, 1, Reuters, Bitcoin, leapt, since, Rus...

In [26]:

```
# Create a new tokens column for Ethereum
ethereum_df["tokens"] = ethereum_df.text.apply(tokenizer)
ethereum_df.head()
```

Out[26]:

	title	description	text	date	title_compound	title_pos	title_neu	title_neg	title_sent	text_compound	text_pos	text_neu	text_neg	text_sent	tokens
0	Web3 Threatens to Segregate Our Online Lives	Governance tokens seem like a tantalizing solu...	In February, shit hit the fan in the usual way...	2022-03-01	-0.3818	0.00	0.698	0.302	-1	-0.3182	0.059	0.848	0.093	-1	[February, shit, hit, fan, usual, way, old, tw...
1	Coinbase earnings show trading of ethereum and...	Ethereum trading volume increased from 15% to ...	Coinbase reported that the share of trading vo...	2022-02-25	0.0000	0.00	1.000	0.000	0	0.6705	0.188	0.812	0.000	1	[Coinbase, reported, share, trading, volume, e...
2	How Ukrainians are fundraising in cryptocurrency	Millions of dollars of cryptocurrency have flo...	Illustration by James Bareham / The Verge\r\n\r\n...	2022-02-26	0.0000	0.00	1.000	0.000	0	-0.4588	0.000	0.917	0.083	-1	[Illustration, James, Bareham, Verge, 15, mill...
3	Vitalik Buterin talks about the problems of cr...	The founder of Ethereum confessed his concerns...	His name is Vitalik Buterin and after dedicati...	2022-03-22	-0.1027	0.11	0.762	0.129	-1	0.0000	0.000	1.000	0.000	0	[name, Vitalik, Buterin, dedicating, cover, re...
4	How People Actually Make Money From Cryptocurr...	Power traders use "staking" and "yield farming...	If it sounds too good to be true, youre not wr...	2022-03-13	0.0000	0.00	1.000	0.000	0	0.8340	0.236	0.713	0.050	1	[sound, good, true, youre, wrong, Yield, farmi...

NGrams and Frequency Analysis

In this section you will look at the ngrams and word frequency for each coin.

1. Use NLTK to produce the n-grams for N = 2.
2. List the top 10 words for each coin.

In [27]:

```
from collections import Counter
from nltk import ngrams
```

In [28]:

```
# Generate the Bitcoin N-grams where N=2
N = 2
grams = ngrams(tokenizer(bitcoin_df.text.str.cat()), N)
Counter(grams).most_common(20)
```

Out[28]:

```
[(('char', 'SAN'), 4),
 (('SAN', 'SALVADOR'), 4),
 (('SALVADOR', 'March'), 4),
 (('Reuters', 'El'), 4),
 (('El', 'Salvador'), 4),
 (('March', '22'), 4),
 (('22', 'Reuters'), 4),
 (('Reuters', 'Bitcoin'), 4),
 (('char', 'March'), 3),
 (('since', 'Russia'), 3),
 (('bitcoin-backed', 'bond'), 3),
 (('Russia', 'invaded'), 2),
 (('invaded', 'Ukraine'), 2),
 (('Russia', 'invasion'), 2),
 (('invasion', 'Ukraine'), 2),
 (('Getty', 'Welcome'), 2),
 (('Welcome', 'Nonfungible'), 2),
 (('Nonfungible', 'Tidbits'), 2),
 (('char', 'LONDON'), 2),
 (('LONDON', 'March'), 2)]
```

In [29]:

```
# Generate the Ethereum N-grams where N=2
N = 2
grams = ngrams(tokenizer(ethereum_df.text.str.cat()), N)
Counter(grams).most_common(20)
```

