Imports, global variable declarations and other high-level configs

In [ ]:
```
import nltk
nltk.download('stopwords')
nltk.download('punkt')
from nltk.corpus import stopwords
```

```
[nltk_data] Downloading package stopwords to
[nltk_data]     C:\Users\udayk\AppData\Roaming\nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
[nltk_data] Downloading package punkt to
[nltk_data]     C:\Users\udayk\AppData\Roaming\nltk_data...
[nltk_data]   Package punkt is already up-to-date!
```

In [ ]:
```
import requests
from bs4 import BeautifulSoup
import pandas as pd
import config
import matplotlib.pyplot as plt
from collections import Counter
import seaborn as sns
import os
```

Avoid running the following cell repeatedly because it might require re-scrapping the data. Running the following block once is enough.

In [ ]:
```
stop_words = set(stopwords.words('english'))
companies = config.companies_of_interest
df = pd.DataFrame()
yahoo_results = []

# create the folder if it does not exist
if not os.path.exists('Visualizations'):
    os.makedirs('Visualizations')
```

The following cell collects data from Yahoo news about our companies

Warning: don't run this block repeatedly, you'll risk getting your IP blocked.

In [ ]:
```
for company in companies:
    yahoo_url = f"https://news.search.yahoo.com/search?p={company}"
    yahoo_response = requests.get(yahoo_url)
    yahoo_soup = BeautifulSoup(yahoo_response.content, "html.parser")

    yahoo_titles = yahoo_soup.find_all("h4", class_="s-title")
    yahoo_summaries = yahoo_soup.find_all("p", class_="s-desc")

    for i in range(len(yahoo_titles)):
        title = yahoo_titles[i].text.strip()
        summary = yahoo_summaries[i].text.strip()
        yahoo_results.append({"title": title, "summary": summary, "source": "Yahoo

    # Create dataframe
    results = yahoo_results
    results_df = pd.DataFrame(results)
    # Append the results_df to the existing DataFrame (df)
```

```
    df = df.append(results_df, ignore_index=True)
    # df.head(5)
```

```
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\781613398.py:18: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(results_df, ignore_index=True)
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\781613398.py:18: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(results_df, ignore_index=True)
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\781613398.py:18: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
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C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\781613398.py:18: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
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C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\781613398.py:18: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
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C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\781613398.py:18: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
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C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\781613398.py:18: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(results_df, ignore_index=True)
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\781613398.py:18: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(results_df, ignore_index=True)
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\781613398.py:18: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(results_df, ignore_index=True)
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\781613398.py:18: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(results_df, ignore_index=True)
```

Dataframe information

In [ ]:

```
grouped = df.groupby('company')

# Loop over the groups and create a new data frame for each group
for group_name, group_data in grouped:
    group_df = pd.DataFrame(group_data)
    print('Group:', group_name)
    group_df
```

```
Group: Adani
Group: Block
Group: Blockchain
Group: Ebix
Group: Kandi
Group: Loki
Group: Lordstown
Group: Nikola
Group: Twitter
```

In [ ]:
```
df.info()
df.describe()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 540 entries, 0 to 539
Data columns (total 4 columns):
 #   Column   Non-Null Count  Dtype 
---  ------   --------------  ----- 
 0   title    540 non-null    object
 1   summary  540 non-null    object
 2   source   540 non-null    object
 3   company  540 non-null    object
dtypes: object(4)
memory usage: 17.0+ KB
```

Out[ ]:

	title	summary	source	company
count	540	540	540	540
unique	88	88	1	9
top	10 Best RFID Blocking Wallets To Help Keep You...	Commonly known as radio-frequency identificati...	Yahoo News	Block
freq	11	11	540	110

In [ ]:
```
df.head()
```

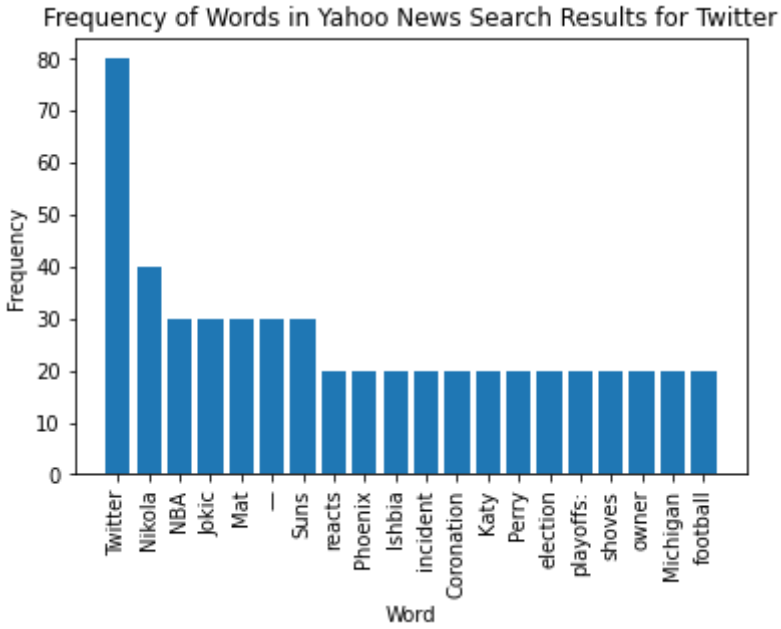
Out[ ]:

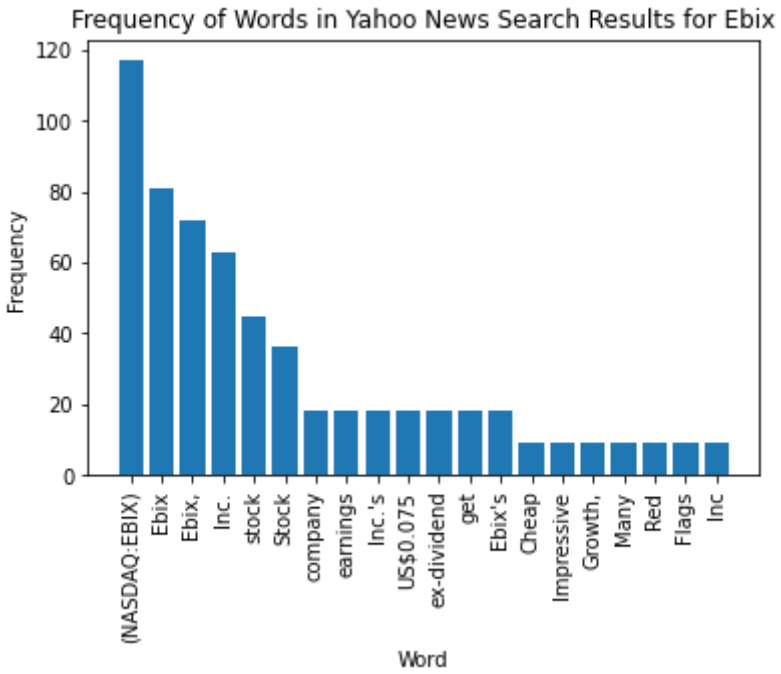
	title	summary	source	company
0	NBA Twitter reacts to Denver Nuggets' Nikola J...	NBA Twitter had thoughts on the incident betwe...	Yahoo News	Twitter
1	Twitter Criticized for Allowing Texas Shooting...	When graphic images began circulating on Twitt...	Yahoo News	Twitter
2	You'll Never Walk Alone performance at Coronat...	The song has a close link to Liverpool footbal...	Yahoo News	Twitter
3	Twitter Memed Katy Perry Being Super Lost At T...	Video of Katy Perry struggling to find her sea...	Yahoo News	Twitter
4	New Twitter rules expose election offices to s...	The election commission applied weeks ago for ...	Yahoo News	Twitter

