

News Headlines Sentiment

Use the news api 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 [14]:

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

%matplotlib inline
```

In [15]:

```
# Read your api key environment variable
load_dotenv()

api_key = os.getenv("news_api_key")
```

In [16]:

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

In [17]:

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

# Print total articles
print(f"Total articles about Bitcoin: {bitcoin_news_en['totalResults']}")

# Show sample article
bitcoin_news_en["articles"][0]
```

Total articles about Bitcoin: 4581

Out[17]:

```
{'source': {'id': None, 'name': 'Lifehacker.com'},
 'author': 'Mike Winters on Two Cents, shared by Mike Winters to Lifehacker',
 'title': 'Is the New Visa Bitcoin Rewards Card Worth It?',
 'description': 'Visa has partnered with cryptocurrency startup BlockFi to offer the first rewards credit card that pays out in Bitcoin rather than cash, but is it worth applying for? Unless you’re extremely bullish on cryptocurrency and don’t mind getting seriously dinged for...',
 'url': 'https://twocents.lifehacker.com/is-the-new-visa-bitcoin-rewards-card-worth-it-1845803159',
 'urlToImage': 'https://i.kinja-img.com/gawker-media/image/upload/c_fill,f_auto,f1_progressive,g_center,h_675,pg_1,q_80,w_1200/a2650t4nr8r2uyujbnfu.png',
 'publishedAt': '2020-12-03T22:00:00Z',
 'content': 'Visa has partnered with cryptocurrency startup BlockFi to offer the first rewards credit card that pays out in Bitcoin rather than cash, but is it worth applying for? Unless you’re extremely bullish on... [+2239 chars]'}

```

In [18]:

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

# Print total articles
print(f"Total articles about Ethereum: {ethereum_news_en['totalResults']}")

# Show sample article
ethereum_news_en["articles"][0]
```

Total articles about Ethereum: 1256

Out[18]:

```
{'source': {'id': 'engadget', 'name': 'Engadget'},
 'author': 'Karissa Bell',
 'title': 'PayPal now lets all US users buy, sell and hold cryptocurren
cy',
 'description': 'PayPal is bringing its newly-announced support for cry
ptocurrency to all US accounts. It first announced plans to open crypto
currency trading to US-based users in October, but until now it was onl
y available to a small subset of PayPal account holders. That’s...',
 'url': 'https://www.engadget.com/paypal-opens-cryptocurrency-all-us-ac
counts-210541778.html',
 'urlToImage': 'https://o.aolcdn.com/images/dims?resize=1200%2C630&crop
=1200%2C630%2C0%2C0&quality=95&image_uri=https%3A%2F%2Fs.yimg.com%2Fos%
2Fcreatr-uploaded-images%2F2020-11%2F4e1af080-2528-11eb-bbdf-193e571d14
2a&client=amp-blogsides-v2&signature=22ad23dde6ee3e667a8067a4c39e1962659
cec92',
 'publishedAt': '2020-11-12T21:05:41Z',
 'content': 'PayPal is bringing its newly-announced support for cryptoc
urrency to all US accounts. It first announced plans to open cryptocurr
ency trading to US-based users in October, but until now it was only a...
[+589 chars]'}
```

In [20]:

```
# Create the Bitcoin sentiment scores DataFrame
bitcoin_sentiments = []

for article in bitcoin_news_en["articles"]:
    try:
        text = article["content"]
        date = article["publishedAt"][:10]
        sentiment = analyzer.polarity_scores(text)
        compound = sentiment["compound"]
        pos = sentiment["pos"]
        neu = sentiment["neu"]
        neg = sentiment["neg"]

        bitcoin_sentiments.append({
            "Compound": compound,
            "Negative": neg,
            "Neutral": neu,
            "Positive": pos,
            "text": text
        })

    except AttributeError:
        pass

# Create DataFrame
bitcoin_df = pd.DataFrame(bitcoin_sentiments)

# Reorder DataFrame columns
cols = ["Compound", "Negative", "Neutral", "Positive", "text"]
bitcoin_df = bitcoin_df[cols]

bitcoin_df.head()
```

Out[20]:

	Compound	Negative	Neutral	Positive	text
0	0.6369	0.000	0.838	0.162	Visa has partnered with cryptocurrency startup...
1	0.2144	0.000	0.947	0.053	PayPal is bringing its newly-announced support...
2	0.2023	0.000	0.950	0.050	In November 2017, after an absolutely massive,...
3	0.0000	0.000	1.000	0.000	Unlike 'conventional' cryptocurrencies, a cent...
4	0.4404	0.075	0.773	0.152	If youve been watching the crypto markets over...

In [25]:

```
# Create the ethereum sentiment scores DataFrame
ethereum_sentiments = []

for article in ethereum_news_en["articles"]:
    try:
        text = article["content"]
        date = article["publishedAt"][:10]
        sentiment = analyzer.polarity_scores(text)
        compound = sentiment["compound"]
        pos = sentiment["pos"]
        neu = sentiment["neu"]
        neg = sentiment["neg"]

        ethereum_sentiments.append({
            "Compound": compound,
            "Negative": neg,
            "Neutral": neu,
            "Positive": pos,
            "text": text
        })

    except AttributeError:
        pass

# Create DataFrame
ethereum_df = pd.DataFrame(ethereum_sentiments)

# Reorder DataFrame columns
cols = ["Compound", "Negative", "Neutral", "Positive", "text"]
ethereum_df = ethereum_df[cols]

ethereum_df.head()
```

Out[25]:

	Compound	Negative	Neutral	Positive	text
0	0.2144	0.0	0.947	0.053	PayPal is bringing its newly-announced support...
1	0.0000	0.0	1.000	0.000	FILE PHOTO: Representation of the Ethereum vir...
2	0.0000	0.0	1.000	0.000	FILE PHOTO: Representation of the Ethereum vir...
3	0.4215	0.0	0.912	0.088	LONDON (Reuters) - Digital currencies Ethereum...
4	0.1779	0.0	0.948	0.052	NEW YORK (Reuters) - Institutional investors p...

In [26]:

```
# Describe the Bitcoin Sentiment
bitcoin_df.describe()
```

Out[26]:

	Compound	Negative	Neutral	Positive
count	19.000000	19.000000	19.000000	19.000000
mean	0.205768	0.003947	0.942526	0.053526
std	0.262239	0.017206	0.075928	0.068179
min	0.000000	0.000000	0.773000	0.000000
25%	0.000000	0.000000	0.897500	0.000000
50%	0.000000	0.000000	1.000000	0.000000
75%	0.411700	0.000000	1.000000	0.102500
max	0.765000	0.075000	1.000000	0.174000

In [27]:

```
# Describe the Ethereum Sentiment
ethereum_df.describe()
```

Out[27]:

	Compound	Negative	Neutral	Positive
count	20.000000	20.000000	20.000000	20.000000
mean	0.122565	0.021050	0.918000	0.060950
std	0.320198	0.054473	0.105304	0.078682
min	-0.493900	0.000000	0.672000	0.000000
25%	0.000000	0.000000	0.876000	0.000000
50%	0.000000	0.000000	0.948000	0.052000
75%	0.261275	0.000000	1.000000	0.095250
max	0.877900	0.196000	1.000000	0.318000

Questions:

Q: Which coin had the highest mean positive score?

A: Ethereum had the highest mean positive score that indicates on average there is a greater positive sentiment about Ethereum based on the new articles.

Q: Which coin had the highest compound score?

A: While both coins had a compound score greater than .05 to indicate positive sentiment, Ethereum had the highest compound score of .877900.

Q: Which coin had the highest positive score?

A: Ethereum had the highest positive score of .318000 that again indicates a greater positive sentiment.

Q: Which coin had the highest negative score?

A: Ethereum had the highest negative score of .196000 that indicates while it had the most news with positive sentiment as shown by the higher positive score it also had the most news with negative sentiment.

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 [35]:

```
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 [87]:

```
# Expand the default stopwords list if necessary
sw_addons = ['said', 'sent', 'found', 'including', 'today', 'announced', 'week', 'basically', 'also', 'weekly', 'following', ',', '']
```

In [88]:

```
# Complete the tokenizer function
def tokenizer(text):
    """Tokenizes text."""

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

    # Convert the words to lowercase
    text = [word.lower() for word in text]

    # Remove the punctuation
    regex = re.compile("[^a-zA-Z ]")
    text = [regex.sub('', word) for word in text]

    # Remove the stop words
    sw = set(stopwords.words('english') + sw_addons)

    # Lemmatize Words into root words
    lemmatizer = WordNetLemmatizer()
    lem = [lemmatizer.lemmatize(word) for word in text]
    tokens = [word for word in lem if word not in sw]

    return tokens
```


In [89]:

```
# Create a new tokens column for bitcoin
btc_tokens = []
[btc_tokens.append(tokenizer(text)) for text in bitcoin_df.text]
bitcoin_df['tokens'] = btc_tokens
bitcoin_df.head()
```

Out[89]:

	Compound	Negative	Neutral	Positive	text	tokens
0	0.6369	0.000	0.838	0.162	Visa has partnered with cryptocurrency startup...	[visa, ha, partnered, cryptocurrency, startup,...]
1	0.2144	0.000	0.947	0.053	PayPal is bringing its newly-announced support...	[paypal, bringing, newlyannounced, support, cr...]
2	0.2023	0.000	0.950	0.050	In November 2017, after an absolutely massive,...	[november, absolutely, massive, twomonth, rall...]
3	0.0000	0.000	1.000	0.000	Unlike 'conventional' cryptocurrencies, a cent...	[unlike, conventional, cryptocurrencies, centr...]
4	0.4404	0.075	0.773	0.152	If youve been watching the crypto markets over...	[youve, watching, crypto, market, past, youll,...]

In [90]:

```
# Create a new tokens column for ethereum
eth_tokens = []
[eth_tokens.append(tokenizer(text)) for text in ethereum_df.text]
ethereum_df['tokens'] = eth_tokens
ethereum_df.head()
```

Out[90]:

	Compound	Negative	Neutral	Positive	text	tokens
0	0.2144	0.0	0.947	0.053	PayPal is bringing its newly-announced support...	[paypal, bringing, newlyannounced, support, cr...
1	0.0000	0.0	1.000	0.000	FILE PHOTO: Representation of the Ethereum vir...	[file, photo, representation, ethereum, virtua...
2	0.0000	0.0	1.000	0.000	FILE PHOTO: Representation of the Ethereum vir...	[file, photo, representation, ethereum, virtua...
3	0.4215	0.0	0.912	0.088	LONDON (Reuters) - Digital currencies Ethereum...	[london, reuters, digital, currency, ethereum,...
4	0.1779	0.0	0.948	0.052	NEW YORK (Reuters) - Institutional investors p...	[new, york, reuters, institutional, investor, ...