Out[29]:

```
[(('char', 'cryptocurrency'), 4),
 (('cryptocurrency', 'boom'), 4),
 (('boom', 'past'), 4),
 (('past', 'year'), 4),
 (('year', 'helped'), 4),
 (('helped', 'propel'), 4),
 (('propel', 'newer'), 4),
 (('newer', 'market'), 4),
 (('market', 'record'), 4),
 (('record', 'height'), 4),
 (('height', 'digital'), 4),
 (('digital', 'collectible'), 4),
 (('collectible', 'known'), 4),
 (('known', 'NFTs'), 4),
 (('NFTs', 'fact'), 4),
 (('fact', 'total'), 4),
 (('total', 'NFT'), 4),
 (('NFT', 'sale'), 4),
```



```
((('sale', 'volume'), 4),  
 (('volume', 'hit'), 4])
```

```
In [30]: # Function token_count generates the top 10 words for a given coin  
def token_count(tokens, N=3):  
    """Returns the top N tokens from the frequency count"""  
    return Counter(tokens).most_common(N)
```

```
In [31]: # Use token_count to get the top 10 words for Bitcoin  
btc_tokens = tokenizer(bitcoin_df.text.str.cat())  
token_count(btc_tokens, N = 10)
```

```
Out[31]: [('char', 20),  
 ('March', 11),  
 ('Reuters', 11),  
 ('Bitcoin', 8),  
 ('Russia', 7),  