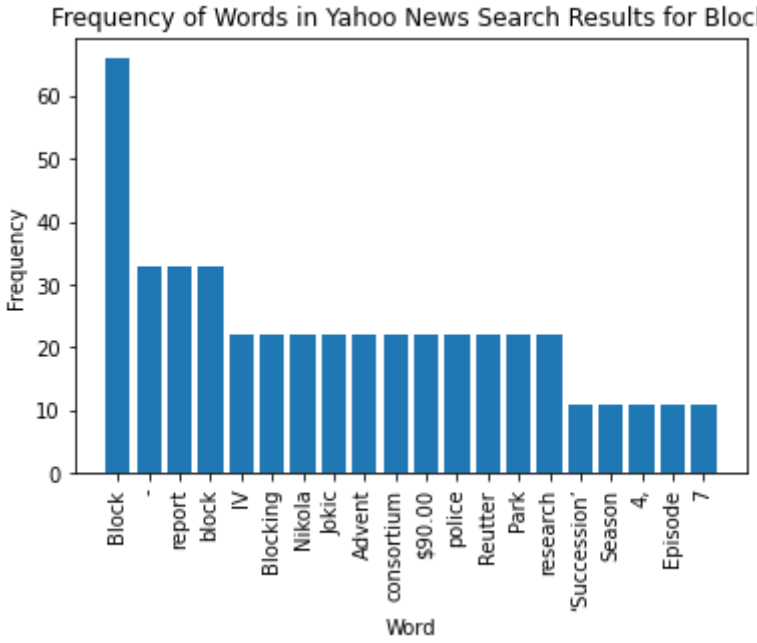
Visualizations of data scrapped from Yahoo News

In [ ]:
```
for company in companies:
    # Filter the DataFrame for the current company
    df_company = df[df["company"] == company]

    # Join all titles and summaries into a single string
    text = " ".join(df_company["title"].tolist() + df_company["summary"].tolist())

    # Split the text into individual words
    words = text.split()
    words = [word for word in words if word.lower() not in stop_words]
    # Count the frequency of each word
    word_counts = Counter(words)

    # Create a bar chart of the 20 most common words
    most_common_words = word_counts.most_common(20)
    x = [word[0] for word in most_common_words]
```

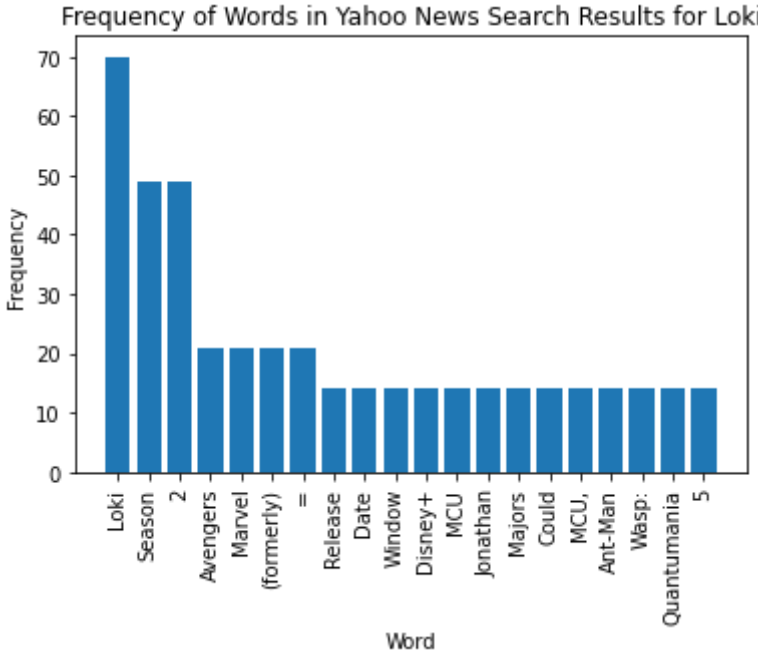
```
    y = [word[1] for word in most_common_words]
    plt.bar(x, y)
    plt.title(f"Frequency of Words in Yahoo News Search Results for {company}")
    plt.xlabel("Word")
    plt.xticks(rotation=90)
    plt.ylabel("Frequency")
    # plt.savefig(f"v-Word Frequency-YN-{company}.png", dpi=300, bbox_inches='tight
    plt.savefig(os.path.join('Visualizations', f"Word Frequency-YN-{company}.png")
    plt.show()
    print("------")
```



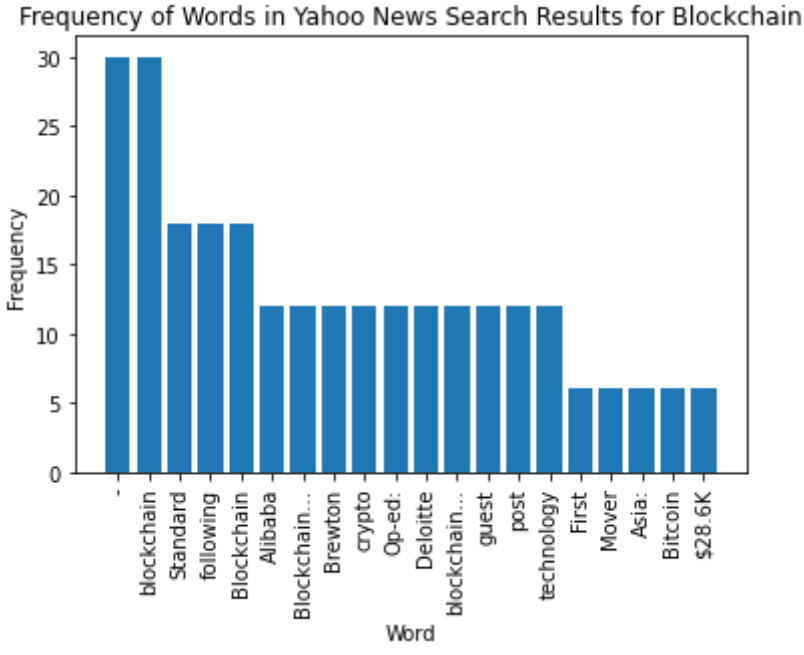



Frequency of Words in Yahoo News Search Results for Block
Frequency
Word
Block
-
report
block
IV
Blocking
Nikola
Jokic
Advent
consortium
$90.00
police
Reutter
Park
research
'Succession'
Season
4,
Episode
7

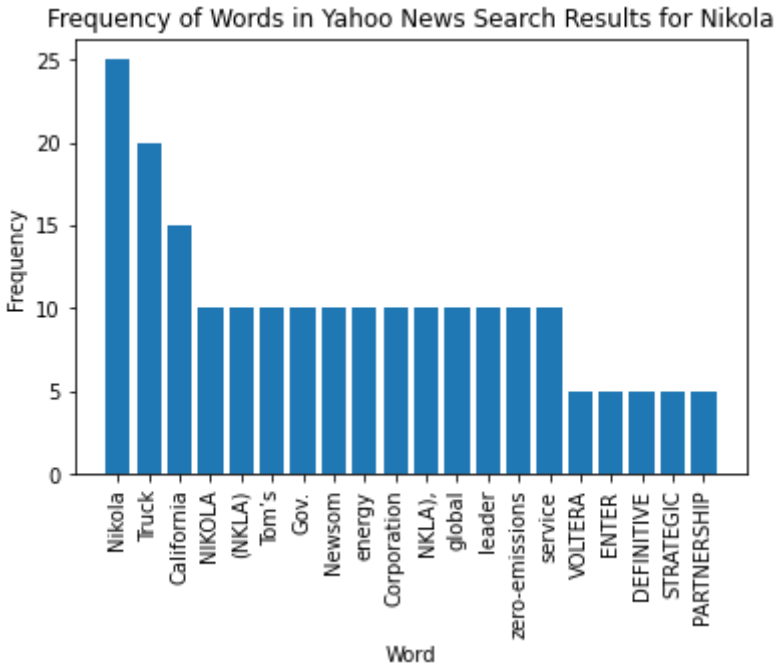
- - - - - -


Frequency of Words in Yahoo News Search Results for Loki
Frequency
Word
Loki
Season
2
Avengers
Marvel
(formerly)
=
Release
Date
Window
Disney+
MCU
Jonathan
Majors
Could
MCU,
Ant-Man
Wasp:
Quantumania
5

