

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

%matplotlib inline
load_dotenv()
```

Python-dotenv could not parse statement starting at line 6

Out[1]: True

```
In [2]: # Read your api key environment variable
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"
)
print(f"Total Articles about Bitcoin: {Bitcoin_Headlines['totalResults']}")
Bitcoin_Headlines["articles"][0]
```

Total Articles about Bitcoin: 4566

```
Out[4]: {'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,fl_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 [5]: # Fetch the Ethereum news articles
Ethereum_Headlines = NewsAPI.get_everything(
    q="Ethereum",
    language= "en",
    sort_by="relevancy"
)
print(f"Total Articles about Ethereum: {Ethereum_Headlines['totalResults']}")
Ethereum_Headlines["articles"][0]
```

Total Articles about Ethereum: 1231

```
Out[5]: {'source': {'id': 'reuters', 'name': 'Reuters'},
  'author': 'Tom Wilson',
  'title': 'Smaller digital coins soar as bitcoin powers on towards record high - Reuters UK',
  'description': 'Digital currencies Ethereum and XRP soared on Monday, gaining momentum as bitcoin powered on towards its all-time high.',
  'url': 'https://in.reuters.com/article/us-crypto-currencies-idUKKBN2831RI',
  'urlToImage': 'https://static.reuters.com/resources/r/?m=02&d=20201123&t=2&i=1542157677&r=LYNXMPEGAM0XD&w=800',
  'publishedAt': '2020-11-23T14:16:00Z',
  'content': '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 [6]: # Create the Bitcoin sentiment scores DataFrame
Bitcoin_Sentiment_Scores_DF = pd.DataFrame.from_dict(Bitcoin_Headlines[
"articles"] )
Bitcoin_Sentiment_Scores_DF.head()
```

Out[6]:

	source	author	title	description	url	
0	{'id': None, 'name': 'Lifehacker.com'}	Mike Winters on Two Cents, shared by Mike Wint...	Is the New Visa Bitcoin Rewards Card Worth It?	Visa has partnered with cryptocurrency startup...	https://twocents.lifehacker.com/is-the-new-vis...	
1	{'id': 'mashable', 'name': 'Mashable'}	Stan Schroeder	Bitcoin is flirting with \$20,000 again. How hi...	In November 2017, after an absolutely massive,...	https://mashable.com/article/bitcoin-20000/	http
2	{'id': 'engadget', 'name': 'Engadget'}	Jon Fingas	You can now spend China's digital currency at ...	China's official digital currency is now usabl...	https://www.engadget.com/jd-com-supports-china...	h
3	{'id': None, 'name': 'Gizmodo.com'}	John Biggs	Bitcoin Could Hit \$20K Again But This Time No ...	If you've been watching the crypto markets ove...	https://gizmodo.com/bitcoin-could-hit-20k-agai...	
4	{'id': 'techcrunch', 'name': 'TechCrunch'}	Jonathan Shieber	With investors expecting a Latin American cryp...	Six years after the launch of the Mexico-based...	http://techcrunch.com/2020/12/09/with-investor...	

```
In [7]: # Create the ethereum sentiment scores DataFrame
Ethereum_Sentiment_Scores_DF = pd.DataFrame.from_dict(Ethereum_Headlines
[ "articles" ])
Ethereum_Sentiment_Scores_DF.head()
```

Out[7]:

	source	author	title	description	url	
0	{'id': 'reuters', 'name': 'Reuters'}	Tom Wilson	Smaller digital coins soar as bitcoin powers o...	Digital currencies Ethereum and XRP soared on ...	https://in.reuters.com/article/us-crypto-curre...	https://static.reuters.cc
1	{'id': 'reuters', 'name': 'Reuters'}	Tom Wilson	Smaller digital coins soar as bitcoin powers o...	Digital currencies Ethereum and XRP soared on ...	https://www.reuters.com/article/us-crypto-curr...	https://static.reuters.cc
2	{'id': 'reuters', 'name': 'Reuters'}	Tom Wilson	Smaller digital coins soar as bitcoin powers o...	Digital currencies Ethereum and XRP soared on ...	https://in.reuters.com/article/us-crypto-curre...	https://static.reuters.cc
3	{'id': 'reuters', 'name': 'Reuters'}	Gertrude Chavez- Dreyfuss	Crypto fund inflows hit second highest on reco...	Institutional investors pumped \$429 million in...	https://uk.reuters.com/article/us-crypto-curre...	https://s1.reutersmedia
4	{'id': 'reuters', 'name': 'Reuters'}	Gertrude Chavez- Dreyfuss	Crypto fund inflows hit second highest on reco...	Institutional investors pumped \$429 million in...	https://www.reuters.com/article/us-crypto-curr...	https://s1.reutersmedia

```

In [8]: # Describe the Bitcoin Sentiment DataFrame
Bitcoin_Sentiments = []
for article in Bitcoin_Headlines["articles"]:
    try:
        sentiment = analyzer.polarity_scores(article["content"])
        Bitcoin_Sentiments.append({
            "Date" : article["publishedAt"][:10],
            "Text": article["content"],
            "Compound": sentiment["compound"],
            "Positive": sentiment["pos"],
            "Negative": sentiment["neg"],
            "Neutral": sentiment["neu"]
        })
    except AttributeError:
        pass
# Create DataFrame
Bitcoin_Sentiment_DF = pd.DataFrame(Bitcoin_Sentiments)
# Reorder DataFrame columns
Columns = ["Date", "Text", "Compound", "Positive", "Negative", "Neutral"]
Bitcoin_Sentiments_DF = Bitcoin_Sentiment_DF[Columns]
Bitcoin_Sentiments_DF.head()

```

Out[8]:

	Date	Text	Compound	Positive	Negative	Neutral
0	2020-12-03	Visa has partnered with cryptocurrency startup...	0.6369	0.162	0.000	0.838
1	2020-11-20	In November 2017, after an absolutely massive,...	0.2023	0.050	0.000	0.950
2	2020-12-06	Unlike 'conventional' cryptocurrencies, a cent...	0.0000	0.000	0.000	1.000
3	2020-11-25	If youve been watching the crypto markets over...	0.4404	0.152	0.075	0.773
4	2020-12-09	Six years after the launch of the Mexico-based...	0.0000	0.000	0.000	1.000

```

In [9]: # Describe the Ethereum Sentiment DataFrame
Ethereum_Sentiments = []
for article in Ethereum_Headlines["articles"]:
    try:
        sentiment = analyzer.polarity_scores(article["content"])
        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({
            "Text": text,
            "Date": date,
            "Compound": compound,
            "Positive": pos,
            "Negative": neg,
            "Neutral": neu
        })
    except AttributeError:
        pass
# Create DataFrame
Ethereum_Sentiments_DF = pd.DataFrame(Ethereum_Sentiments)
# Reorder DataFrame columns
Columns = ["Date", "Text", "Compound", "Positive", "Negative", "Neutral"]
Ethereum_Sentiments_DF = Ethereum_Sentiments_DF[Columns]
Ethereum_Sentiments_DF.head()

```

Out[9]:

	Date	Text	Compound	Positive	Negative	Neutral
0	2020-11-23	FILE PHOTO: Representation of the Ethereum vir...	0.0000	0.000	0.0	1.000
1	2020-11-23	FILE PHOTO: Representation of the Ethereum vir...	0.0000	0.000	0.0	1.000
2	2020-11-23	LONDON (Reuters) - Digital currencies Ethereum...	0.4215	0.088	0.0	0.912
3	2020-12-07	NEW YORK (Reuters) - Institutional investors p...	0.1779	0.052	0.0	0.948
4	2020-12-07	NEW YORK (Reuters) - Institutional investors p...	0.1779	0.052	0.0	0.948

```
In [10]: Bitcoin_Sentiments_DF.describe()
```

Out[10]:

	Compound	Positive	Negative	Neutral
count	19.000000	19.000000	19.000000	19.000000
mean	0.194484	0.050737	0.003947	0.945316
std	0.266427	0.069277	0.017206	0.077066
min	0.000000	0.000000	0.000000	0.773000
25%	0.000000	0.000000	0.000000	0.897500
50%	0.000000	0.000000	0.000000	1.000000
75%	0.411700	0.102500	0.000000	1.000000
max	0.765000	0.174000	0.075000	1.000000