 ('Ukraine', 6),  
 ('crypto', 6),  
 ('bitcoin', 5),  
 ('SAN', 4),  
 ('SALVADOR', 4)]
```

```
In [32]: # Use token_count to get the top 10 words for Ethereum  
eth_tokens = tokenizer(ethereum_df.text.str.cat())  
token_count(eth_tokens, N = 10)
```

```
Out[32]: [('char', 20),  
 ('volume', 6),  
 ('year', 6),  
 ('past', 6),  
 ('hit', 5),  
 ('cryptocurrency', 5),  
 ('digital', 5),  
 ('billion', 5),  
 ('Ethereum', 4),  
 ('boom', 4)]
```

Word Clouds

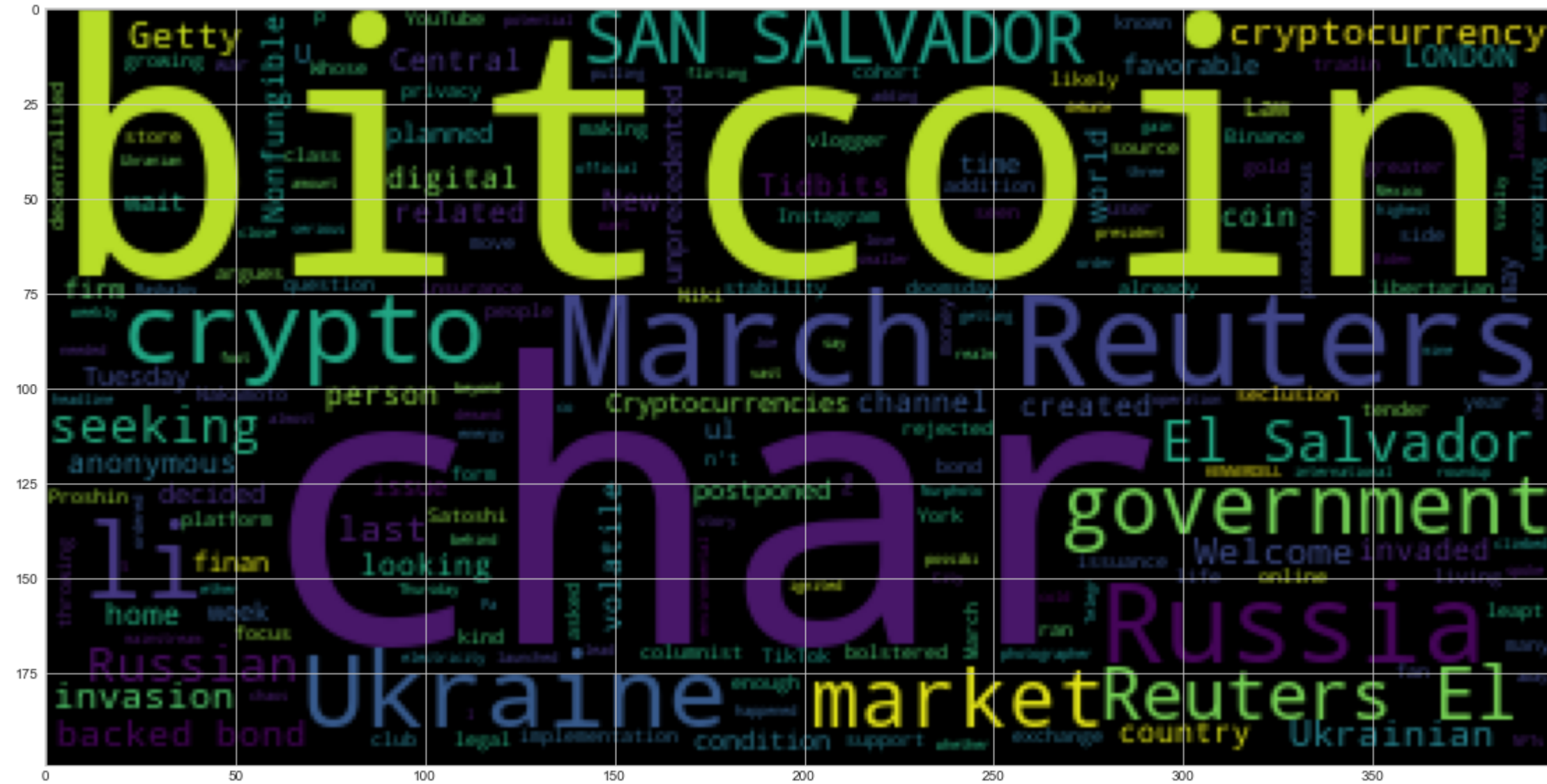
In this section, you will generate word clouds for each coin to summarize the news for each coin

```
In [33]: from wordcloud import WordCloud  
import matplotlib.pyplot as plt  
plt.style.use('seaborn-whitegrid')  
import matplotlib as mpl  
mpl.rcParams['figure.figsize'] = [20.0, 10.0]
```

```
In [34]: # Generate the Bitcoin word cloud  
word_cloud = WordCloud().generate(' '.join(btc_tokens))  
plt.imshow(word_cloud)  
plt.title("BITCOIN WORD CLOUD", fontdict={'fontsize':30})
```

```
Out[34]: Text(0.5, 1.0, 'BITCOIN WORD CLOUD')
```