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 [91]:

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

In [94]:

```
# Generate the Bitcoin N-grams where N=2
bitcoin_bigram_counts = [Counter(ngrams(tokens, n=2)) for tokens in bitcoin_df.tokens]
dict(bitcoin_bigram_counts[0].most_common(20))
```

Out[94]:

```
{('visa', 'ha'): 1,
 ('ha', 'partnered'): 1,
 ('partnered', 'cryptocurrency'): 1,
 ('cryptocurrency', 'startup'): 1,
 ('startup', 'blockfi'): 1,
 ('blockfi', 'offer'): 1,
 ('offer', 'first'): 1,
 ('first', 'reward'): 1,
 ('reward', 'credit'): 1,
 ('credit', 'card'): 1,
 ('card', 'pay'): 1,
 ('pay', 'bitcoin'): 1,
 ('bitcoin', 'rather'): 1,
 ('rather', 'cash'): 1,
 ('cash', 'worth'): 1,
 ('worth', 'applying'): 1,
 ('applying', 'unless'): 1,
 ('unless', 'youre'): 1,
 ('youre', 'extremely'): 1,
 ('extremely', 'bullish'): 1}
```

In [95]:

```
# Generate the Ethereum N-grams where N=2 -OK
ethereum_bigram_counts = [Counter(ngrams(tokens, n=2)) for tokens in ethereum_df.tokens]
dict(ethereum_bigram_counts[0].most_common(20))
```

Out[95]:

```
{('paypal', 'bringing'): 1,
 ('bringing', 'newlyannounced'): 1,
 ('newlyannounced', 'support'): 1,
 ('support', 'cryptocurrency'): 1,
 ('cryptocurrency', 'u'): 1,
 ('u', 'account'): 1,
 ('account', 'first'): 1,
 ('first', 'plan'): 1,
 ('plan', 'open'): 1,
 ('open', 'cryptocurrency'): 1,
 ('cryptocurrency', 'trading'): 1,
 ('trading', 'usbased'): 1,
 ('usbased', 'user'): 1,
 ('user', 'october'): 1,
 ('october', 'wa'): 1,
 ('wa', 'char'): 1}
```

In [96]:

```
# Use the token_count function to generate the top 10 words from each coin - OK
def token_count(tokens, N=10):
    """Returns the top N tokens from the frequency count"""
    return Counter(tokens).most_common(N)
```

In [101]:

```
# Get the top 10 words for Bitcoin
bitcoin_big_string = ' '.join(bitcoin_df['text'])
bitcoin_processed = tokenizer(bitcoin_big_string)
bitcoin_top_10 = token_count(bitcoin_processed)
bitcoin_top_10
```

Out[101]:

```
[('char', 19),
 ('bitcoin', 13),
 ('currency', 9),
 ('reuters', 9),
 ('photo', 8),
 ('file', 7),
 ('representation', 7),
 ('virtual', 7),
 ('ha', 6),
 ('illustration', 6)]
```

In [105]:

```
# Get the top 10 words for Ethereum - OK
ethereum_big_string = ' '.join(ethereum_df['text'])
ethereum_processed = tokenizer(ethereum_big_string)
ethereum_top_10 = token_count(ethereum_processed)
ethereum_top_10
```

Out[105]:

```
[('char', 20),
 ('reuters', 15),
 ('bitcoin', 14),
 ('photo', 10),
 ('currency', 10),
 ('representation', 9),
 ('virtual', 9),
 ('illustration', 8),
 ('reutersdado', 8),
 ('file', 7)]
```