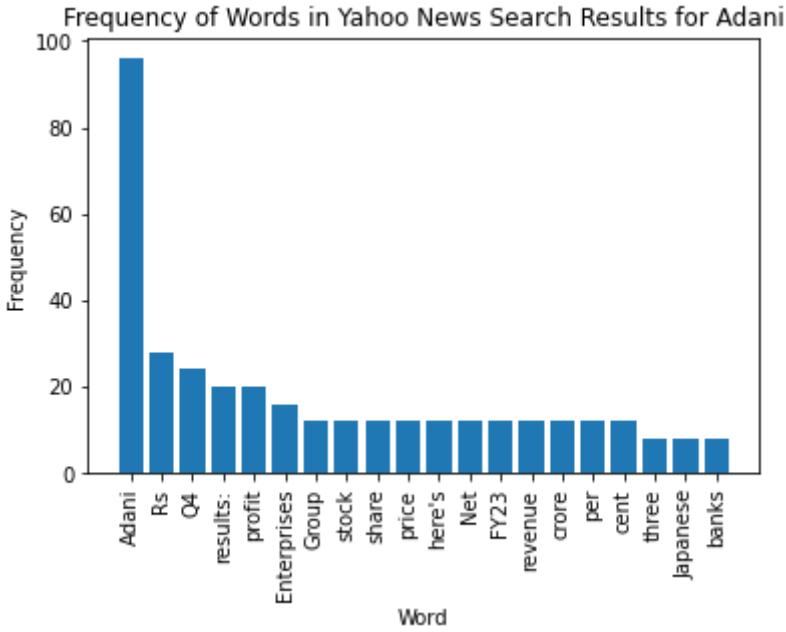
- - - - - -


Frequency of Words in Yahoo News Search Results for Blockchain
Frequency
Word
-
blockchain
Standard
following
Blockchain
Alibaba
Blockchain...
Brewton
crypto
Op-ed:
Deloitte
blockchain...
guest
post
technology
First
Mover
Asia:
Bitcoin
$28.6K

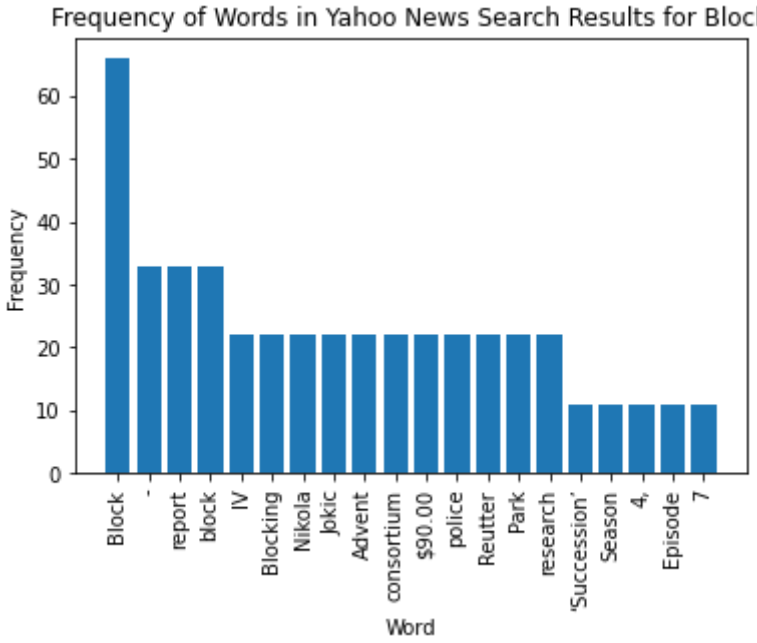
- - - - - -

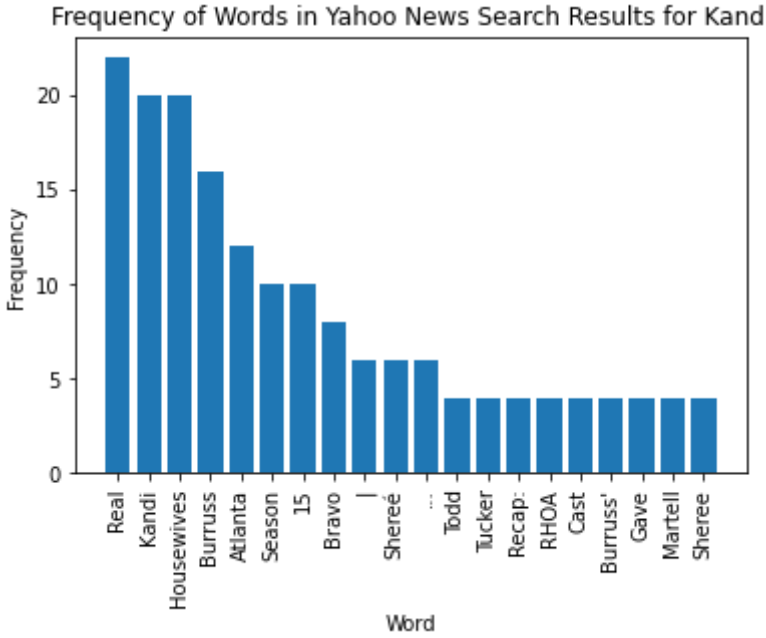

Frequency of Words in Yahoo News Search Results for Nikola
Frequency
0
5
10
15
20
25
Nikola
Truck
California
NIKOLA
(NKLA)
Tom's
Gov.
Newsom
energy
Corporation
NKLA),
global
leader
zero-emissions
service
VOLTERA
ENTER
DEFINITIVE
STRATEGIC
PARTNERSHIP
Word

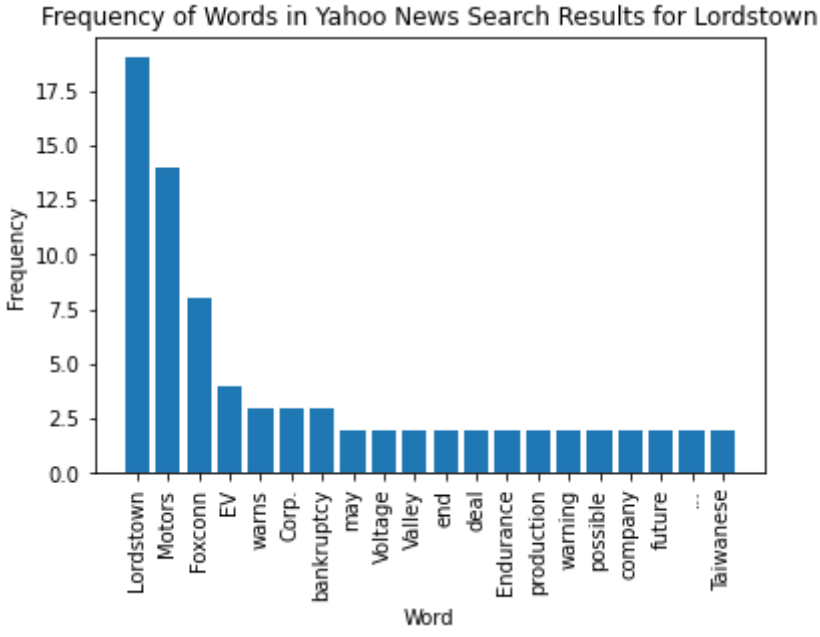
- - - - - -


Frequency of Words in Yahoo News Search Results for Adani
Frequency
0
20
40
60
80
100
Adani
Rs
Q4
results:
profit
Enterprises
Group
stock
share
price
here's
Net
FY23
revenue
crore
per
cent
three
Japanese
banks
Word