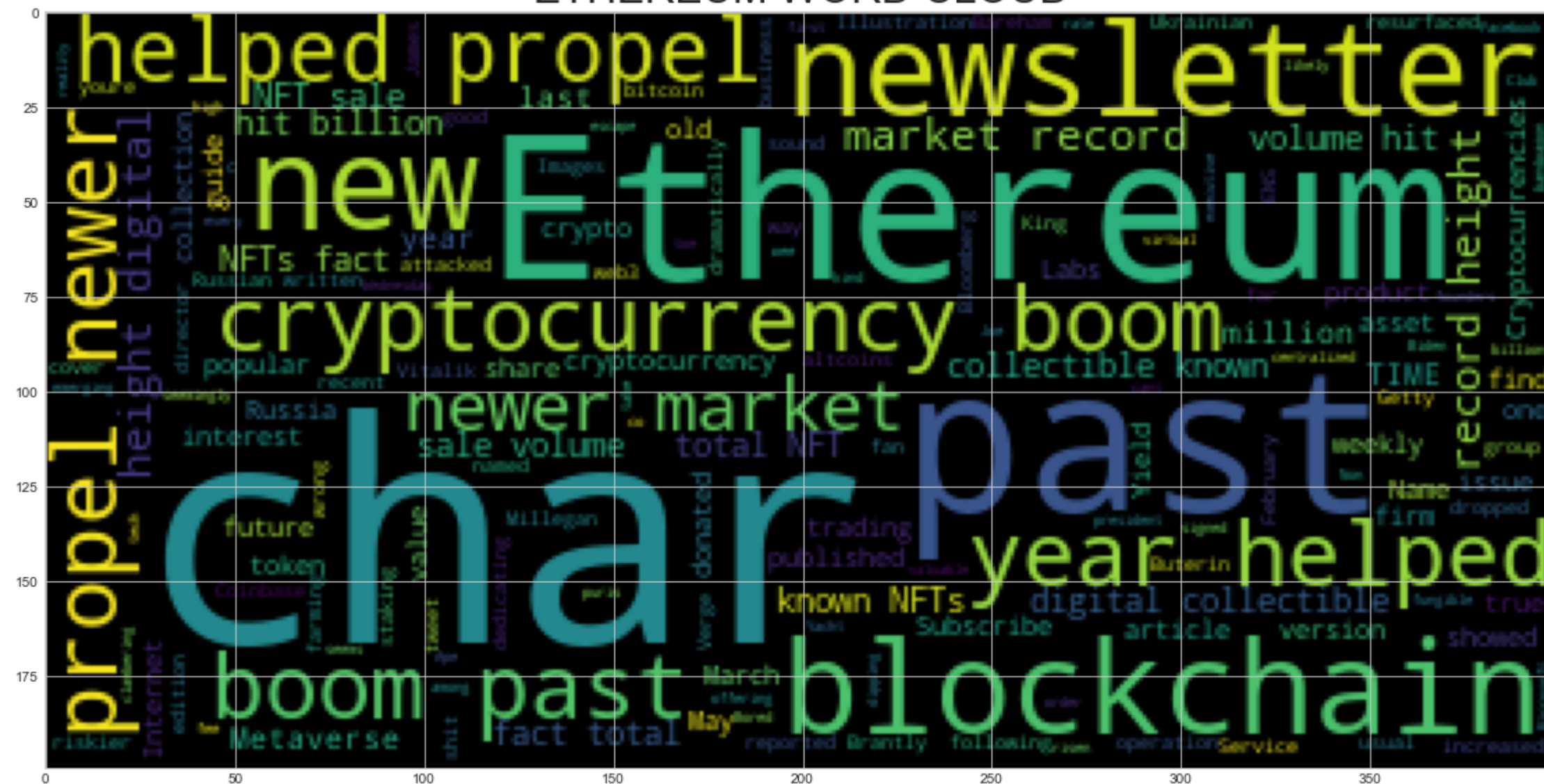
BITCOIN WORD CLOUD



```
In [35]: # Generate the Ethereum word cloud
word_cloud = WordCloud().generate(' '.join(eth_tokens))
plt.imshow(word_cloud)
plt.title("ETHEREUM WORD CLOUD", fontdict={'fontsize':30})
```

```
Out[35]: Text(0.5, 1.0, 'ETHEREUM WORD CLOUD')
```

