```
import numpy as np
import pandas as pd
```

```
dataFrame=pd.read_csv("/content/twitter_training.csv",names=["id","company","kind","tweet"])
dataFrame.head()
```

	id	company	kind	tweet
0	2401	Borderlands	Positive	im getting on borderlands and i will murder yo...
1	2401	Borderlands	Positive	I am coming to the borders and I will kill you...
2	2401	Borderlands	Positive	im getting on borderlands and i will kill you ...
3	2401	Borderlands	Positive	im coming on borderlands and i will murder you...
4	2401	Borderlands	Positive	im getting on borderlands 2 and i will murder ...

```
del dataFrame["id"] # Deleting ID column as it has no use in sentiment analysis
```

```
dataFrame.isnull().sum() #Finding the null entries in each column
```

```
company      0
kind         0
tweet      686
dtype: int64
```

```
dataFrame=dataFrame.dropna()
```

```
dataFrame.isnull().sum() #All the null values are removed
```

```
company    0
kind       0
tweet      0
dtype: int64
```

Counting the sentiment of each kind in the dataFrame

```
dataFrame_count = pd.DataFrame(dataFrame['kind'].value_counts()).reset_index()
dataFrame_count.columns = ['kind', 'Count']
dataFrame_count
```

	kind	Count
0	Negative	22358
1	Positive	20655
2	Neutral	18108
3	Irrelevant	12875

Removing Punctuation in Tweet column by creating a new column named new_Tweet

```
dataFrame['new_Tweet']=dataFrame['tweet'].str.replace('[^a-zA-Z0-9]',' ')
dataFrame.head()
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: FutureWarning: The default value of regex will change from True to False in a future versio
  """Entry point for launching an IPython kernel.
```

	company	kind	tweet	new_Tweet
0	Borderlands	Positive	im getting on borderlands and i will murder yo...	im getting on borderlands and i will murder yo...
1	Borderlands	Positive	I am coming to the borders and I will kill you...	I am coming to the borders and I will kill you...
2	Borderlands	Positive	im getting on borderlands and i will kill you ...	im getting on borderlands and i will kill you ...
3	Borderlands	Positive	im coming on borderlands and i will murder you...	im coming on borderlands and i will murder you...
4	Borderlands	Positive	im getting on borderlands 2 and i will murder ...	im getting on borderlands 2 and i will murder ...

Removing short words like "of", "in" , "on" from the tweets as they are not helpful in sentiment analysis.

```
dataFrame['new_Tweet'] = dataFrame['new_Tweet'].apply(lambda row: ' '.join([word for word in row.split() if len(word)>2]))
dataFrame.head()

# In this code we have removed all 2 letter words from tweets and replaced them with a space whereever needed.
```

	company	kind	tweet	new_Tweet
0	Borderlands	Positive	im getting on borderlands and i will murder yo...	getting borderlands and will murder you all
1	Borderlands	Positive	I am coming to the borders and I will kill you...	coming the borders and will kill you all
2	Borderlands	Positive	im getting on borderlands and i will kill you ...	getting borderlands and will kill you all
3	Borderlands	Positive	im coming on borderlands and i will murder you...	coming borderlands and will murder you all
4	Borderlands	Positive	im getting on borderlands 2 and i will murder ...	getting borderlands and will murder you all

```
dataFrame['new_Tweet']=dataFrame['new_Tweet'].str.lower()
```

```
dataFrame.head()
```

	company	kind	tweet	new_Tweet
0	Borderlands	Positive	im getting on borderlands and i will murder yo...	getting borderlands and will murder you all
1	Borderlands	Positive	I am coming to the borders and I will kill you...	coming the borders and will kill you all
2	Borderlands	Positive	im getting on borderlands and i will kill you ...	getting borderlands and will kill you all
3	Borderlands	Positive	im coming on borderlands and i will murder you...	coming borderlands and will murder you all
4	Borderlands	Positive	im getting on borderlands 2 and i will murder ...	getting borderlands and will murder you all

In the next few cells we will be removing stop words from the tweets

```
import nltk                                #importing libraries for stop word removal
nltk.download('punkt')
nltk.download('stopwords')
from nltk.corpus import stopwords
from nltk import word_tokenize

stop_words = stopwords.words('english')
```