- - - - - -


Frequency of Words in Yahoo News Search Results for Block
Frequency
Word
Block
-
report
block
IV
Blocking
Nikola
Jokic
Advent
consortium
$90.00
police
Reutter
Park
research
'Succession'
Season
4,
Episode
7

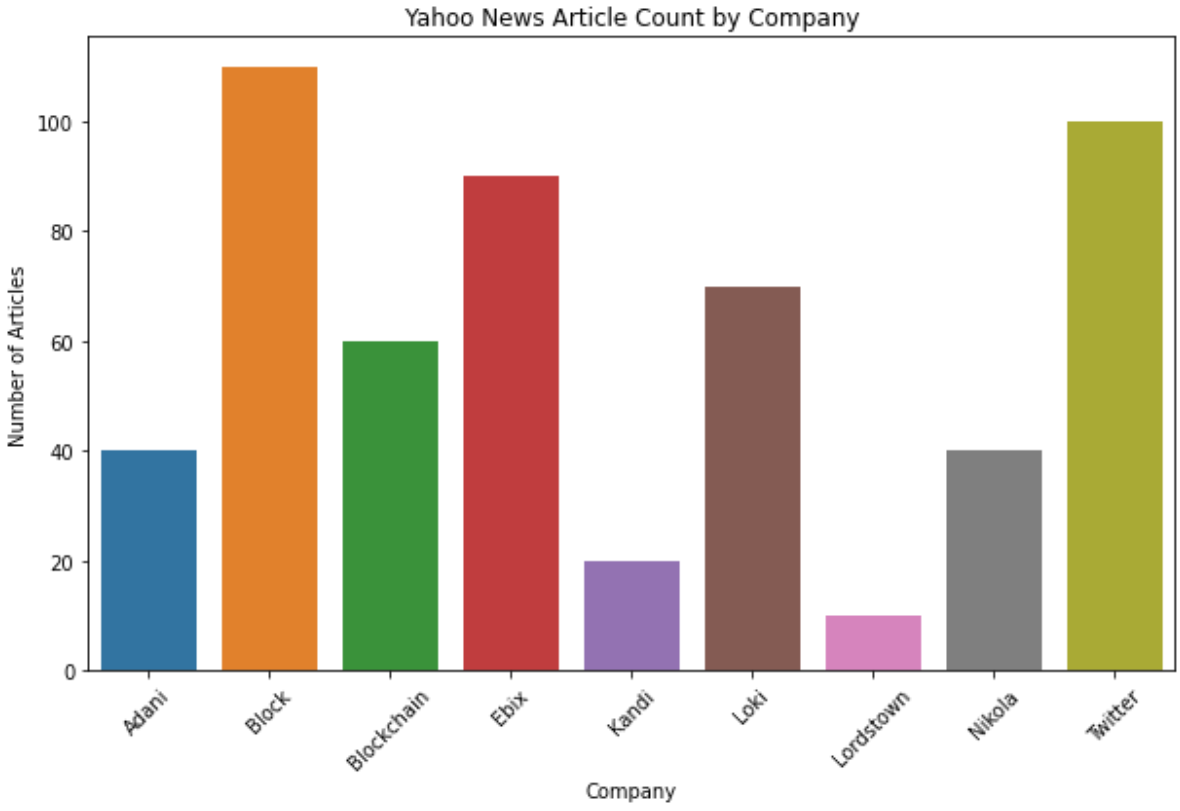

Frequency of Words in Yahoo News Search Results for Kandi
Frequency
Word
Real
Kandi
Housewives
Burruss
Atlanta
Season
15
Bravo
|
Sheree
...
Todd
Tucker
Recap:
RHOA
Cast
Burruss'
Gave
Martell
Sheree


Frequency of Words in Yahoo News Search Results for Lordstown
Frequency
Word
Lordstown
Motors
Foxconn
EV
warns
Corp.
bankruptcy
may
Voltage
Valley
end
deal
Endurance
production
warning
possible
company
future
...
Taiwanese

In [ ]:
```
# Group the data by company and count the number of articles
grouped_data = df.groupby('company').size().reset_index(name='count')

# Print the exact number of articles for each company
for index, row in grouped_data.iterrows():
    print(f"Company: {row['company']}, Number of articles: {row['count']}")
```

```
Company: Adani, Number of articles: 40
Company: Block, Number of articles: 110
Company: Blockchain, Number of articles: 60
Company: Ebix, Number of articles: 90
Company: Kandi, Number of articles: 20
Company: Loki, Number of articles: 70
Company: Lordstown, Number of articles: 10
Company: Nikola, Number of articles: 40
Company: Twitter, Number of articles: 100
```

In [ ]:
```
# First, group the data by company and count the number of articles
grouped_data = df.groupby('company').size().reset_index(name='count')

# Data visualization
plt.figure(figsize=(10, 6))
sns.barplot(x='company', y='count', data=grouped_data)
plt.xlabel("Company")
plt.ylabel("Number of Articles")
plt.title("Yahoo News Article Count by Company")
plt.xticks(rotation=45)
plt.savefig("v-Article Count Frequency-YN.png", dpi=300, bbox_inches='tight')
plt.show()
```



The following cell collects data from Hindenburg Research about our companies

Warning: don't run this block repeatedly, you'll risk getting your IP blocked.

In [ ]:

```
for search_term in companies:
    # Get user input for the URL
    url = f'https://hindenburgresearch.com/{search_term}'
    # Send a GET request to the URL and parse the HTML content
    response = requests.get(url)
    soup = BeautifulSoup(response.text, 'html.parser')

    # Extract all headers and their related paragraphs
    headers = {}
    current_header = None
    for element in soup.find_all(['h1', 'h2', 'h3', 'h4', 'h5', 'h6', 'p']):
        if element.name.startswith('h'):
            # If a new header is found, update the current header
            current_header = element.text.strip()
            headers[current_header] = []
        elif current_header is not None:
            # If a paragraph is found, add it to the list of paragraphs for the cu
            headers[current_header].append(element.text.strip())

    # Create a list of dictionaries with the title, summary, source, and company i
    data = []
    for header, paragraphs in headers.items():
        data.append({
            'title': header,
            'summary': ' '.join(paragraphs),
            'source': 'Hindenburg Research',
            'company': search_term  # Add the company information
        })

    # Append the new data to the existing DataFrame
    df = df.append(pd.DataFrame(data), ignore_index=True)

# Print the dataframe
print(df)
```

```
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\2470689038.py:31: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(pd.DataFrame(data), ignore_index=True)
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\2470689038.py:31: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(pd.DataFrame(data), ignore_index=True)
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\2470689038.py:31: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(pd.DataFrame(data), ignore_index=True)
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\2470689038.py:31: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(pd.DataFrame(data), ignore_index=True)
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\2470689038.py:31: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(pd.DataFrame(data), ignore_index=True)
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\2470689038.py:31: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(pd.DataFrame(data), ignore_index=True)
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\2470689038.py:31: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(pd.DataFrame(data), ignore_index=True)
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\2470689038.py:31: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(pd.DataFrame(data), ignore_index=True)
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\2470689038.py:31: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future version. Use pandas.concat instead.
  df = df.append(pd.DataFrame(data), ignore_index=True)
```

```
                                                  title  \
0     NBA Twitter reacts to Denver Nuggets' Nikola J...
1     Twitter Criticized for Allowing Texas Shooting...
2     You'll Never Walk Alone performance at Coronat...
3     Twitter Memed Katy Perry Being Super Lost At T...
4     New Twitter rules expose election offices to s...
...                                                 ...
1123  Conclusion: Investors, Workers, And The Local ...
1124  Disclosure: We are short shares of Lordstown M...
1125              Appendix A: Background on Steve Burns
1126                                   Legal Disclaimer
1127  262 thoughts on "The Lordstown Motors Mirage: ...

                                                summary               source  \
0     NBA Twitter had thoughts on the incident betwe...           Yahoo News
1     When graphic images began circulating on Twitt...           Yahoo News
2     The song has a close link to Liverpool footbal...           Yahoo News
3     Video of Katy Perry struggling to find her sea...           Yahoo News
4     The election commission applied weeks ago for ...           Yahoo News
...                                                 ...                  ...
1123  One key thread we experienced through our rese...  Hindenburg Research
1124                                                     Hindenburg Research
1125  Typically, upstart auto companies rely heavily...  Hindenburg Research
1126  Use of Hindenburg Research's research is at yo...  Hindenburg Research
1127  Fisker. FSR is another scam misleading investo...  Hindenburg Research

        company
0       Twitter
1       Twitter
2       Twitter
3       Twitter
4       Twitter
...         ...
1123  Lordstown
1124  Lordstown
1125  Lordstown
1126  Lordstown
1127  Lordstown

[1128 rows x 4 columns]
C:\Users\udayk\AppData\Local\Temp\ipykernel_11844\2470689038.py:31: FutureWarning:
The frame.append method is deprecated and will be removed from pandas in a future
version. Use pandas.concat instead.
  df = df.append(pd.DataFrame(data), ignore_index=True)
```