ETHEREUM WORD CLOUD



3. Named Entity Recognition

In this section, you will build a named entity recognition model for both Bitcoin and Ethereum, then visualize the tags using SpaCy.

```
In [36]: import spacy
```



```
from spacy import displacy
```

In [37]:

```
# Download the Language model for SpaCy
!python -m spacy download en_core_web_sm
```

Collecting en-core-web-sm==3.2.0
 Downloading https://github.com/explosion/spacy-models/releases/download/en_core_web_sm-3.2.0/en_core_web_sm-3.2.0-py3-none-any.whl (13.9 MB)
 Requirement already satisfied: spacy<3.3.0,>=3.2.0 in c:\users\luke\anaconda3\lib\site-packages (from en-core-web-sm==3.2.0) (3.2.2)
 Requirement already satisfied: spacy-legacy<3.1.0,>=3.0.8 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (3.0.9)
 Requirement already satisfied: numpy>=1.15.0 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (1.20.3)
 Requirement already satisfied: packaging>=20.0 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (21.3)
 Requirement already satisfied: preshed<3.1.0,>=3.0.2 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (3.0.6)
 Requirement already satisfied: pydantic!=1.8,!=1.8.1,<1.9.0,>=1.7.4 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (1.8.2)
 Requirement already satisfied: tqdm<5.0.0,>=4.38.0 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (4.62.3)
 Requirement already satisfied: typer<0.5.0,>=0.3.0 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (0.4.0)
 Requirement already satisfied: requests<3.0.0,>=2.13.0 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (2.27.1)
 Requirement already satisfied: jinja2 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (2.11.3)
 Requirement already satisfied: srsly<3.0.0,>=2.4.1 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (2.4.2)
 Requirement already satisfied: setuptools in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (58.0.4)
 Requirement already satisfied: spacy-loggers<2.0.0,>=1.0.0 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (1.0.1)
 Requirement already satisfied: thinc<8.1.0,>=8.0.12 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (8.0.14)
 Requirement already satisfied: wasabi<1.1.0,>=0.8.1 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (0.9.0)
 Remem<2.1.0,>=2.0.2 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (2.0.6)
 Requirement already satisfied: catalogue<2.1.0,>=2.0.6 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (2.0.6)
 Requirement already satisfied: pathy>=0.3.5 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (0.6.1)
 Requirement already satisfied: blis<0.8.0,>=0.4.0 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (0.7.6)
 Requirement already satisfied: murmurhash<1.1.0,>=0.28.0 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (1.0.6)
 Requirement already satisfied: langcodes<4.0.0,>=3.2.0 in c:\users\luke\anaconda3\lib\site-packages (from spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (3.3.0)
 Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in c:\users\luke\anaconda3\lib\site-packages (from packaging>=20.0->spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (3.0.4)
 Requirement already satisfied: smart-open<6.0.0,>=5.0.0 in c:\users\luke\anaconda3\lib\site-packages (from pathy>=0.3.5->spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (5.2.1)
 Requirement already satisfied: typing-extensions>=3.7.4.3 in c:\users\luke\anaconda3\lib\site-packages (from pydantic!=1.8,!=1.8.1,<1.9.0,>=1.7.4->spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (3.10.0.2)
 Requirement already satisfied: charset-normalizer~=2.0.0 in c:\users\luke\anaconda3\lib\site-packages (from requests<3.0.0,>=2.13.0->spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (2.0.4)
 Requirement already satisfied: idna<4,>=2.5 in c:\users\luke\anaconda3\lib\site-packages (from requests<3.0.0,>=2.13.0->spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (2.8)
 Requirement already satisfied: certifi>=2017.4.17 in c:\users\luke\anaconda3\lib\site-packages (from requests<3.0.0,>=2.13.0->spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (2021.10.8)
 Requirement already satisfied: urllib3<1.27,>=1.21.1 in c:\users\luke\anaconda3\lib\site-packages (from requests<3.0.0,>=2.13.0->spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (1.26.8)
 Requirement already satisfied: colorama in c:\users\luke\anaconda3\lib\site-packages (from tqdm<5.0.0,>=4.38.0->spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (0.4.4)
 Requirement already satisfied: click<9.0.0,>=7.1.1 in c:\users\luke\anaconda3\lib\site-packages (from typer<0.5.0,>=0.3.0->spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (8.0.4)
 Requirement already satisfied: MarkupSafe>=0.23 in c:\users\luke\anaconda3\lib\site-packages (from jinja2->spacy<3.3.0,>=3.2.0->en-core-web-sm==3.2.0) (1.1.1)
[+] Download and installation successful
You can now load the package via spacy.load('en_core_web_sm')

In [38]:

```
# Load the spaCy model
nlp = spacy.load('en_core_web_sm')
```

Bitcoin NER

In [51]:

```
# Concatenate all of the Bitcoin text together
bitcoin_NER = bitcoin_df["text"].str.cat()
```

In [52]:

```
# Run the NER processor on all of the text
doc = nlp(bitcoin_NER)

# Add a title to the document
doc.user_data["title"]="BITCOIN NER"
```

In [53]:

```
# Render the visualization
displacy.render(doc, style='ent')
```

BITCOIN NER

When Russia GPE invaded Ukraine GPE , Niki Proshin PERSON was already a year DATE into making a living as a vlogger — he had a YouTube ORG channel, a TikTok ORG channel, and an Instagram ORG . He also ran an online Russian NORP club for a... [+5883 chars]SAN SALVADOR, March 23

DATE (Reuters ORG) - El Salvador GPE is seeking support from cryptocurrency exchange Binance PERSON for its implementation of bitcoin as legal tender and the issuance of bitcoin bonds, the Central ORG ... [+1109 chars]"Bitcoin was seen by many of its libertarian-leaning fans as a kind of doomsday

insurance," argues a columnist in the New York Times ORG , "a form of 'digital gold' that would be a source of stability as ... [+3914 chars]March 22 CARDINAL (Reuters ORG) - Bitcoin just isn't anonymous enough for a growing cohort of crypto users who are seeking greater seclusion.