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

The below function takes a paragraph, breaks it into words, checks if the word is a stop word, removes if it is a stop word and combine the remaining words into a sentence again.

```
def remove_stopwords(twt):

    twt_tokenized = word_tokenize(twt)
    twt_new = " ".join([i for i in twt_tokenized  if i not in stop_words])
    return twt_new


dataFrame['new_Tweet'] = [remove_stopwords(t) for t in dataFrame['new_Tweet']]


dataFrame.head()
```

	company	kind	tweet	new_Tweet
0	Borderlands	Positive	im getting on borderlands and i will murder yo...	getting borderlands murder
1	Borderlands	Positive	I am coming to the borders and I will kill you...	coming borders kill
2	Borderlands	Positive	im getting on borderlands and i will kill you ...	getting borderlands kill
3	Borderlands	Positive	im coming on borderlands and i will murder you...	coming borderlands murder
4	Borderlands	Positive	im getting on borderlands 2 and i will murder ...	getting borderlands murder

Lemmatinzation of the tweets:

In lemmatinzation we convert each word in the tweet to its base root word as many words used provide same meaning but in different verbal form. To avoid this we do lemmatization.

```
nltk.download('wordnet')      #Libraries required for lemmatization
nltk.download('omw-1.4')
nltk.download('averaged_perceptron_tagger')
from nltk.stem import WordNetLemmatizer
from nltk.corpus import wordnet
```

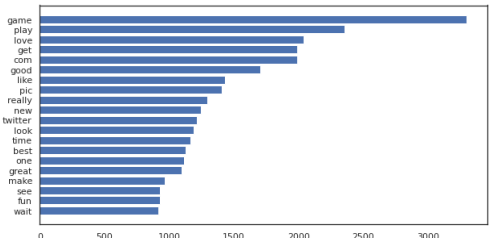
```
[nltk_data] Downloading package wordnet to /root/nltk_data...
[nltk_data]   Package wordnet is already up-to-date!
[nltk_data] Downloading package omw-1.4 to /root/nltk_data...
[nltk_data]   Package omw-1.4 is already up-to-date!
[nltk_data] Downloading package averaged_perceptron_tagger to
[nltk_data]     /root/nltk_data...
[nltk_data]   Package averaged_perceptron_tagger is already up-to-
[nltk_data]       date!
```

```
# function to convert nltk tag to wordnet tag
lemmatizer = WordNetLemmatizer()


def nltk_tag_to_wordnet_tag(nltk_tag):    #Function that finds the parts of speech tag
    if nltk_tag.startswith('J'):
        return wordnet.ADJ
    elif nltk_tag.startswith('V'):
        return wordnet.VERB
    elif nltk_tag.startswith('N'):
        return wordnet.NOUN
    elif nltk_tag.startswith('R'):
        return wordnet.ADV
    else:
        return None


def lemmatize_sentence(sentence):     #Function for lemmatization
  # word tokenize -> pos tag (detailed) -> wordnet tag (shallow pos) -> lemmatizer -> root word
    #tokenizes the sentence and finds the POS tag for each token
    nltk_tagged = nltk.pos_tag(nltk.word_tokenize(sentence))
    #tuple of (token, wordnet_tag)
    wordnet_tagged = map(lambda x: (x[0], nltk_tag_to_wordnet_tag(x[1])), nltk_tagged)
    lemmatized_sentence = []
    for word, tag in wordnet_tagged:
        if tag is None:
          lemmatized_sentence.append(word)
        else:
            #uses the tag to lemmatize the token
            lemmatized_sentence.append(lemmatizer.lemmatize(word, tag))
    return " ".join(lemmatized_sentence)


dataFrame['new_Tweet'] = dataFrame['new_Tweet'].apply(lambda x: lemmatize_sentence(x))


dataFrame.head()   #Data Frame after Lemmatization
```

	company	kind	tweet	new_Tweet
0	Borderlands	Positive	im getting on borderlands and i will murder yo...	get borderland murder
1	Borderlands	Positive	I am coming to the borders and I will kill you...	come border kill
2	Borderlands	Positive	im getting on borderlands and i will kill you ...	get borderland kill
3	Borderlands	Positive	im coming on borderlands and i will murder you...	come borderland murder
4	Borderlands	Positive	im getting on borderlands 2 and i will murder ...	get borderland murder