In [ ]:
```
df['company'].unique()
```

Out[ ]:
```
array(['Twitter', 'Ebix', 'Block', 'Loki', 'Blockchain', 'Nikola',
       'Adani', 'Kandi', 'Lordstown'], dtype=object)
```

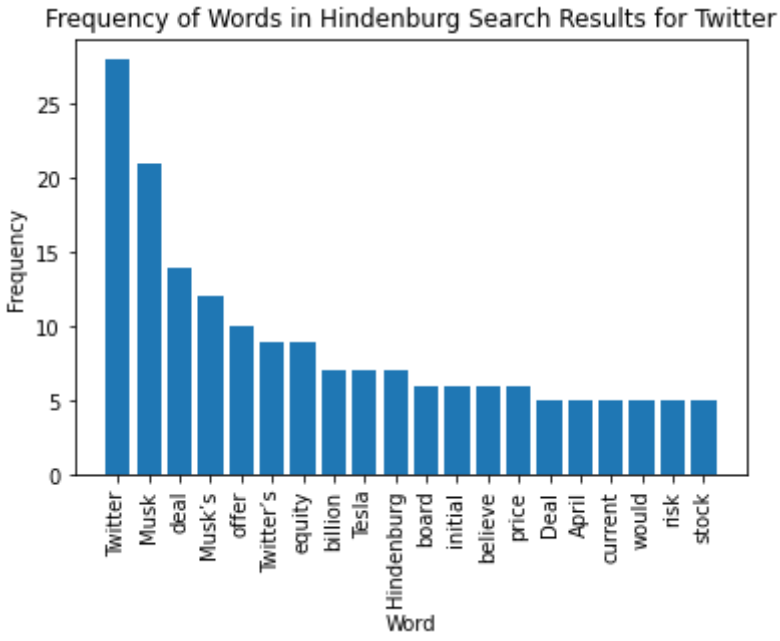
In [ ]:
```
# Group the data by company and count the number of articles
grouped_data = df.groupby('company').size().reset_index(name='count')

# Print the exact number of articles for each company
for index, row in grouped_data.iterrows():
    print(f"Company: {row['company']}, Number of articles: {row['count']}")
```

```
Company: Adani, Number of articles: 181
Company: Block, Number of articles: 292
Company: Blockchain, Number of articles: 67
Company: Ebix, Number of articles: 150
Company: Kandi, Number of articles: 81
Company: Loki, Number of articles: 77
Company: Lordstown, Number of articles: 47
Company: Nikola, Number of articles: 120
Company: Twitter, Number of articles: 113
```

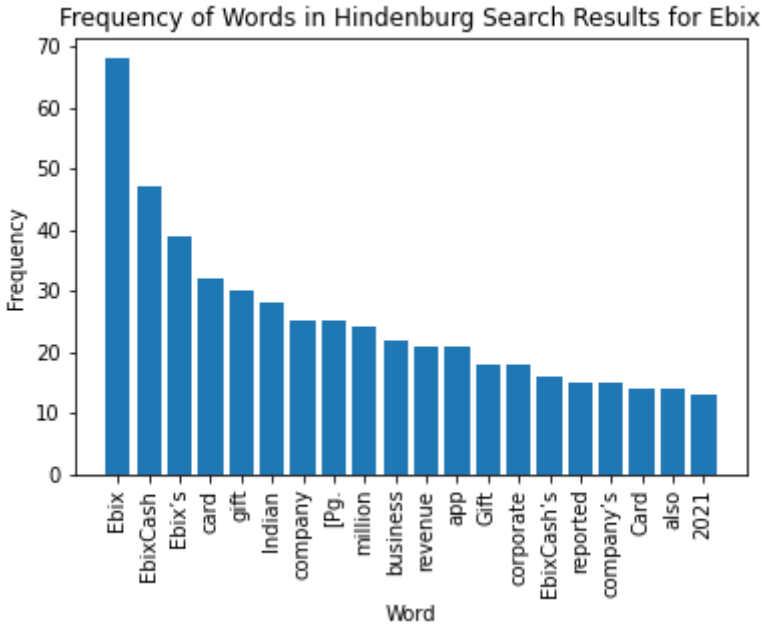
In [ ]:
```python
df['source'].unique()
```

Out[ ]:
```
array(['Yahoo News', 'Hindenburg Research'], dtype=object)
```

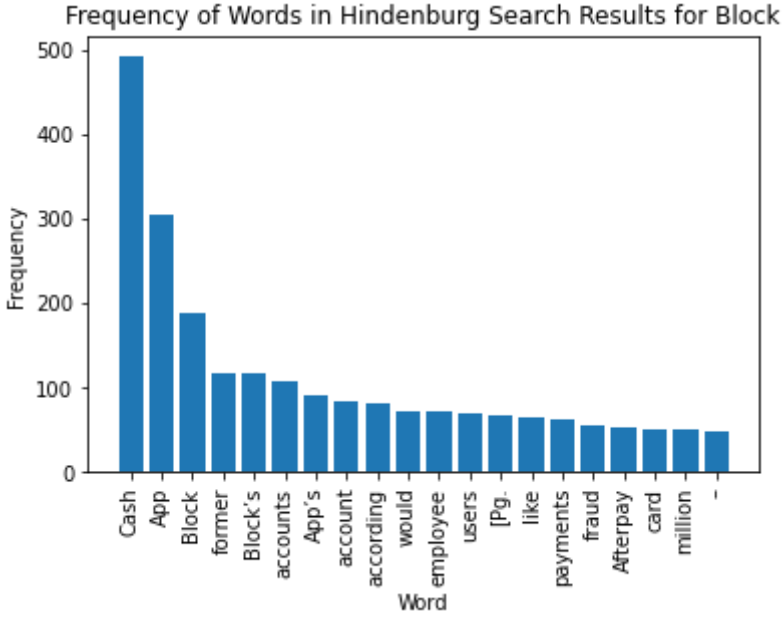
In [ ]:
```python
for company in companies:
    # Filter the DataFrame for the current company
    # df_company = df[df["company"] == company and df["source"] == 'Hindenburg Rese
    df_company = df[(df["company"] == company) & (df["source"] == 'Hindenburg Resea

    # Join all titles and summaries into a single string
    text = " ".join(df_company["title"].tolist() + df_company["summary"].tolist())

    # Split the text into individual words
    words = text.split()
    words = [word for word in words if word.lower() not in stop_words]
    # Count the frequency of each word
    word_counts = Counter(words)

    # Create a bar chart of the 20 most common words
    most_common_words = word_counts.most_common(20)
    x = [word[0] for word in most_common_words]
    y = [word[1] for word in most_common_words]
    plt.bar(x, y)
    plt.title(f"Frequency of Words in Hindenburg Search Results for {company}")
    plt.xlabel("Word")
    plt.xticks(rotation=90)
    plt.ylabel("Frequency")
    # plt.savefig(f"v-Word Frequency-YN-{company}.png", dpi=300, bbox_inches='tight
    plt.savefig(os.path.join('Visualizations', f"Word Frequency-HR-{company}.png"))
    plt.show()
    print("------")
```