A volatile class of crypto known as privacy coins, created with the p... [+4776 chars]March 1 (Reuters ORG) - Bitcoin has leapt since Russia GPE 's invasion of Ukraine GPE , bolstered by people in those countries looking to store and move money in anonymous and decentralised crypto.

Bitcoin tradin... [+3955 chars]Whose side is cryptocurrency on? If you had asked Satoshi Nakamoto PERSON , the pseudonymous person (or persons) who created the Bitcoin platform in 2008 DATE , he/they likely would have rejected the question. The... [+3643 chars]Getty

Welcome to Nonfungible Tidbits PERSON . Our focus this week DATE : Russia GPE 's war in Ukraine GPE .

In addition to uprooting the lives of Ukrainians NORP and throwing the international order into chaos, the Russian NORP in... [+3275 ORG chars]Here's what happened this week DATE in the crypto world.

Getty Welcome to ORG Nonfungible Tidbits PERSON , a weekly DATE roundup of news in crypto, NFTs and their related realms.

Our lead story this week DATE is the possibi... [+2860 chars]Nurphoto/ Getty GPE

As Russia GPE launched an invasion into his home country last Thursday DATE , Ukranian NORP photographer Vitaliy Raskalov found himself a world away in Mexico City GPE . When I spoke with him over Telegr ORG ... [+7815 chars]LONDON, March 4 DATE (Reuters ORG) - Cryptocurrencies have

been close to the headlines since Russia GPE invaded Ukraine GPE , with the ever-volatile bitcoin in demand in Russia GPE and beyond.

Here are some charts that I... [+3634 chars]SAN SALVADOR, March 22 DATE (Reuters ORG) - El Salvador GPE postponed an unprecedented issue of a bitcoin-backed bond planned for last week DATE , as the government decided to wait for favorable conditions in the finan GPE ... [+1425 chars]March 15 (Reuters ORG) - Bitcoin loves flirting with the mainstream. But now, as the U.S. GPE president says he wants to get serious, it may be getting cold crypto feet.

When Joe Biden PERSON ordered officials to ... [+4501 chars]KENNERDELL ORG , Pa. GPE , March 21 DATE (Reuters ORG) - The vast amounts of electricity needed to mine bitcoin has ignited a debate about whether the energy behind the operation is worth the potential environmental co... [+1781

chars]LONDON, March 22 DATE (Reuters ORG) - Bitcoin climbed on Tuesday DATE to its highest in almost three weeks DATE , adding to its gains since Russia GPE 's invasion of Ukraine GPE , pulling up smaller digital coins such as ether.

... [+865 chars]Feb 24 - Welcome to the home for real-time coverage of markets brought to you by Reuters ORG reporters. You can share your thoughts with us at markets.research@thomsonreuters.com

BITCOIN PERSON , NOT EXACTLY A ... [+6882 chars]SAN SALVADOR, March 22 DATE (Reuters ORG) - El Salvador GPE postponed an unprecedented issue of a bitcoin-backed bond planned for last week DATE , as the government decided to wait for favorable conditions in the finan GPE ... [+1235 chars]

Summary WORK_OF_ART

Law firms PERSON Related documents GPE >

The company and law firm names shown above are generated automatically based on the text of the article. We are improving ... [+2414 chars]The Ukrainian NORP government asking for donations in bitcoin shows the utility of the cryptocurrency and is a positive sign for the market, veteran strategist Tom Lee PERSON has said.

Ukraine GPE government accoun... [+1750 chars]SAN SALVADOR, March 11 DATE (Reuters ORG) - El Salvador GPE is looking for the right timing to launch its bitcoin-backed bond, which could happen between March 15 and 20 DATE , the Central American NORP nation's finance min... [+533

chars]Bitcoin rallied to a two-week DATE high on Tuesday DATE in spite of the turmoil on the broader markets, thanks to a surge in buying by Russians NORP and Ukrainians NORP who may be seeking refuge in cryptocurrencies as t... [+2894 chars]

In [55]:

```
# List all Entities
for i in doc.ents:
    print(i.text, i.label_)
```

Russia GPE
Ukraine GPE
Niki Proshin PERSON
a year DATE
YouTube ORG
TikTok ORG
Instagram ORG
Russian NORP
March 23 DATE
Reuters ORG
El Salvador GPE
Binance PERSON
Central ORG
the New York Times ORG
22 CARDINAL
Reuters ORG
Reuters ORG
Russia GPE
Ukraine GPE
Satoshi Nakamoto PERSON
2008 DATE
Nonfungible Tidbits PERSON
this week DATE
Russia GPE
Ukraine GPE
Ukrainians NORP
Russian NORP
+3275 ORG
this week DATE
Getty
Welcome to ORG
Nonfungible Tidbits PERSON
weekly DATE
this week DATE
Getty GPE
Russia GPE
last Thursday DATE
Ukranian NORP
Mexico City GPE
Telegr ORG
March 4 DATE
Reuters ORG
Russia GPE
Ukraine GPE
Russia GPE
March 22 DATE
Reuters ORG
El Salvador GPE
last week DATE
finan GPE
Reuters ORG
U.S. GPE
Joe Biden PERSON
chars]KENNERDELL ORG
Pa. GPE
March 21 DATE
Reuters ORG
March 22 DATE
Reuters ORG

Tuesday DATE
almost three weeks DATE
Russia GPE
Ukraine GPE
Reuters ORG
BITCOIN PERSON
March 22 DATE
Reuters ORG
El Salvador GPE
last week DATE
finan GPE
Summary WORK_OF_ART
Law firms
PERSON
documents GPE
Ukrainian NORP
Tom Lee PERSON
Ukraine GPE
March 11 DATE
Reuters ORG
El Salvador GPE
between March 15 and 20 DATE
Central American NORP
two-week DATE
Tuesday DATE
Russians NORP
Ukrainians NORP

Ethereum NER

```
In [56]: # Concatenate all of the Ethereum text together
ethereum_NER = ethereum_df["text"].str.cat()
```

```
In [57]: # Run the NER processor on all of the text
doc = nlp(ethereum_NER)

# Add a title to the document
doc.user_data["title"]="ETHEREUM NER"
```

```
In [59]: # Render the visualization
displacy.render(doc, style='ent')
```

ETHEREUM NER

In February DATE , shit hit the fan in the usual way: An old tweet resurfaced. Brantly Millegan, director of operations at Ethereum Name Service ORG (ENS ORG), a web3 business, had written the following in May 201 DATE ... [+3096 chars]Coinbase reported that the share of trading volume for ethereum and other altcoins increased last year DATE , while bitcoin's share dropped dramatically.

Between 2020 and 2021 DATE , ethereum trading volume in... [+1187 chars]Illustration by James Bareham PERSON / The Verge

More than \$15 million MONEY has been donated so far More than \$15 million MONEY in cryptocurrency has been donated to Ukrainian GPE groups since Russia GPE attacked the c... [+7442 chars]His name is Vitalik Buterin PERSON and after dedicating the cover of its most recent edition to him, TIME ORG has named him the King of Cryptocurrencies .

Bloomberg GPE | Getty Images PERSON

The 28-year-old DATE Russian NORP is ... [+2627 chars]If it sounds too good to be true, youre not wrong. Yield farming is riskier than staking. The tokens that are offering such high interest rates and fee yields are also the ones most likely to take a ... [+2371 chars]It seems that in 2022 DATE , you cant escape from the metaverse. From Facebook ORG to Microsoft ORG , seemingly every centralized tech firm is clambering on the bandwagon of this emerging virtual reality. For puris... [+5412 chars]Non-fungible tokens have risen in interest and value over the last year DATE , with Bored Ape Yacht Club ORG among the most popular and valuable collections. Here's what one CARDINAL of the Ethereum PERSON co-founders had to ... [+1535 chars]The cryptocurrency boom over the past few years DATE has helped propel a newer market to record heights: digital collectibles known as NFTs.