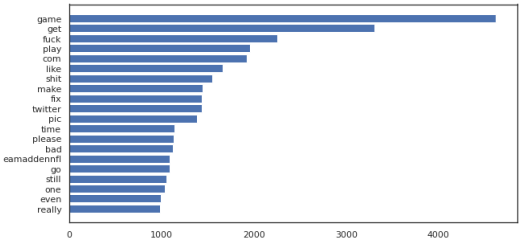
Plotting top 20 words in positive kind of sentences frequency

```
import matplotlib.pyplot as plt
import seaborn as sns
sns.set(style = 'white')
from nltk import FreqDist #function to find the frequent words in the data

# Subset positive review dataset
pos_Words = dataFrame.loc[dataFrame['kind'] == 'Positive',:]

#Extracts words into list and count frequency
pos_Words_1 = ' '.join([text for text in pos_Words['new_Tweet']])
pos_Words_1 = pos_Words_1.split()
words_df = FreqDist(pos_Words_1)

# Extracting words and frequency from words_df object
words_df = pd.DataFrame({'word':list(words_df.keys()), 'count':list(words_df.values())})
words_df
# Subsets top 20 words by frequency
words_df = words_df.nlargest(columns="count", n = 20)

words_df.sort_values('count', inplace = True)

# Plotting 20 frequent positive words
plt.figure(figsize=(10,5))
ax = plt.barh(words_df['word'], width = words_df['count'])
plt.show()
```



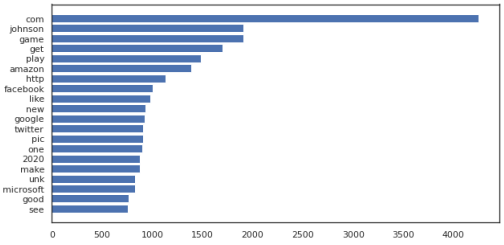
Plotting top 20 words in negative kind of sentences frequency

```
# Subset negative review dataset
neg_Words = dataFrame.loc[dataFrame['kind'] == 'Negative',:]

#Extracts words into list and count frequency
neg_Words_1 = ' '.join([text for text in neg_Words['new_Tweet']])
neg_Words_1 = neg_Words_1.split()
words_df = FreqDist(neg_Words_1)

# Extracting words and frequency from words_df object
words_df = pd.DataFrame({'word':list(words_df.keys()), 'count':list(words_df.values())})
words_df
# Subsets top 20 words by frequency
words_df = words_df.nlargest(columns="count", n = 20)

words_df.sort_values('count', inplace = True)

# Plotting 20 frequent negative words
plt.figure(figsize=(10,5))
ax = plt.barh(words_df['word'], width = words_df['count'])
plt.show()
```



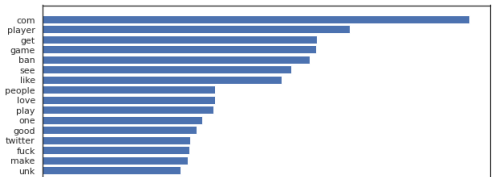
Plotting top 20 words in neutral kind of sentences frequency

```
# Subset Neutral review dataset
neu_Words = dataFrame.loc[dataFrame['kind'] == 'Neutral',:]

#Extracts words into list and count frequency
neu_Words_1 = ' '.join([text for text in neu_Words['new_Tweet']])
neu_Words_1 = neu_Words_1.split()
words_df = FreqDist(neu_Words_1)

# Extracting words and frequency from words_df object
words_df = pd.DataFrame({'word':list(words_df.keys()), 'count':list(words_df.values())})
words_df
# Subsets top 20 words by frequency
words_df = words_df.nlargest(columns="count", n = 20)

words_df.sort_values('count', inplace = True)

# Plotting 20 frequent neutral words
plt.figure(figsize=(10,5))
ax = plt.barh(words_df['word'], width = words_df['count'])
plt.show()
```