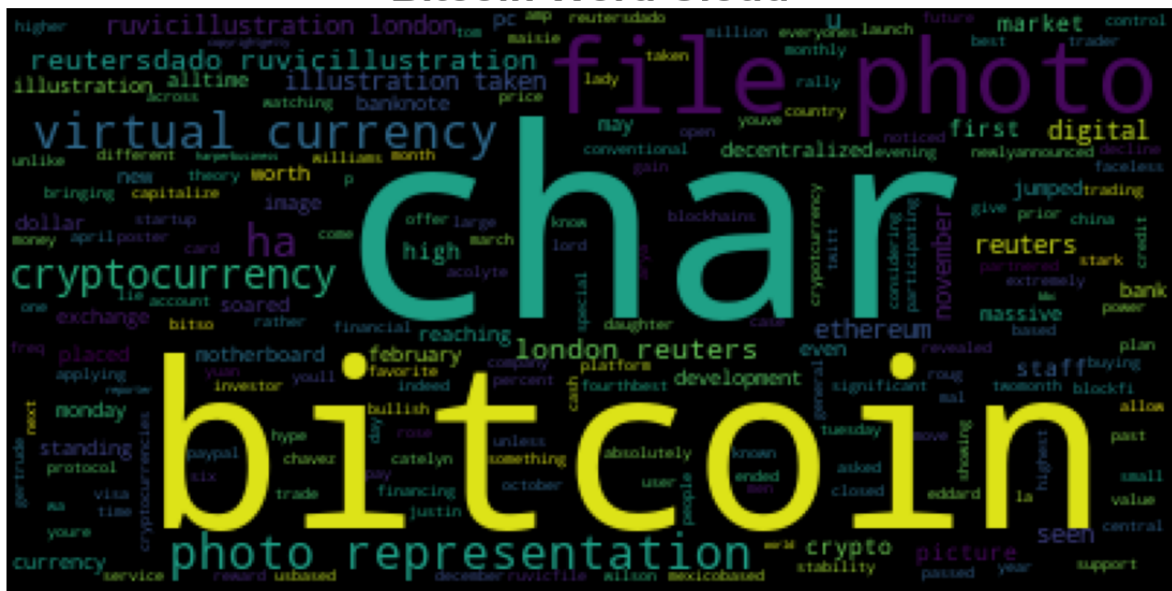
Word Clouds

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

In [106]:

```
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]
```

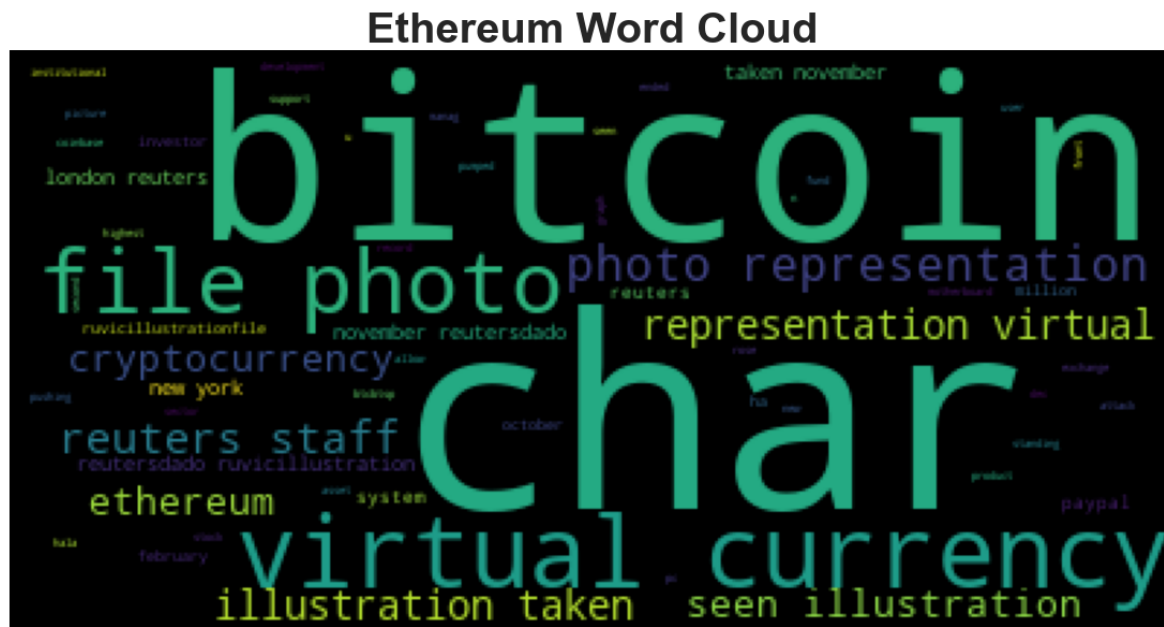
```
# Generate the Bitcoin word cloud
bitcoin_word_cloud = ' '.join(bitcoin_processed)
wc = WordCloud().generate(bitcoin_word_cloud)
plt.title('Bitcoin Word Cloud', fontsize=40, fontweight='bold')
plt.style.use('seaborn-whitegrid')
plt.imshow(wc)
plt.axis('off')
```

$$(-0.5, 399.5, 199.5, -0.5)$$
[illegible]

In [124]:

```
# Generate the Ethereum word cloud
ethereum_word_cloud = ' '.join(ethereum_processed)
wc = WordCloud().generate(ethereum_word_cloud)
plt.title('Ethereum Word Cloud', fontsize=40, fontweight='bold')
plt.style.use('seaborn-whitegrid')
plt.imshow(wc)
plt.axis('off')
```

Out[124]:

$$(-0.5, 399.5, 199.5, -0.5)$$


Named Entity Recognition

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

In [125]:

```
import spacy
from spacy import displacy
```

In [28]:

```
# Optional - download a language model for SpaCy
# !python -m spacy download en_core_web_sm
```

In [126]:

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

Bitcoin NER

In [131]:

```
# Concatenate all of the bitcoin text together  
bitcoin_big_string
```

Out[131]:

"Visa\xa0has partnered with cryptocurrency startup BlockFi to offer the first rewards credit card that pays out in Bitcoin rather than cash, but is it worth applying for? Unless youre extremely bullish o... [+2239 chars] PayPal is bringing its newly-announced support for cryptocurrency to all US accounts. It first announced plans to open cryptocurrency trading to US-based users in October, but until now it was only a... [+589 chars] In November 2017, after an absolutely massive, two-month rally, Bitcoin passed \$10,000 for the first time. And then, over the next 20 days, it soared even higher, reaching a price of \$19,665 and roug... [+6738 chars] Unlike 'conventional' cryptocurrencies, a central bank controls digital yuan – in this case, the People's Bank of China. The move gives the country more power and, in theory, more stability than freq... [+366 chars] If youve been watching the crypto markets over the past few weeks youll have noticed something special: bitcoin, everyones favorite decentralized digital currency based on hype, lies, and general mal... [+2490 chars] Six years after the launch of the Mexico-based cryptocurrency exchange and financial services platform Bitso the company revealed it has closed on \$62 million in financing to capitalize on the crypto... [+4328 chars] Decentralized exchange protocols that allow crypto traders and investors to trade across different blockchains have been in development for a while. A significant new development now comes with the la... [+3079 chars] 4. U.S. markets ended November with large gains. \r\nEven with a small decline today, the S&P 500 jumped by 10.8 percent in November, its best monthly showing since April and the fourth-best month ... [+535 chars] Maisie Williams also known as Arya Stark, daughter of Lady Catelyn and Lord Eddard, acolyte of the Faceless Men, you know the one is considering buying some bitcoins.\xa0\r\nOn Monday, she asked her Twitt... [+1512 chars] 8 with 7 posters participating\r\nBitcoin rose above \$18,000 on Tuesday evening, reaching its highest value since December 2017. Indeed, prior to this week bitcoin has only been worth more than \$18,000... [+1796 chars] FILE PHOTO: Representations of virtual currency Bitcoin are seen in this picture illustration taken March 13, 2020. REUTERS/Dado Ruvic//File Photo\r\nFuture of Money\r\nTom Wilson\r\nGertrude Chavez-... [+2623 chars] By Justin HarperBusiness reporter, BBC News\r\nimage copyrightGetty Images\r\nBitcoin, the world's best-known cryptocurrency, has jumped above \$17,000 (£12,800) to hit a three-year high.\r\nThe digital cur... [+3044 chars] Posted \r\nBitcoin has grabbed headlines this week with its ascent to an all-time high. Yet, a trend has been playing out that could change the face of the cryptocurrency market: a massive flow of coin... [+51 chars] By Reuters Staff\r\nFILE PHOTO: A representation of virtual currency Bitcoin is seen in this illustration taken November 19, 2020. REUTERS/Dado Ruvic/Illustration\r\nTOKYO (Reuters) - Bitcoin dropped to ... [+219 chars] FILE PHOTO: Representation of the Ethereum virtual currency standing on the PC motherboard is seen in this illustration picture, February 3, 2018. REUTERS/Dado Ruvic/Illustration\r\nLONDON (Reuters) - ... [+1237 chars] LONDON (Reuters) - Digital currencies Ethereum and XRP soared on Monday, gaining momentum as bitcoin powered on towards its all-time high.\r\nFILE PHOTO: Representation of the Ethereum virtual currency... [+1950 chars] By Reuters Staff\r\nFILE PHOTO: Representations of virtual currency Bitcoin are placed on U.S. Dollar banknotes in this illustration taken May 26, 2020. REUTE

RS/Dado Ruvic/Illustration\r\nLONDON (Reuters... [+463 chars] By Reuters Staff\r\nFILE PHOTO: Representations of virtual currency Bitcoin are placed on U.S. Dollar banknotes in this illustration taken May 26, 2020. REUTERS/Dado Ruvic/Illustration\r\nLONDON (Reuters... [+463 chars] FILE PHOTO: Representation of the Ethereum virtual currency standing on the PC motherboard is seen in this illustration picture, February 3, 2018. REUTERS/Dado Ruvic/Illustration\r\nLONDON (Reuters) - ... [+1237 chars]"

In [135]:

```
# Run the NER processor on all of the text
bitcoin_doc = nlp(bitcoin_big_string)

# Add a title to the document
bitcoin_doc.user_data['title'] = "Bitcoin NER"
```

In [136]:

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

Bitcoin NER

Visa **ORG** has partnered with cryptocurrency startup BlockFi to offer the first **ORDINAL** rewards credit card that pays out in Bitcoin **GPE** rather than cash, but is it worth applying for? Unless youre extremely bullish o... [+2239 chars] PayPal **PRODUCT** is bringing its newly-announced support for cryptocurrency to all US **GPE** accounts. It first **ORDINAL** announced plans to open cryptocurrency trading to US **GPE** -based users in October **DATE** , but until now it was only a... [+589 chars] In November 2017 **DATE** , after an absolutely massive, two-month **DATE** rally, Bitcoin **GPE** passed \$ 10,000 **MONEY** for the first **ORDINAL** time. And then, over the next 20 days **DATE** , it soared even higher, reaching a price of \$ 19,665 **MONEY** and roug... [+6738 chars] Unlike 'conventional' cryptocurrencies, a central bank controls digital yuan **ORG** — in this case, the People's Bank of China **ORG** . The move gives the country more power and, in theory, more stability than freq... [+366 chars] If youve been watching the crypto markets over the past few weeks **DATE** youll have noticed something special: bitcoin **GPE** , everyones favorite decentralized digital **ORG** currency based on hype **GPE** , lies, and general mal... [+2490 chars] Six years **DATE** after the launch of the Mexico **GPE** -based cryptocurrency exchange and financial services platform Bitso the company revealed it has closed on \$62 million **MONEY** in financing to capitalize on the crypto... [+4328 chars] Decentralized **GPE** exchange protocols that allow crypto traders and investors to trade across different blockchains have been in development for a while. A significant new development now comes with the la... [+3079 chars] 4 **CARDINAL** . U.S. **GPE** markets ended November **DATE** with large gains. Even with a small decline today **DATE** , the S&P 500 **CARDINAL** jumped by 10.8 percent **PERCENT** in November **DATE** , its best monthly **DATE** showing since April **DATE** and the fourth **ORDINAL** -best month ... [+535 chars] Maisie