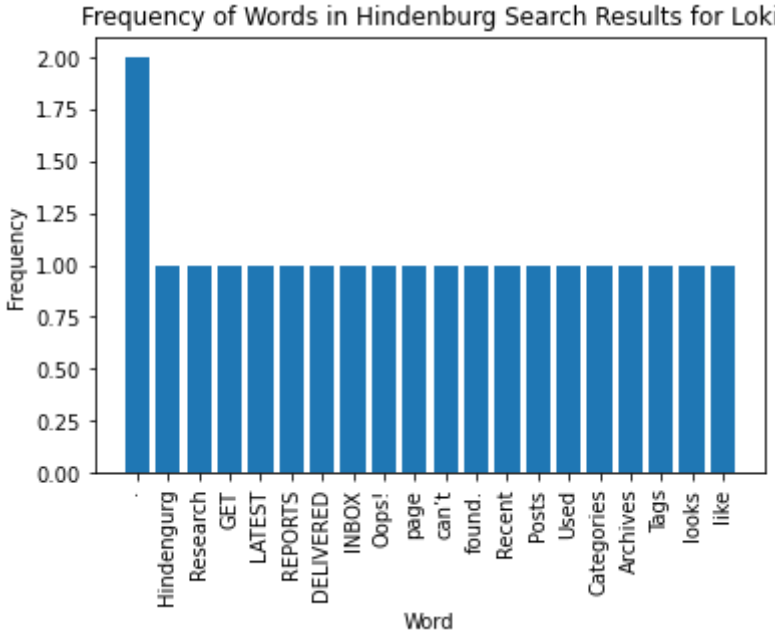

```
------
```


Frequency of Words in Hindenburg Search Results for Ebix
Frequency
Word
0
10
20
30
40
50
60
70
Ebix
EbixCash
Ebix's
card
gift
Indian
company
[Pg.
million
business
revenue
app
Gift
corporate
EbixCash's
reported
company's
Card
also
2021

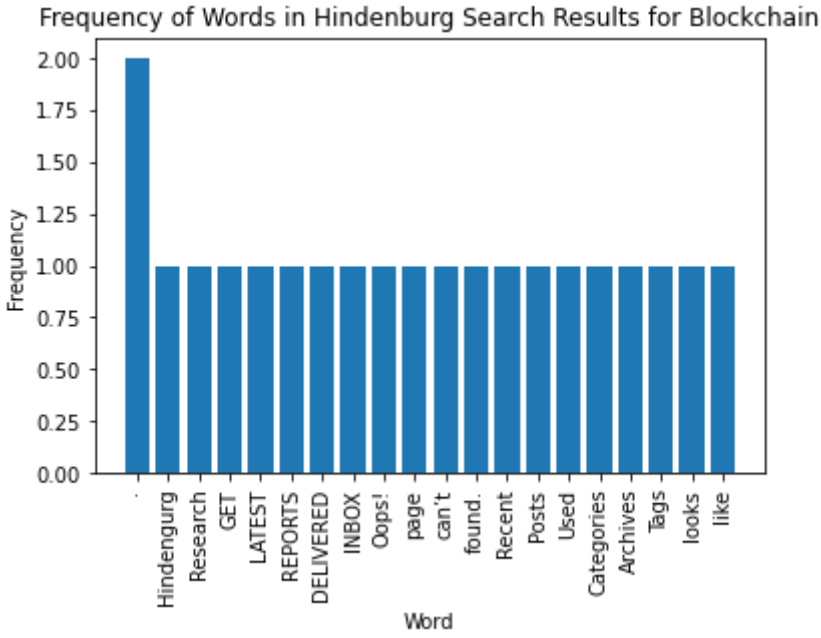
- - - - - -

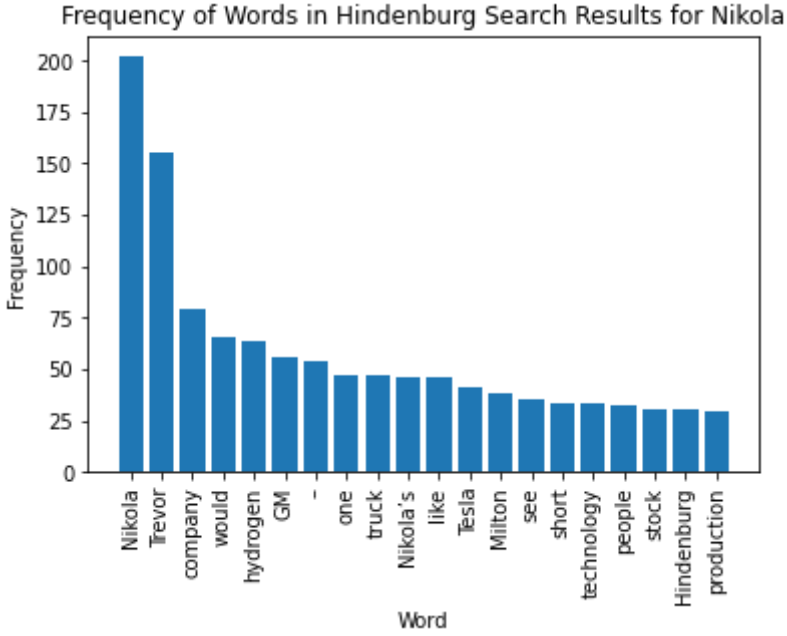

Frequency of Words in Hindenburg Search Results for Block
Frequency
Word
0
100
200
300
400
500
Cash
App
Block
former
Block's
accounts
App's
account
according
would
employee
users
[Pg.
like
payments
fraud
Afterpay
card
million
-