Plotting top 20 words in Irrelevant kind of sentences frequency

```
# Subset Irrelavent review dataset
irr_Words = dataFrame.loc[dataFrame['kind'] == 'Irrelevant',:]

#Extracts words into list and count frequency
irr_Words_1 = ' '.join([text for text in irr_Words['new_Tweet']])
irr_Words_1 = irr_Words_1.split()
words_df = FreqDist(irr_Words_1)

# Extracting words and frequency from words_df object
words_df = pd.DataFrame({'word':list(words_df.keys()), 'count':list(words_df.values())})
words_df
# Subsets top 20 words by frequency
words_df = words_df.nlargest(columns="count", n = 20)

words_df.sort_values('count', inplace = True)

# Plotting 20 frequent negative words
plt.figure(figsize=(10,5))
ax = plt.barh(words_df['word'], width = words_df['count'])
plt.show()
```



In TF-IDF, we calculate the TF-IDF score of each word in accordance with the dataset. After that we store the vlaues into a vector.

```
#Applying TF-IDF vectorizer

from sklearn.feature_extraction.text import TfidfVectorizer
tfidf = TfidfVectorizer(max_features=2500)
```

Encoding:

In this step we are mapping positive to 1, negative to 0, neutral to 2 and irrelevant to 3.

```
dataFrame['kind']=dataFrame['kind'].map({'Positive':1, 'Neutral':2, 'Negative':0, 'Irrelevant':3})
```

Decision Tree

```
X = tfidf.fit_transform(dataFrame['new_Tweet']).toarray()
y = dataFrame['kind'].values
featureNames = tfidf.get_feature_names()

# Splitting the dataset into train and test
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=30)
```

```
/usr/local/lib/python3.7/dist-packages/sklearn/utils/deprecation.py:87: FutureWarning: Function get_feature_names is deprecated; get_feature_names is deprecated in 1.0 and will be removed in 1.2. Please use get_feature_names_out ins
  warnings.warn(msg, category=FutureWarning)
```

Fitting model

```
from sklearn.tree import DecisionTreeClassifier

dt = DecisionTreeClassifier()
dt.fit(X_train,y_train)

y_pred = dt.predict(X_test)


from sklearn.metrics import roc_auc_score
roc_auc_score(y_test, dt.predict_proba(X_test),multi_class="ovo")
```

```
0.9562499999999999
```

```
X = tfidf.fit_transform(dataFrame['new_Tweet']).toarray()
y = dataFrame["kind"].values


from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3)
from sklearn.ensemble import RandomForestClassifier
rf_model = RandomForestClassifier(n_estimators=50, max_features="auto")
rf_model.fit(X_train, y_train)
```

```
RandomForestClassifier(n_estimators=50)
```

```
predictions = rf_model.predict(X_test)
predictions
```

```
array([1, 2, 1, ..., 2, 2, 0])
```

```
from sklearn.metrics import roc_auc_score
roc_auc_score(y_test, rf_model.predict_proba(X_test),multi_class="ovo")
```

```
0.9712428513886021
```

```
featureImportance = pd.DataFrame({i : j for i,j in zip(rf_model.feature_importances_,featureNames)}.items(),columns = ['Importance','word'])
featureImportance.sort_values(by='Importance',ascending=False)
```

	Importance	word
457	1.153347e-02	com
1321	9.603583e-03	love
931	7.012652e-03	fuck
944	6.526015e-03	game
719	6.492820e-03	eamaddennfl
...	...	...
1536	9.457493e-06	origins
1216	6.396480e-06	kamuy
39	5.572827e-06	40gb
134	3.759708e-06	anna
1660	4.786465e-07	poverty

2500 rows × 2 columns

INCREMENT-2

```
df=dataFrame['company'].unique()
df
```

```
array(['Borderlands', 'CallOfDutyBlackopsColdWar', 'Amazon', 'Overwatch',
       'Xbox(Xseries)', 'NBA2K', 'Dota2', 'PlayStation5(PS5)',
       'WorldOfCraft', 'CS-GO', 'Google', 'AssassinsCreed', 'ApexLegends',
       'LeagueOfLegends', 'Fortnite', 'Microsoft', 'Hearthstone',
       'Battlefield', 'PlayerUnknownsBattlegrounds(PUBG)', 'Verizon',
       'HomeDepot', 'FIFA', 'RedDeadRedemption(RDR)', 'CallOfDuty',
       'TomClancysRainbowSix', 'Facebook', 'GrandTheftAuto(GTA)',
       'MaddenNFL', 'johnson&johnson', 'Cyberpunk2077',
       'TomClancysGhostRecon', 'Nvidia'], dtype=object)
```

```
dataFrame.dtypes
```

```
company      object
kind          int64
tweet        object
new_Tweet    object
dtype: object
```

```
df1=dataFrame[dataFrame['kind']==0]
df2=dataFrame[dataFrame['kind']==1]
```

```
dataFrame_count = pd.DataFrame(dataFrame['kind'].value_counts()).reset_index()
dataFrame_count.columns = ['kind', 'Count']
dataFrame_count
```