In fact, total NFT ORG sales volume hit \$23 billion MONEY over the past... [+2680 chars]A version of this article was published in TIME ORG 's newsletter Into the Metaverse. Subscribe for a weekly DATE guide to the future of the Internet. You can find past issues of the newsletter here.

Last wee... [+7988 chars]The cryptocurrency boom over the past few years DATE has helped propel a newer market to record heights: digital collectibles known as NFTs.

In fact, total NFT ORG sales volume hit \$24 billion MONEY over the past... [+2741 chars]Joe Biden PERSON is dipping his toes into crypto. On Wednesday DATE , the president signed a first ORDINAL -of-its-kind executive order outlining a path to regulation of cryptocurrencies and encouraging federal agencies t... [+2590 chars]A version of this article was published in TIME ORG 's newsletter Into the Metaverse. Subscribe for a weekly DATE guide to the future of the Internet. You can find past issues of the newsletter here.

It's bee... [+15336 chars]The cryptocurrency boom over the past few years DATE has helped propel a newer market to record heights: digital collectibles known as NFTs.

In fact, total NFT ORG sales volume hit \$23 billion MONEY over the past... [+2603 chars]The cryptocurrency boom over the past few years DATE has helped propel a newer market to record heights: digital collectibles known as NFTs.

In fact, total NFT ORG sales volume hit \$23 billion MONEY over the past... [+2633 chars]NEW YORK GPE , March 21 DATE (Reuters ORG) - Cryptocurrency investment products and funds showed net outflows for a second straight week DATE , a report from digital asset manager CoinShares ORG

showed on Monday **DATE** , on persist... [+2322 chars]If **PERSON** blockchain technology is to reach true mass adoption, it will have to become cheaper and more efficient. Low transaction throughput on some of the most popular blockchains, most notably Ethereum **ORG** , ... [+1852 chars]The news: Blockchain specialist ConsenSys scooped \$450 million **MONEY** in a Series **EVENT** D round that values the US **GPE** -based firm at over \$7 billion **MONEY** , per a press release. Its valuation has more than doubled since its... [+2949 chars](Kitco News) The escalating Russia **GPE** - Ukraine **GPE** crisis, new sanctions, and surging oil prices have investors fleeing risk-on assets. And the crypto space is getting its safe-haven appeal back as more peop... [+3790 chars]During the days **DATE** leading up to the March 11 **DATE** purchase by Yuga Labs **PERSON** of the intellectual property of the Meebits **NORP** collection from Larva Labs **PERSON** , more than a dozen **CARDINAL** addresses on the Ethereum **ORG** blockchain purchas... [+556 chars]Personal Finance Insider writes about products, strategies, and tips to help you make smart decisions with your money. We may receive a small commission from our partners, like American Express **ORG** , but ... [+5248 chars]

In [50]:

```
# List all Entities
for i in doc.ents:
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```

February DATE
Ethereum Name Service ORG
ENS ORG
May 201 DATE
last year DATE
Between 2020 and 2021 DATE
James Bareham PERSON
More than \$15 million MONEY
More than \$15 million MONEY
Ukrainian GPE
Russia GPE
Vitalik Buterin PERSON
TIME ORG
Bloomberg GPE
Getty Images PERSON
28-year-old DATE
Russian NORP
2022 DATE
Facebook ORG
Microsoft ORG
the last year DATE
Bored Ape Yacht Club ORG
one CARDINAL
Ethereum PERSON
the past few years DATE
NFT ORG
\$23 billion MONEY
TIME ORG
weekly DATE
the past few years DATE
NFT ORG
\$24 billion MONEY
Biden PERSON
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TIME ORG
weekly DATE
the past few years DATE
NFT ORG
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NFT ORG
\$23 billion MONEY
chars]NEW YORK GPE
March 21 DATE
Reuters ORG
a second straight week DATE
CoinShares ORG
Monday DATE
chars]If PERSON
Ethereum ORG
\$450 million MONEY
Series EVENT
US GPE
over \$7 billion MONEY
Russia GPE
Ukraine GPE
days DATE
March 11 DATE
Yuga Labs PERSON
Meebits NORP
Larva Labs PERSON
more than a dozen CARDINAL
Ethereum ORG
American Express ORG