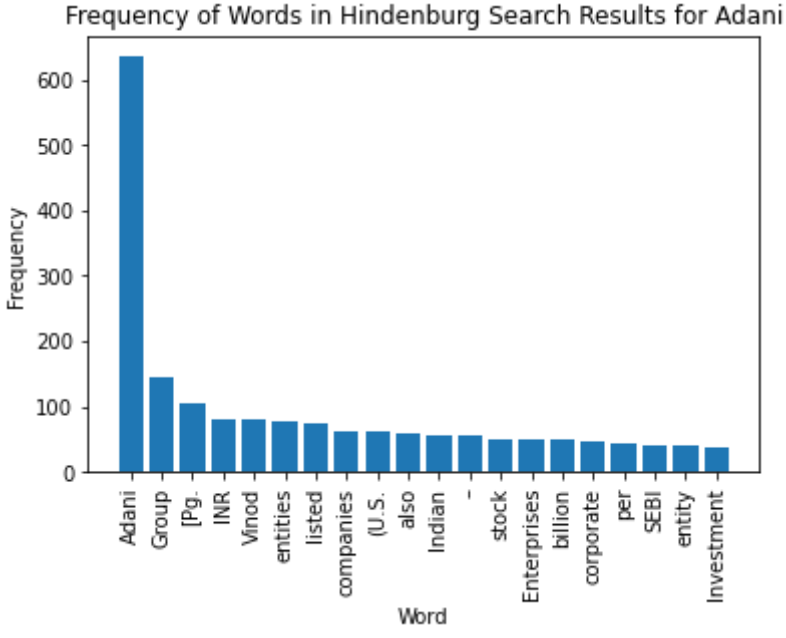
- - - - - -

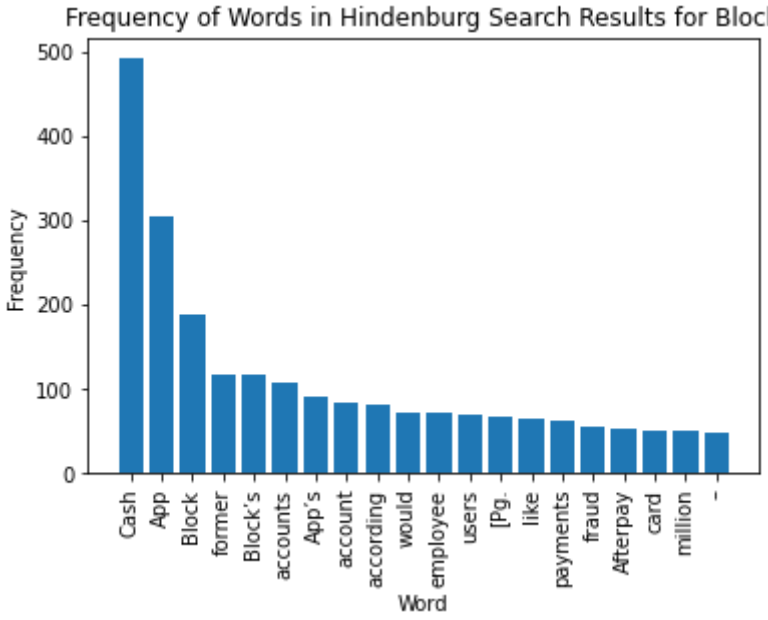

Frequency of Words in Hindenburg Search Results for Loki
Frequency
Word
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
.
Hindengurg
Research
GET
LATEST
REPORTS
DELIVERED
INBOX
Oops!
page
can't
found.
Recent
Posts
Used
Categories
Archives
Tags
looks
like

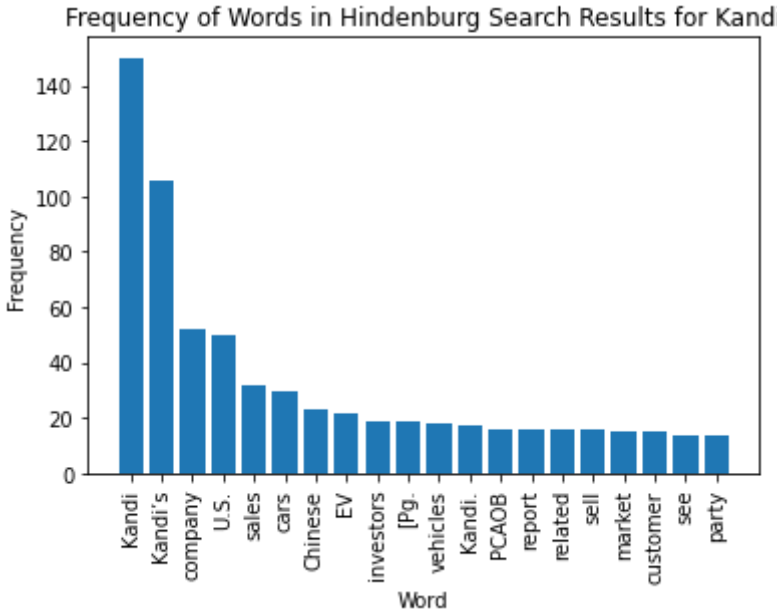
- - - - - -

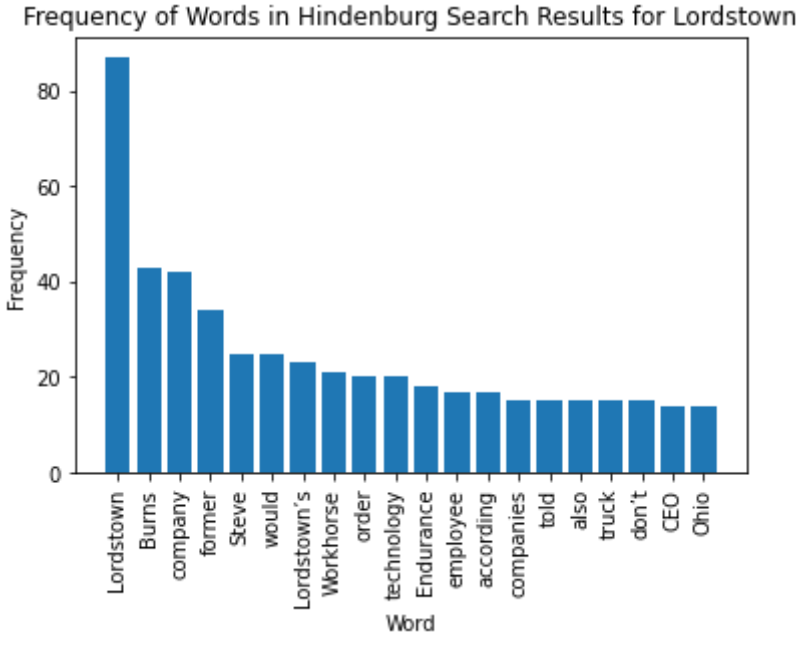

Frequency of Words in Hindenburg Search Results for Blockchain
Frequency
Word
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
.
Hindengurg
Research
GET
LATEST
REPORTS
DELIVERED
INBOX
Oops!
page
can't
found.
Recent
Posts
Used
Categories
Archives
Tags
looks
like


Frequency of Words in Hindenburg Search Results for Nikola
Frequency
Word
200
175
150
125
100
75
50
25
0
Nikola
Trevor
company
would
hydrogen
GM
-
one
truck
Nikola's
like
Tesla
Milton
see
short
technology
people
stock
Hindenburg
production


Frequency of Words in Hindenburg Search Results for Adani
Frequency
Word
600
500
400
300
200
100
0
Adani
Group
[Pg.
INR
Vinod
entities
listed
companies
(U.S.
also
Indian
-
stock
Enterprises
billion
corporate
per
SEBI
entity
Investment


Frequency of Words in Hindenburg Search Results for Block
Frequency
Word
0
100
200
300
400
500
Cash
App
Block
former
Block's
accounts
App's
account
according
would
employee
users
[Pg.
like
payments
fraud
Afterpay
card
million
-


Frequency of Words in Hindenburg Search Results for Kandi
Frequency
Word
0
20
40
60
80
100
120
140
Kandi
Kandi's
company
U.S.
sales
cars
Chinese
EV
investors
[Pg.
vehicles
Kandi.
PCAOB
report
related
sell
market
customer
see
party


Frequency of Words in Hindenburg Search Results for Lordstown
Frequency
Word
0
20
40
60
80
Lordstown
Burns
company
former
Steve
would
Lordstown's
Workhorse
order
technology
Endurance
employee
according
companies
told
also
truck
don't
CEO
Ohio