	kind	Count
0	0	22358
1	1	20655
2	2	18108
3	3	12875

```
df1_count = pd.DataFrame(df1['company'].value_counts()).reset_index() #Count of Positive tweets on a game or company
df1_count.columns = ['company', 'Count']
df1_count
```

	company	Count
0	MaddenNFL	1694
1	NBA2K	1469
2	FIFA	1169
3	TomClancysRainbowSix	1115
4	Verizon	1092
5	TomClancysGhostRecon	894
6	HomeDepot	892
7	CallOfDuty	883
8	johnson&johnson	845
9	Dota2	767
10	Microsoft	764
11	Facebook	716
12	Fortnite	697
13	PlayerUnknownsBattlegrounds(PUBG)	678
14	LeagueOfLegends	632
15	Overwatch	627
16	GrandTheftAuto(GTA)	593
17	ApexLegends	591
18	Google	591
19	Amazon	575
20	CallOfDutyBlackopsColdWar	566
21	Hearthstone	527
22	Nvidia	516
23	Battlefield	464
24	PlayStation5(PS5)	453
25	Borderlands	426
26	Cyberpunk2077	385
27	AssassinsCreed	375
28	Xbox(Xseries)	373
29	CS-GO	344
30	WorldOfCraft	340
31	RedDeadRedemption(RDR)	305

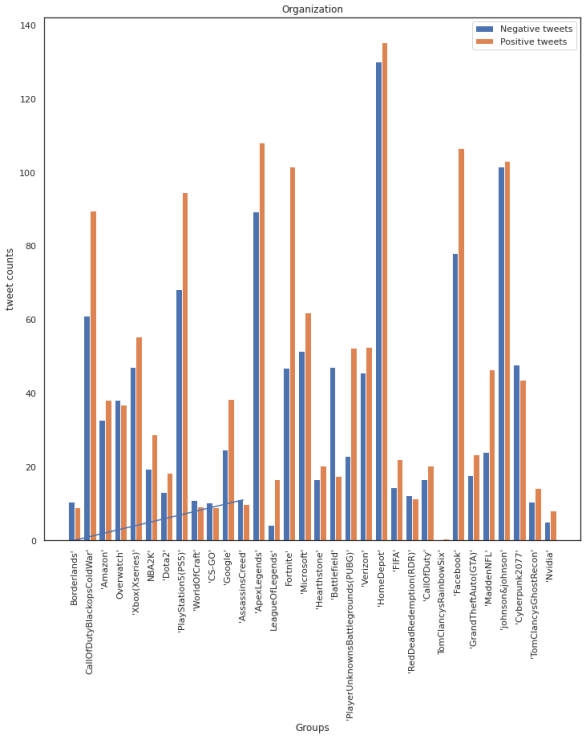
```
df2_count = pd.DataFrame(df2['company'].value_counts()).reset_index() #count of negative tweets on a Game or company
df2_count.columns = ['company', 'Count']
df2_count
```

	company	Count
0	AssassinsCreed	1439
1	Borderlands	1017
2	Cyberpunk2077	950
3	PlayStation5(PS5)	936
4	RedDeadRedemption(RDR)	927
5	CallOfDutyBlackopsColdWar	856
6	Hearthstone	833
7	Nvidia	802

```
dataFrame1=pd.read_csv("/content/nlp_myfile.csv",names=["Game_or_Org","Organization","Published Year","Stoke price before","Stock price after","Positive tweets","Negative tweet","Positivity percent"])
dataFrame1.head()
```

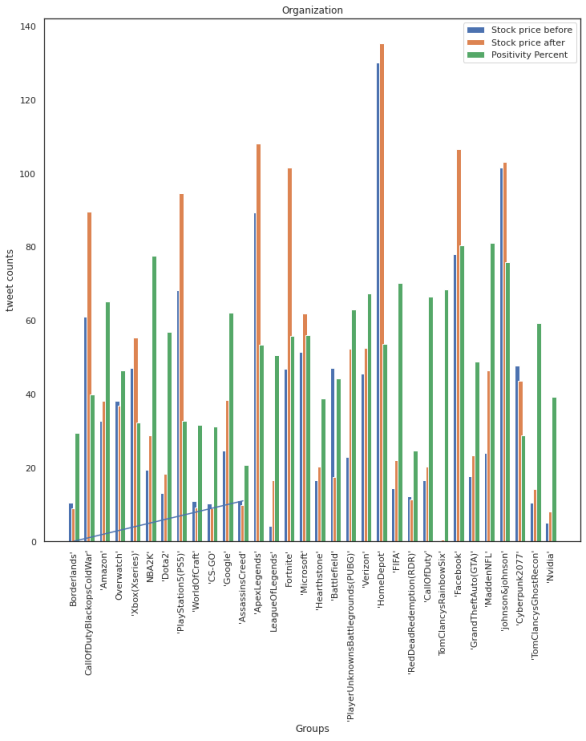
	Game_or_Org	Organization	Published Year	Stoke price before	Stock price after	Positive tweets	Negative tweet	Positivity percent
0	Borderlands'	TAKE-TWO INTERACTIVE SOFTWARE	2009	10.55	9.01	426	1017	29.52
1	CallOfDutyBlackopsColdWar'	Activision Blizzard	2020	61.00	89.48	566	856	39.80
2	'Amazon'	Amazon	2016	32.81	38.17	575	308	65.12
3	Overwatch'	Activision Blizzard	2016	38.06	36.77	627	726	46.34
4	'Xbox(Xseries)'	Xbox Game Studios	2015	47.00	55.35	373	785	32.21

```
import numpy as np
import matplotlib.pyplot as plt


X = dataFrame1['Game_or_Org']
Y = dataFrame1['Stoke price before']
Z = dataFrame1['Stock price after']

X_axis = np.arange(len(X))

plt.bar(X_axis - 0.2, Y, 0.4, label = 'Negative tweets')
plt.bar(X_axis + 0.2, Z, 0.4, label = 'Positive tweets')

plt.xticks(X_axis, X)
plt.xlabel("Groups")
plt.xticks(rotation=90)
plt.ylabel("tweet counts")
plt.title("Organization")
plt.legend()
plt.rcParams['figure.figsize'] = (12, 12)

plt.plot(range(12), range(12))
plt.savefig('nlpimage.png')

plt.show()
```




```
X = dataFrame1['Game_or_Org']
Y = dataFrame1['Stoke price before']
Z = dataFrame1['Stock price after']
A = dataFrame1['Positivity percent']

X_axis = np.arange(len(X))

plt.bar(X_axis - 0.2, Y, 0.3, label = 'Stock price before')
plt.bar(X_axis -0, Z, 0.3, label = 'Stock price after')
plt.bar(X_axis + 0.2, A, 0.3, label = 'Positivity Percent')

plt.xticks(X_axis, X)
plt.xlabel("Groups")
plt.xticks(rotation=90)
plt.ylabel("tweet counts")
plt.title("Organization")
plt.legend()
plt.rcParams['figure.figsize'] = (12, 12)
```

```
plt.plot(range(12), range(12))
plt.savefig('nlpimage1.png')

plt.show()
```



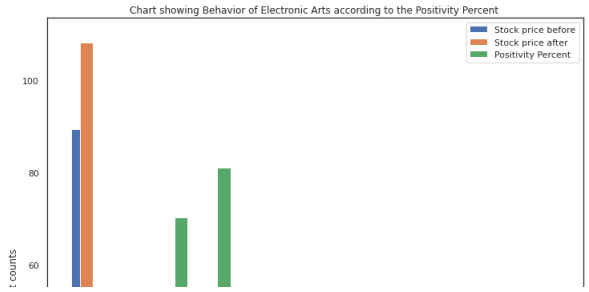

```
dataFrame1['Organization'] = dataFrame1['Organization'].astype('str')
dataFrame1.dtypes
```

```
Game_or_Org            object
Organization           object
Published Year          int64
Stoke price before    float64
Stock price after     float64
Positive tweets         int64
Negative tweet          int64
Positivity percent    float64
dtype: object
```

```
dataFrame2=pd.read_csv("/content/NLP_file2.csv",names=["Game_or_Org","Organization","Published Year","Stoke price before","Stock price after","Positive tweets","Negative tweet","Positivity percent"])
dataFrame2.head()
```