```
In [11]: Ethereum_Sentiments_DF.describe()
```

Out[11]:

	Compound	Positive	Negative	Neutral
count	20.000000	20.000000	20.000000	20.000000
mean	0.102920	0.057700	0.025750	0.916550
std	0.299156	0.076181	0.054482	0.104965
min	-0.493900	0.000000	0.000000	0.672000
25%	0.000000	0.000000	0.000000	0.878000
50%	0.000000	0.052000	0.000000	0.948000
75%	0.226300	0.087250	0.011750	1.000000
max	0.877900	0.318000	0.196000	1.000000

Questions:

Q: Which coin had the highest mean positive score?

A: Ethereum is the highest mean positive score coming to 0.060950

Q: Which coin had the highest negative score?

A: Ethereum had the highest compound score 0.196 compared to BitCoin at 0.075

Q: Which coin had the highest positive score?

A: Ethereum had the highest positive score 0.318 compared to BitCoin at 0.174

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 [12]: 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 [13]: from nltk.corpus import reuters, stopwords
```

```
# Code to download corpora
import nltk
nltk.download('stopwords')
nltk.download('reuters')
nltk.download('punkt')
```

```
[nltk_data] Downloading package stopwords to
[nltk_data] /Users/miladnazar/nltk_data...
[nltk_data] Package stopwords is already up-to-date!
[nltk_data] Downloading package reuters to
[nltk_data] /Users/miladnazar/nltk_data...
[nltk_data] Package reuters is already up-to-date!
[nltk_data] Downloading package punkt to
[nltk_data] /Users/miladnazar/nltk_data...
[nltk_data] Package punkt is already up-to-date!
```

Out[13]: True

```
In [14]: # Expand the default stopwords list if necessary
Additional_Stopwords = ['.', ',', '!', 'https', 'http', 'btc', 'ha', 'bitcoin',
                        'to', 'with', 'has', 'char', 'unlike', 'eth', 'u', 'is', 'its', 'has',
                        'with', 'bringing', 'ethereum', 'said', 'sent', 'found', 'today', 'follo',
                        'wing', 'announced', 'week', 'basically', 'also', 'weekly']
```

```
In [15]: # 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') + Additional_Stopwords)

    # Lemmatize Words into root words
    lemmatizer = WordNetLemmatizer()
    Text = [lemmatizer.lemmatize(word) for word in Text]
    Text = [word for word in Text if word not in sw]
    return Text
```

```
In [16]: # Create a new tokens column for bitcoin
Bitcoin_Tokens = []
[Bitcoin_Tokens.append(tokenizer(Text)) for Text in Bitcoin_Sentiments_DF.Text]
Bitcoin_Sentiments_DF['Tokens'] = Bitcoin_Tokens
Bitcoin_Sentiments_DF.head()
```

Out[16]:

	Date	Text	Compound	Positive	Negative	Neutral	Tokens
0	2020-12-03	Visa has partnered with cryptocurrency startup...	0.6369	0.162	0.000	0.838	[visa, partnered, cryptocurrency, startup, blo...
1	2020-11-20	In November 2017, after an absolutely massive,...	0.2023	0.050	0.000	0.950	[november, absolutely, massive, twomonth, rall...
2	2020-12-06	Unlike 'conventional' cryptocurrencies, a cent...	0.0000	0.000	0.000	1.000	[conventional, cryptocurrencies, central, bank...
3	2020-11-25	If youve been watching the crypto markets over...	0.4404	0.152	0.075	0.773	[youve, watching, crypto, market, past, youll,...
4	2020-12-09	Six years after the launch of the Mexico-based...	0.0000	0.000	0.000	1.000	[six, year, launch, mexicobased, cryptocurrenc...

```
In [17]: # Create a new tokens column for ethereum
Ethereum_Tokens = []
[Ethereum_Tokens.append(tokenizer(Text)) for Text in Ethereum_Sentiments_DF.Text]
Ethereum_Sentiments_DF['Tokens'] = Ethereum_Tokens
Ethereum_Sentiments_DF.head()
```

Out[17]:

	Date	Text	Compound	Positive	Negative	Neutral	Tokens
0	2020-11-23	FILE PHOTO: Representation of the Ethereum vir...	0.0000	0.000	0.0	1.000	[file, photo, representation, virtual, currenc...
1	2020-11-23	FILE PHOTO: Representation of the Ethereum vir...	0.0000	0.000	0.0	1.000	[file, photo, representation, virtual, currenc...
2	2020-11-23	LONDON (Reuters) - Digital currencies Ethereum...	0.4215	0.088	0.0	0.912	[london, reuters, digital, currency, xrp, soar...
3	2020-12-07	NEW YORK (Reuters) - Institutional investors p...	0.1779	0.052	0.0	0.948	[new, york, reuters, institutional, investor, ...
4	2020-12-07	NEW YORK (Reuters) - Institutional investors p...	0.1779	0.052	0.0	0.948	[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 [18]: from collections import Counter
from nltk import ngrams
```

```
In [19]: # Generate the Bitcoin N-grams where N=2
Bitcoin_Bigram_Counts = [Counter(ngrams(Tokens, n=2)) for Tokens in Bitcoin_Sentiments_DF.Tokens]
dict(Bitcoin_Bigram_Counts[0].most_common(10))
```

```
Out[19]: {('visa', '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}
```

```
In [20]: # Generate the Ethereum N-grams where N=2
Ethereum_Bigram_Counts = [Counter(ngrams(Tokens, n=2)) for Tokens in Ethereum_Sentiments_DF.Tokens]
dict(Ethereum_Bigram_Counts[0].most_common(10))
```

```
Out[20]: {('file', 'photo'): 1,
          ('photo', 'representation'): 1,
          ('representation', 'virtual'): 1,
          ('virtual', 'currency'): 1,
          ('currency', 'standing'): 1,
          ('standing', 'pc'): 1,
          ('pc', 'motherboard'): 1,
          ('motherboard', 'seen'): 1,
          ('seen', 'illustration'): 1,
          ('illustration', 'picture'): 1}
```

```
In [21]: # Use the token_count function to generate the top 10 words from each coin
def token_count(Tokens, N=10):
    """Returns the top N tokens from the frequency count"""
    return Counter(Tokens).most_common(N)
```

```
In [22]: # Get the top 10 words for Bitcoin
Top10_Words_Bitcoin = []
for Tokens in Bitcoin_Sentiments_DF.Tokens:
    Top10_Words_Bitcoin += Tokens
token_count(Top10_Words_Bitcoin, 10)
```

```
Out[22]: [('reuters', 11),
          ('currency', 10),
          ('photo', 8),
          ('representation', 8),
          ('virtual', 8),
          ('file', 7),
          ('illustration', 7),
          ('reutersdado', 7),
          ('taken', 6),
          ('ruvicillustration', 6)]
```

```
In [23]: # Get the top 10 words for Ethereum
Top10_Words_Ethereum = []
for Tokens in Ethereum_Sentiments_DF.Tokens:
    Top10_Words_Ethereum += Tokens
token_count(Top10_Words_Ethereum, 10)
```

```
Out[23]: [('reuters', 17),
          ('photo', 10),
          ('currency', 10),
          ('representation', 9),
          ('virtual', 9),
          ('illustration', 8),
          ('reutersdado', 8),
          ('file', 7),
          ('seen', 7),
          ('london', 7)]
```

Word Clouds

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

```
In [24]: 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 [25]: # Generate the Bitcoin word cloud
Bitcoin_WorldCloud = ' '.join(Top10_Words_Bitcoin)
wc = WordCloud(width=1200, height=800, max_words=50).generate(Bitcoin_WorldCloud)
plt.title("Bitcoin World Cloud", fontsize=50, fontweight="bold")
plt.axis("off")
plt.imshow(wc);
```

```
In [26]: # Generate the Ethereum word cloud
Ethereum_WorldCloud = ' '.join(Top10_Words_Ethereum)
wc = WordCloud(width=1200, height=800, max_words=50).generate(Ethereum_WorldCloud)
plt.title("Ethereum World Cloud", fontsize=50, fontweight="bold")
plt.axis("off")
plt.imshow(wc);
```



Named Entity Recognition

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

```
In [27]: import spacy
from spacy import displacy
```

```
In [28]: # Optional - download a language model for SpaCy  
!python -m spacy download en_core_web_sm
```


Requirement already satisfied: en_core_web_sm==2.3.1 from https://github.com/explosion/spacy-models/releases/download/en_core_web_sm-2.3.1/en_core_web_sm-2.3.1.tar.gz#egg=en_core_web_sm==2.3.1 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (2.3.1)

Requirement already satisfied: spacy<2.4.0,>=2.3.0 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from en_core_web_sm==2.3.1) (2.3.4)

Requirement already satisfied: tqdm<5.0.0,>=4.38.0 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (4.47.0)

Requirement already satisfied: numpy>=1.15.0 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (1.18.1)

Requirement already satisfied: preshed<3.1.0,>=3.0.2 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (3.0.4)

Requirement already satisfied: srsly<1.1.0,>=1.0.2 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (1.0.4)

Requirement already satisfied: plac<1.2.0,>=0.9.6 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (0.9.6)

Requirement already satisfied: cymem<2.1.0,>=2.0.2 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (2.0.4)

Requirement already satisfied: thinc<7.5.0,>=7.4.1 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (7.4.3)

Requirement already satisfied: setuptools in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (49.2.0.post20200714)

Requirement already satisfied: murmurhash<1.1.0,>=0.28.0 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (1.0.4)

Requirement already satisfied: requests<3.0.0,>=2.13.0 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (2.25.0)

Requirement already satisfied: catalogue<1.1.0,>=0.0.7 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (1.0.0)

Requirement already satisfied: blis<0.8.0,>=0.4.0; python_version >= "3.6" in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (0.7.3)

Requirement already satisfied: wasabi<1.1.0,>=0.4.0 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (0.8.0)

Requirement already satisfied: idna<3,>=2.5 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from requests<3.0.0,>=2.13.0->spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (2.10)

Requirement already satisfied: chardet<4,>=3.0.2 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from requests<3.0.0,>=2.13.0->spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (3.0.4)

Requirement already satisfied: urllib3<1.27,>=1.21.1 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from requests<3.0.0,>=2.13.0->spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (1.25.11)

Requirement already satisfied: certifi>=2017.4.17 in /Users/miladnazar/.conda/envs/pyvizenv/lib/python3.8/site-packages (from requests<3.0.

0,>=2.13.0->spacy<2.4.0,>=2.3.0->en_core_web_sm==2.3.1) (2020.11.8)

✓ Download and installation successful

You can now load the model via `spacy.load('en_core_web_sm')`

```
In [29]: # Load the spaCy model
nlp = spacy.load('en_core_web_sm')
```

Bitcoin NER

```
In [30]: # Concatenate all of the bitcoin text together
Bitcoin_Corpus = ' '.join(Bitcoin_Sentiments_DF["Text"].values)
Bitcoin_Corpus
```

Out[30]: "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] 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 Catelwyn 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. REUTERS/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] By Reuters Staff\r\nA representation of virtual currency Bitcoin is seen in this illustration taken November 19, 2020. REUTERS/Dado Ruvic/Illustration

ation\r\nTOKYO (Reuters) - Bitcoin dropped to \$17,657.53 o... [+207 characters]"

```
In [31]: # Run the NER processor on all of the text
NER_Processor = nlp(Bitcoin_Corpus)

# Add a title to the document
NER_Processor.user_data["title"] = "All the Article Text on BitCoin"
```

```
In [32]: # Render the visualization  
displacy.render(NER_Processor, style='ent')
```

All the Article Text on BitCoin

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] 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 Catelyn **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] By Reuters ORG Staff

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 \$17,657.53 o... [+207 chars]

```
In [33]: # List all Entities
Bitcoin_Entities = [ent.text for ent in NER_Processor.ents]
Bitcoin_Entities_Set = set(Bitcoin_Entities)
Bitcoin_Entities[0:10]
```

```
Out[33]: ['Visa',
'first',
'Bitcoin',
'November 2017',
'two-month',
'Bitcoin',
'10,000',
'first',
'the next 20 days',
'19,665']
```

Ethereum NER