In [ ]:
```
df
```

Out[ ]:

	title	summary	source	company
0	nba twitter reacts denver nuggets' nikola joki...	nba twitter thoughts incident nikola jokic pho...	Yahoo News	Twitter
1	twitter criticized allowing texas shooting ima...	graphic images began circulating twitter showi...	Yahoo News	Twitter
2	you'll never walk alone performance coronation...	song close link liverpool football club, whose...	Yahoo News	Twitter
3	twitter memed katy perry super lost coronation...	video katy perry struggling find seat #coronat...	Yahoo News	Twitter
4	new twitter rules expose election offices spoo...	election commission applied weeks ago gray che...	Yahoo News	Twitter
...	...	...	...	...
1123	conclusion: investors, workers, local communit...	one key thread experienced research hope. even...	Hindenburg Research	Lordstown
1124	disclosure: short shares lordstown motors corp...		Hindenburg Research	Lordstown
1125	appendix a: background steve burns	typically, upstart auto companies rely heavily...	Hindenburg Research	Lordstown
1126	legal disclaimer	use hindenburg research's research risk. event...	Hindenburg Research	Lordstown
1127	262 thoughts "the lordstown motors mirage: fak...	fisker. fsr another scam misleading investors ...	Hindenburg Research	Lordstown

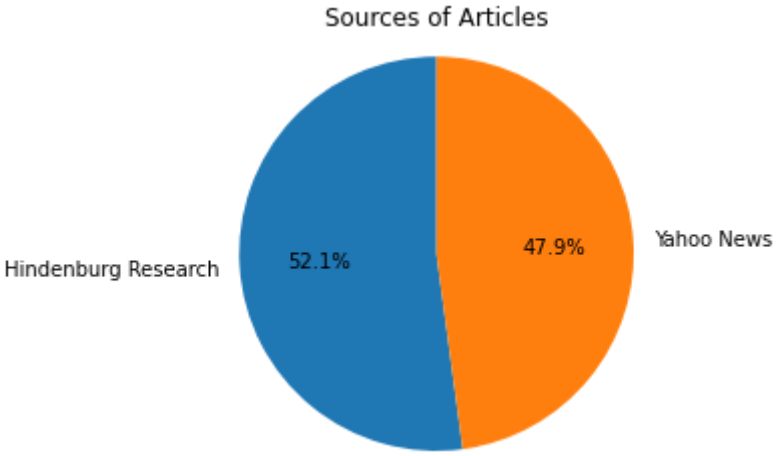
1128 rows × 4 columns

In [ ]:
```
from wordcloud import WordCloud
import matplotlib.pyplot as plt
# Combine the 'title' and 'summary' columns into one
text = ' '.join(df['title']) + ' ' + ' '.join(df['summary'])

# Generate a word cloud for the combined text
wordcloud = WordCloud(width=800, height=400, background_color='white').generate(te

# Plot the word cloud for the title column
plt.figure(figsize=(10, 5))
plt.imshow(WordCloud(width=800, height=400, background_color='white').generate(' '
plt.axis('off')
plt.title('Word Cloud for Title Column')
plt.show()

# Plot the word cloud for the summary column
plt.figure(figsize=(10, 5))
plt.imshow(WordCloud(width=800, height=400, background_color='white').generate(' '
plt.axis('off')
plt.title('Word Cloud for Summary Column')
plt.show()
```

In [ ]:
```
import re
import string
from nltk.corpus import stopwords
from nltk.tokenize import word_tokenize
from collections import Counter
```

Results

In [ ]:
```
source_counts = df['source'].value_counts()
labels = source_counts.index.tolist()
sizes = source_counts.values.tolist()

fig1, ax1 = plt.subplots()
ax1.pie(sizes, labels=labels, autopct='%1.1f%%', startangle=90)
ax1.axis('equal')  # Equal aspect ratio ensures that pie is drawn as a circle.
ax1.set_facecolor('white')
plt.title('Sources of Articles')
plt.show()
```



NLP Vader Lexicon

In [ ]:
```
!pip install nltk
import nltk
nltk.download('vader_lexicon')
from nltk.sentiment import SentimentIntensityAnalyzer
```

```
Requirement already satisfied: nltk in c:\users\udayk\anaconda3\lib\site-packages
(3.7)
Requirement already satisfied: tqdm in c:\users\udayk\anaconda3\lib\site-packages
(from nltk) (4.64.0)
Requirement already satisfied: joblib in c:\users\udayk\anaconda3\lib\site-package
s (from nltk) (1.1.0)
Requirement already satisfied: click in c:\users\udayk\anaconda3\lib\site-packages
(from nltk) (8.0.4)
Requirement already satisfied: regex>=2021.8.3 in c:\users\udayk\anaconda3\lib\sit
e-packages (from nltk) (2022.3.15)
Requirement already satisfied: colorama in c:\users\udayk\anaconda3\lib\site-packa
ges (from click->nltk) (0.4.6)
[nltk_data] Downloading package vader_lexicon to
[nltk_data]     C:\Users\udayk\AppData\Roaming\nltk_data...
[nltk_data]   Package vader_lexicon is already up-to-date!
```

In [ ]:
```
def get_sentiment_scores(text):
    sid = SentimentIntensityAnalyzer()
    scores = sid.polarity_scores(text)
    return scores
```

In [ ]:
```
# Group the data by company and count the number of articles
grouped_data = df.groupby('company')

# Loop over the groups and create a new data frame for each group
for group_name, group_data in grouped_data:
    group_df = pd.DataFrame(group_data)
    print('Group:', group_name)
    group_df
    group_df['title_sentiment'] = group_df['title'].apply(get_sentiment_scores)
    group_df['summary_sentiment'] = group_df['summary'].apply(get_sentiment_scores
    title_sentiment_avg = group_df['title_sentiment'].apply(lambda x: x['compound'
    summary_sentiment_avg = group_df['summary_sentiment'].apply(lambda x: x['compou

    print("Title sentiment average:", title_sentiment_avg)
    print("Summary sentiment average:", summary_sentiment_avg)
```

```
Group: Adani
Title sentiment average: 0.03885966850828723
Summary sentiment average: 0.137321546961326
Group: Block
Title sentiment average: -0.18250787671232865
Summary sentiment average: -0.11688801369863006
Group: Blockchain
Title sentiment average: 0.07623582089552239
Summary sentiment average: 0.1319223880597015
Group: Ebix
Title sentiment average: 0.09495933333333328
Summary sentiment average: 0.25737599999999994
Group: Kandi
Title sentiment average: -0.007106172839506174
Summary sentiment average: 0.14979506172839502
Group: Loki
Title sentiment average: -0.03311818181818181
Summary sentiment average: 0.12353506493506491
Group: Lordstown
Title sentiment average: -0.04899999999999999
Summary sentiment average: 0.3453595744680851
Group: Nikola
Title sentiment average: 0.05930083333333334
Summary sentiment average: 0.2458983333333333
Group: Twitter
Title sentiment average: 0.03417256637168141
Summary sentiment average: 0.017971681415929214
```

NLP MultinomialNB

In [ ]:
```python
import pandas as pd
from textblob import TextBlob
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.naive_bayes import MultinomialNB
```

In [ ]:
```python
# define a function to calculate sentiment polarity using TextBlob
def calculate_sentiment(text):
    blob = TextBlob(text)
    return blob.sentiment.polarity

# calculate sentiment polarity for each row in the dataframe
df['polarity'] = df['summary'].apply(calculate_sentiment)

# define the features and target for the scikit-learn model
X = df['summary']
y = df['polarity'].apply(lambda x: 'positive' if x > 0 else 'negative' if x < 0 els

# convert text to numerical features using CountVectorizer
vectorizer = CountVectorizer()
X = vectorizer.fit_transform(X)

# train a naive Bayes classifier on the labeled dataset
clf = MultinomialNB()
clf.fit(X, y)

# predict sentiment for a new text
new_text = input("Enter a sentence:")
new_text_features = vectorizer.transform([new_text])
new_text_sentiment = clf.predict(new_text_features)[0]
print(new_text_sentiment)
```

positive