	Game_or_Org	Organization	Published Year	Stoke price before	Stock price after	Positive tweets	Negative tweet	Positivity percent
0	'ApexLegends'	Electronic Arts	2019	89.45	108.11	691	604	53.36
1	'Battlefield'	Electronic Arts	2008	47.01	17.55	464	586	44.19
2	'FIFA'	Electronic Arts	2013	14.46	22.02	1169	495	70.25
3	'MaddenNFL'	Electronic Arts	2014	23.98	46.44	1694	396	81.05

```
X = dataFrame2['Game_or_Org']
Y = dataFrame2['Stoke price before']
Z = dataFrame2['Stock price after']
A = dataFrame2['Positivity percent']

X_axis = np.arange(len(X))

plt.bar(X_axis - 0.2, Y, 0.3, label = 'Stock price before')
plt.bar(X_axis -0, Z, 0.3, label = 'Stock price after')
plt.bar(X_axis + 0.2, A, 0.3, label = 'Positivity Percent')

plt.xticks(X_axis, X)
plt.xlabel("Organization")
plt.xticks(rotation=90)
plt.ylabel("tweet counts")
plt.title("Chart showing Behavior of Electronic Arts according to the Positivity Percent ")
plt.legend()
plt.rcParams['figure.figsize'] = (12, 12)

plt.plot(range(12), range(12))


plt.show()
```




```
pip install yfinance
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Requirement already satisfied: yfinance in /usr/local/lib/python3.7/dist-packages (0.1.87)
Requirement already satisfied: multitasking>=0.0.7 in /usr/local/lib/python3.7/dist-packages (from yfinance) (0.0.11)
Requirement already satisfied: requests>=2.26 in /usr/local/lib/python3.7/dist-packages (from yfinance) (2.28.1)
Requirement already satisfied: numpy>=1.15 in /usr/local/lib/python3.7/dist-packages (from yfinance) (1.21.6)
Requirement already satisfied: appdirs>=1.4.4 in /usr/local/lib/python3.7/dist-packages (from yfinance) (1.4.4)
Requirement already satisfied: lxml>=4.5.1 in /usr/local/lib/python3.7/dist-packages (from yfinance) (4.9.1)
Requirement already satisfied: pandas>=0.24.0 in /usr/local/lib/python3.7/dist-packages (from yfinance) (1.3.5)
Requirement already satisfied: python-dateutil>=2.7.3 in /usr/local/lib/python3.7/dist-packages (from pandas>=0.24.0->yfinance) (2.8.2)
Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.7/dist-packages (from pandas>=0.24.0->yfinance) (2022.6)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (from python-dateutil>=2.7.3->pandas>=0.24.0->yfinance) (1.15.0)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.7/dist-packages (from requests>=2.26->yfinance) (2022.9.24)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.7/dist-packages (from requests>=2.26->yfinance) (2.10)
Requirement already satisfied: charset-normalizer<3,>=2 in /usr/local/lib/python3.7/dist-packages (from requests>=2.26->yfinance) (2.1.1)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /usr/local/lib/python3.7/dist-packages (from requests>=2.26->yfinance) (1.24.3)
```

```
import yfinance as yf
```

```
start = "2008-01-01"
end = '2020-01-01'
EA = yf.download('EA',start,end)
```