```
In [34]: # Concatenate all of the bitcoin text together
Ethereum_Corpus = ' '.join(Ethereum_Sentiments_DF["Text"].values)
Ethereum_Corpus
```

Out[34]: "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 management... [+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 management... [+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 launch... [+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 cryptocurrency... [+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 new... [+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 new... [+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 natural disasters.\r\nHala Systems is a social enterprise... [+3718 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 through... [+3148 chars] Each comment or response costs a tiny ETH fee of 0.00011 (about 5¢ in Ethereum cryptocurrency), payable from your Metamask.io wallet (the wallet is free, and takes just a moment to add to your browser... [+558 chars] LONDON (Reuters) - Bitcoin passed \$17,000 on Tuesday to touch its highest level this year, with investors ascribing the gains to demand for its price

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ONDON (Reuters) - Bitcoin passed \$17,000 on Tuesday to touch its highest
level this year, with investors ascribing the gains to demand for its
perceived inflation-resistant qualities and expectation... [+2152 chars]"

```
In [35]: # Run the NER processor on all of the text
NER_Processor_ETH = nlp(Ethereum_Corpus)

# Add a title to the document
NER_Processor_ETH.user_data["title"] = "All the Article Text on Ethereum"
```

```
In [36]: # Render the visualization  
displacy.render(NER_Processor_ETH, style='ent')
```

All the Article Text on Ethereum

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LONDON (Reuters **ORG**) - ... [+1237 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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PayPal **PERSON** has launched the Generosity Network **ORG** , a platform that allows users to create customized, personal fundraising campaigns. Yes, just like you can on GoFundMe.

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

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... [+336 chars] The New York Times **ORG** 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 **ORG** 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 **DATE** , and one of the biggest flash loan attacks took place last month **DATE** , in October **DATE** , when hackers stole \$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

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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

LONDON (Reuters **ORG** ... [+909 chars] Hala Systems **ORG** is using Hedera **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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Bitcoin **GPE** mining is pictured at the Plug and Play Tech Center **ORG** in Sunnyvale **GPE**

, California **GPE** , October 28, 2013 **DATE** .

REUTERS/Stephen Lam **ORG**

 Bitcoin **GPE** slumped further throug... [+3148 chars] Each comment or response costs a tiny **ETH** **ORG** fee of 0.00011 **CARDINAL** (about 5¢ **CARDINAL** in Ethereum cryptocurrency), payable from your Metamask.io wallet (the wallet is free, and takes just a moment to add to your browse... [+558 chars] LONDON **GPE** (Reuters **ORG**) -

Bitcoin **GPE** passed \$ 17,000 **MONEY** on Tuesday **DATE** to touch its highest level this year **DATE** , with investors ascribing the gains to demand for its perceived inflation-resistant qualities and expectation... [+2068 chars] LONDON **GPE** (Reuters **ORG**) - Bitcoin **GPE** passed \$ 17,000 **MONEY** on Tuesday **DATE** to touch its highest level this year **DATE** , with investors ascribing the gains to demand for its perceived inflation-resistant qualities and expectation... [+2152 chars]


```
In [37]: # List all Entities
Ethereum_Entities = [ent.text for ent in NER_Processor_ETH.ents]
Ethereum_Entities_Set = set(Ethereum_Entities)
Ethereum_Entities_Set
```

```
Out[37]: {'$24 million',
'$429 million',
'0.00011',
'17,000',
'20,000',
'Bitcoin',
'California',
'Coinbase',
'ETH',
'February 3, 2018',
'Hala Systems',
'Hedera',
'LONDON',
'May 26, 2020',
'Monday',
'NEW YORK',
'November 19, 2020',
'October',
'October 28, 2013',
'PayPal',
'REUTERS/',
'REUTERS/Stephen Lam',
'Reuters',
'Sunnyvale',
'Syrians',
'The New York Times',
'Tuesday',
'U.S.',
'XRP',
'about 5¢',
'early February this year',
'last month',
'second',
'the Generosity Network',
'the Plug and Play Tech Center',
'the week ended Dec. 7',
'this year'}
```

```
In [38]: print("Markdown")
print("=====")
print("Ethereum is the highest mean positive score coming to 0.060950")
print("Ethereum had the highest compound score 0.196 compared to BitCoin at 0.075")
print("Ethereum had the highest positive score 0.318 compared to BitCoin at 0.174")
```

Markdown

=====

Ethereum is the highest mean positive score coming to 0.060950

Ethereum had the highest compound score 0.196 compared to BitCoin at 0.075

Ethereum had the highest positive score 0.318 compared to BitCoin at 0.174