Williams **PERSON** also known as Arya Stark **PERSON** , daughter of Lady Catelyst **PERSON** and Lord Eddard **PERSON** , acolyte **PERSON** of the Faceless Men **WORK_OF_ART** , you know the one is considering buying some bitcoins.

On Monday **DATE** , she asked her Twitt... [+1512 chars] 8 **CARDINAL** with 7 **CARDINAL** posters participating

Bitcoin **GPE** rose above \$18,000 **MONEY** on Tuesday **DATE** evening **TIME** , reaching its highest value since December 2017 **DATE** . Indeed, prior to this week **DATE** bitcoin has only been worth more than \$18,000 **MONEY** ... [+1796 chars]

FILE PHOTO: Representations of virtual currency Bitcoin **GPE** are seen in this picture illustration taken taken March 13, 2020 **DATE** . REUTERS/ **ORG** Dado Ruvic//File Photo

Future of Money

Tom Wilson **PERSON**

Gertrude Chavez-... [+2623 chars] By Justin HarperBusiness **ORG** reporter, BBC News **ORG**

image copyrightGetty Images

Bitcoin **GPE** , the world's best-known cryptocurrency, has jumped above \$17,000 **MONEY** (£ 12,800 **MONEY**) to hit a three-year **DATE** high.

The digital cur... [+3044 chars] Posted

Bitcoin **GPE** has grabbed headlines this week **DATE** with its ascent to an all-time high. Yet, a trend has been playing out that could change the face of the cryptocurrency market: a massive flow of coin... [+51 chars] By Reuters **ORG** Staff

FILE PHOTO: A representation of virtual currency Bitcoin **GPE** is seen in this illustration taken November 19, 2020 **DATE** . REUTERS/Dado Ruvic/Illustration **ORG**

TOKYO (Reuters **ORG**) - Bitcoin **GPE** dropped to ... [+219 chars] FILE PHOTO:

Representation of the Ethereum virtual currency standing on the PC motherboard is seen in this illustration picture, February 3, 2018 **DATE** . **REUTERS/ ORG** Dado Ruvic/Illustration

LONDON (**Reuters ORG**) - ... [+1237 chars] LONDON **GPE** (**Reuters ORG**) - Digital currencies Ethereum and **XRP ORG** soared on Monday **DATE** , gaining momentum as bitcoin powered on towards its all-time high.

FILE PHOTO: Representation of the Ethereum virtual currency... [+1950 chars] By **Reuters ORG** Staff

FILE PHOTO: Representations of virtual currency **Bitcoin GPE** are placed on U.S. **GPE** Dollar banknotes in this illustration taken May 26, 2020 **DATE** . **REUTERS/ ORG** Dado Ruvic/Illustration

LONDON (**Reuters ORG** ... [+463 chars] By **Reuters ORG** Staff

FILE PHOTO: Representations of virtual currency **Bitcoin GPE** are placed on U.S. **GPE** Dollar banknotes in this illustration taken May 26, 2020 **DATE** . **REUTERS/ ORG** Dado Ruvic/Illustration

LONDON (**Reuters ORG** ... [+463 chars] FILE PHOTO: Representation of the Ethereum virtual currency standing on the PC motherboard is seen in this illustration picture, February 3, 2018 **DATE** . **REUTERS/ ORG** Dado Ruvic/Illustration

LONDON (**Reuters ORG**) - ... [+1237 chars]



In [147]:

```
# List all Entities  
from pprint import pprint  
pprint([(ent.text, ent.label_) for ent in bitcoin_doc.ents])
```