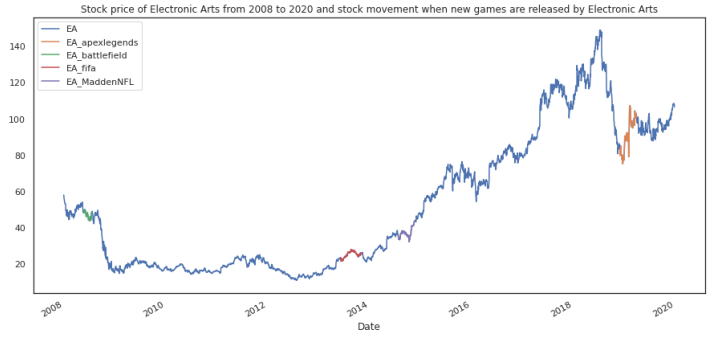
```
[*********************100%**********************]  1 of 1 completed
```

```
s1="2018-12-04" #2 months before launch date of apex legends
e1="2019-04-04" #2 months after launch data of apex legends
EA_apex = yf.download('EA',s1,e1)

s2="2008-05-23" #2 months before launch date of Battle field
e2="2008-07-23" #2 months after launch data of Battle field
EA_batfield = yf.download('EA',s2,e2)

s3="2013-06-10" #2 months before launch date of FIFA
e3="2013-11-10" #2 months after launch data of FIFA
EA_fifa = yf.download('EA',s3,e3)

s4="2014-07-26" #2 months before launch date of MaddenNFL
e4="2014-11-26" #2 months after launch data of MaddenNFL
EA_maddenNFL = yf.download('EA',s4,e4)
```

```
[*********************100%**********************]  1 of 1 completed
[*********************100%**********************]  1 of 1 completed
[*********************100%**********************]  1 of 1 completed
[*********************100%**********************]  1 of 1 completed
```

```
EA['Open'].plot(label = 'EA', figsize = (15,7))
EA_apex['Open'].plot(label = 'EA_apexlegends')
EA_batfield['Open'].plot(label = 'EA_battlefield')
EA_fifa['Open'].plot(label = 'EA_fifa')
EA_maddenNFL['Open'].plot(label = 'EA_MaddenNFL')
plt.title("Stock price of Electronic Arts from 2008 to 2020 and stock movement when new games are released by Electronic Arts")
plt.legend()
```

```
<matplotlib.legend.Legend at 0x7f819a6cfad0>
```

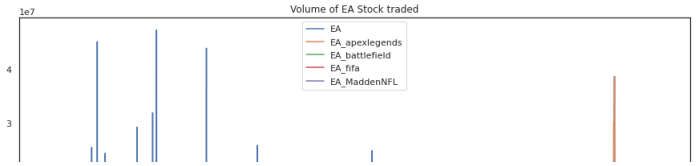



```
print(dataFrame2[["Game_or_Org","Positivity percent"]]) # Positivity percent of the games
```

```
      Game_or_Org  Positivity percent
0  'ApexLegends'               53.36
1  'Battlefield'               44.19
2         'FIFA'               70.25
3    'MaddenNFL'               81.05
```

```
EA['Volume'].plot(label = 'EA', figsize = (15,7))
EA_apex['Volume'].plot(label = "EA_apexlegends")
EA_batfield['Volume'].plot(label = 'EA_battlefield')
EA_fifa['Volume'].plot(label = 'EA_fifa')
EA_maddenNFL['Volume'].plot(label = 'EA_MaddenNFL')
plt.title('Volume of EA Stock traded')
plt.legend()
```

```
<matplotlib.legend.Legend at 0x7f819a679dd0>
```




```
#Market Capitalisation
EA['MarktCap'] = EA['Open'] * EA['Volume']
EA_apex['MarktCap'] = EA_apex['Open'] * EA_apex['Volume']
EA_batfield['MarktCap'] = EA_batfield['Open'] * EA_batfield['Volume']
EA_fifa['MarktCap'] = EA_fifa['Open'] * EA_fifa['Volume']
EA_maddenNFL['MarktCap'] = EA_maddenNFL['Open'] * EA_maddenNFL['Volume']
EA['MarktCap'].plot(label = 'EA', figsize = (15,7))
EA_apex['MarktCap'].plot(label ='EA_apexlegends')
EA_batfield['MarktCap'].plot(label = 'EA_battlefields')
EA_fifa['MarktCap'].plot(label='fifa')
EA_maddenNFL['MarktCap'] = EA_maddenNFL['Open'] * EA_maddenNFL['Volume']
EA_maddenNFL['MarktCap'].plot(label='fifa')
plt.title('Market Cap')
plt.legend()
```

```
<matplotlib.legend.Legend at 0x7f8199f286d0>
```