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[('Visa', 'ORG'),
 ('first', 'ORDINAL'),
 ('Bitcoin', 'GPE'),
 ('PayPal', 'PRODUCT'),
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 ('October', 'DATE'),
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 ('10,000', 'MONEY'),
 ('first', 'ORDINAL'),
 ('the next 20 days', 'DATE'),
 ('19,665', 'MONEY'),
 ('digital yuan', 'ORG'),
 ('the People's Bank of China', 'ORG'),
 ('the past few weeks', 'DATE'),
 ('bitcoin', 'GPE'),
 ('digital', 'ORG'),
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 ('Six years', 'DATE'),
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 ('4', 'CARDINAL'),
 ('U.S.', 'GPE'),
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 ('today', 'DATE'),
 ('500', 'CARDINAL'),
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 ('November', 'DATE'),
 ('monthly', 'DATE'),
 ('April', 'DATE'),
 ('fourth', 'ORDINAL'),
 ('Maisie Williams', 'PERSON'),
 ('Arya Stark', 'PERSON'),
 ('Lady Catelyn', 'PERSON'),
 ('Eddard', 'PERSON'),
 ('acolyte', 'PERSON'),
 ('the Faceless Men', 'WORK_OF_ART'),
 ('Monday', 'DATE'),
 ('8', 'CARDINAL'),
 ('7', 'CARDINAL'),
 ('Bitcoin', 'GPE'),
 ('above $18,000', 'MONEY'),
 ('Tuesday', 'DATE'),
 ('evening', 'TIME'),
 ('December 2017', 'DATE'),
 ('this week', 'DATE'),
 ('more than $18,000', 'MONEY'),
 ('Bitcoin', 'GPE'),
 ('March 13, 2020', 'DATE'),
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('REUTERS/', 'ORG'),
('Tom Wilson', 'PERSON'),
('Justin HarperBusiness', 'ORG'),
('BBC News', 'ORG'),
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('12,800', 'MONEY'),
('three-year', 'DATE'),
('Bitcoin', 'GPE'),
('this week', 'DATE'),
('Reuters', 'ORG'),
('Bitcoin', 'GPE'),
('November 19, 2020', 'DATE'),
('REUTERS/Dado Ruvic/Illustration', 'ORG'),
('Reuters', 'ORG'),
('Bitcoin', 'GPE'),
('February 3, 2018', 'DATE'),
('REUTERS/', 'ORG'),
('Reuters', 'ORG'),
('LONDON', 'GPE'),
('Reuters', 'ORG'),
('XRP', 'ORG'),
('Monday', 'DATE'),
('Reuters', 'ORG'),
('Bitcoin', 'GPE'),
('U.S.', 'GPE'),
('May 26, 2020', 'DATE'),
('REUTERS/', 'ORG'),
('Reuters', 'ORG'),
('Reuters', 'ORG'),
('Bitcoin', 'GPE'),
('U.S.', 'GPE'),
('May 26, 2020', 'DATE'),
('REUTERS/', 'ORG'),
('Reuters', 'ORG'),
('February 3, 2018', 'DATE'),
('REUTERS/', 'ORG'),
('Reuters', 'ORG')]
```

Ethereum NER

In [148]:

```
# Concatenate all of the ethereum text together  
ethereum_big_string
```

Out[148]:

"PayPal is bringing its newly-announced support for cryptocurrency to a ll US accounts. It first announced plans to open cryptocurrency trading to US-based users in October, but until now it was only a... [+589 chars] FILE PHOTO: Representation of the Ethereum virtual currency standing on the PC motherboard is seen in this illustration picture, February 3, 2018. REUTERS/Dado Ruvic/Illustration\r\nLONDON (Reuters) - ... [+1237 chars] FILE PHOTO: Representation of the Ethereum virtual currency standing on the PC motherboard is seen in this illustration picture, February 3, 2018. REUTERS/Dado Ruvic/Illustration\r\nLONDON (Reuters) - ... [+1237 chars] LONDON (Reuters) - Digital currencies Ethereum and XRP soared on Monday, gaining momentum as bitcoin powered on towards its all-time high.\r\nFILE PHOTO: Representation of the Ethereum virtual currency... [+1950 chars] NEW YORK (Reuters) - Institutional investors pumped \$429 million into cryptocurrency funds and products for the week ended Dec. 7, the second highest on record, pushing the sectors assets under manag... [+1888 chars] NEW YORK (Reuters) - Institutional investors pumped \$429 million into cryptocurrency funds and products for the week ended Dec. 7, the second highest on record, pushing the sectors assets under manag... [+1888 chars] PayPal has launched the Generosity Network, a platform that allows users to create customized, personal fundraising campaigns. Yes, just like you can on GoFundMe.\xa0\r\nYou can raise a maximum of \$20,000... [+1601 chars] By Reuters Staff\r\nFILE PHOTO: A representation of virtual currency Bitcoin is seen in front of a stock graph in this illustration taken November 19, 2020. REUTERS/Dado Ruvic/Illustration/File photo\r\n... [+336 chars] By Reuters Staff\r\nFILE PHOTO: A representation of virtual currency Bitcoin is seen in front of a stock graph in this illustration taken November 19, 2020. REUTERS/Dado Ruvic/Illustration/File photo\r\n... [+336 chars] The New York Times is (probably) about to publish a story about cryptocurrency exchange Coinbase. But we're not reading about it on the news outlet's website, because Coinbase has taken the highly un... [+3993 chars] Decentralized exchange protocols that allow crypto traders and investors to trade across different blockchains have been in development for a while. A significant new development now comes with the la... [+3079 chars] These attacks have been growing in numbers since early February this year, and one of the biggest flash loan attacks took place last month, in October, when hackers stole \$24 million worth of cryptoc... [+603 chars] By Reuters Staff\r\nA representation of virtual currency Bitcoin is seen in this illustration taken November 19, 2020. REUTERS/Dado Ruvic/Illustration\r\nNEW YORK (Reuters) - Bitcoin BTC=BTSP rose to a n... [+1407 chars] By Reuters Staff\r\nA representation of virtual currency Bitcoin is seen in this illustration taken November 19, 2020. REUTERS/Dado Ruvic/Illustration\r\nNEW YORK (Reuters) - Bitcoin BTC=BTSP rose to a n... [+1388 chars] By Reuters Staff\r\nFILE PHOTO: A representation of virtual currency Bitcoin is seen in this illustration taken November 19, 2020. REUTERS/Dado Ruvic/Illustration/File Photo\r\nLONDON (Reuters) - Bitcoin... [+861 chars] By Reuters Staff\r\nFILE PHOTO: Representations of virtual currency Bitcoin are placed on U.S. Dollar banknotes in this illustration taken May 26, 2020. REUTERS/Dado Ruvic/Illustration\r\nLONDON (Reuters... [+909 chars] Hala Systems is using Hedera Hashgraph a secure alternative to blockchain technology \xa0to anchor a system that warns Syrians of impending conflict or natura

l disasters.\r\nHala Systems is a social enter... [+3718 chars] Try reaching for a live customer support person from Paypal. It's virtually impossible to get a hold of 1 thru their automated phone system.\r\nImagine there's a glitch in the cypto transfer and you ne... [+23 chars] Paypal now lets you buy and sell cryptocurrencies, like Bitcoin and Ethereum. A lot of people are excited about it, and some have speculated that this is why the price of bitcoin has gone up.But Payp... [+4207 chars] A chain of block erupters used for Bitcoin mining is pictured at the Plug and Play Tech Center in Sunnyvale, California, October 28, 2013.\r\nREUTERS/Stephen Lam\r\nBitcoin slumped further throug... [+3148 chars]"

In [149]:

```
# Run the NER processor on all of the text
ethereum_doc = nlp(ethereum_big_string)

# Add a title to the document
ethereum_doc.user_data['title'] = "Ethereum NER"
```

In [150]:

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

Ethereum NER

PayPal **PRODUCT** is bringing its newly-announced support for cryptocurrency to all US **GPE** accounts. It first **ORDINAL** announced plans to open cryptocurrency trading to US **GPE**-based users in October **DATE**, but until now it was only a...
[+589 chars] FILE PHOTO: Representation of the Ethereum virtual currency standing on the PC motherboard is seen in this illustration picture, February 3, 2018 **DATE**.

REUTERS/ **ORG** Dado Ruvic/Illustration
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FILE PHOTO: Representation of the Ethereum virtual currency... [+1950 chars] NEW YORK **PERSON** (Reuters **ORG**) - Institutional investors pumped \$429 million **MONEY** into cryptocurrency funds and products for the week ended Dec. 7 **DATE**, the second **ORDINAL** highest on record, pushing the sectors assets under manag...
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You can raise a maximum of \$ 20,000 **MONEY** ... [+1601 chars] By Reuters **ORG** Staff

FILE PHOTO: A representation of virtual currency Bitcoin **GPE** is seen in front of a

stock graph in this illustration taken November 19, 2020 **DATE** . REUTERS/ **ORG**

Dado Ruvic/Illustration/File photo

... [+336 chars] By Reuters **ORG** Staff

FILE PHOTO: A representation of virtual currency Bitcoin **GPE** is seen in front of a

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Dado Ruvic/Illustration/File photo

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\$24 million **MONEY** worth of cryptoc... [+603 chars] By Reuters **ORG** Staff

A representation of virtual currency Bitcoin **GPE** is seen in this illustration taken

November 19, 2020 **DATE** . REUTERS/ **ORG** Dado Ruvic/Illustration

NEW YORK (Reuters **ORG**) - Bitcoin BTC=BTSP rose to a n... [+1407 chars] By

Reuters **ORG** Staff

A representation of virtual currency Bitcoin **GPE** is seen in this illustration taken

November 19, 2020 **DATE** . REUTERS/ **ORG** Dado Ruvic/Illustration

NEW YORK (Reuters **ORG**) - Bitcoin BTC=BTSP rose to a n... [+1388 chars] By

Reuters **ORG** Staff

FILE PHOTO: A representation of virtual currency Bitcoin **GPE** is seen in this

illustration taken November 19, 2020 **DATE** . REUTERS/ **ORG** Dado

Ruvic/Illustration/File Photo

LONDON **GPE** (**Reuters** **ORG**)- Bitcoin **GPE** ... [+861 chars] By **Reuters**
ORG Staff

FILE PHOTO: Representations of virtual currency Bitcoin **GPE** are placed on U.S.
GPE Dollar banknotes in this illustration taken May 26, 2020 **DATE** . **REUTERS/**
ORG Dado Ruvic/Illustration

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ORG Hashgraph a secure alternative to blockchain technology to anchor a system
that warns Syrians **NORP** of impending conflict or natural disasters.

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Imagine there's a glitch in the cypto transfer and you ne... [+23 chars] Paypal now lets
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ORG in Sunnyvale **GPE** , California **GPE** , October 28, 2013 **DATE** .
REUTERS/Stephen Lam **ORG**

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In [151]:

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# List all Entities  
pprint([(ent.text, ent.label_) for ent in ethereum_doc.ents])
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('US', 'GPE'),
('first', 'ORDINAL'),
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('February 3, 2018', 'DATE'),
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('Reuters', 'ORG'),
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('Reuters', 'ORG'),
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('bitcoin', 'GPE'),
('Payp', 'PERSON'),
('Bitcoin', 'GPE'),
('the Plug and Play Tech Center', 'ORG'),
('Sunnyvale', 'GPE'),
('California', 'GPE'),
('October 28, 2013', 'DATE'),
('REUTERS/Stephen Lam', 'ORG'),
('Bitcoin', 'GPE')]
```

In []: