```
!pip install wordcloud spacy
```

```
Requirement already satisfied: wordcloud in /usr/local/lib/python3.10/dist-packages (1.9.3)
Requirement already satisfied: spacy in /usr/local/lib/python3.10/dist-packages (3.7.4)
Requirement already satisfied: numpy>=1.6.1 in /usr/local/lib/python3.10/dist-packages (from wordcloud) (1.25.2)
Requirement already satisfied: pillow in /usr/local/lib/python3.10/dist-packages (from wordcloud) (9.4.0)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.10/dist-packages (from wordcloud) (3.7.1)
Requirement already satisfied: spacy-legacy<3.1.0,>=3.0.11 in /usr/local/lib/python3.10/dist-packages (from spacy) (3.0.12)
Requirement already satisfied: spacy-loggers<2.0.0,>=1.0.0 in /usr/local/lib/python3.10/dist-packages (from spacy) (1.0.5)
Requirement already satisfied: murmurhash<1.1.0,>=0.28.0 in /usr/local/lib/python3.10/dist-packages (from spacy) (1.0.10)
Requirement already satisfied: cymem<2.1.0,>=2.0.2 in /usr/local/lib/python3.10/dist-packages (from spacy) (2.0.8)
Requirement already satisfied: preshed<3.1.0,>=3.0.2 in /usr/local/lib/python3.10/dist-packages (from spacy) (3.0.9)
Requirement already satisfied: thinc<8.3.0,>=8.2.2 in /usr/local/lib/python3.10/dist-packages (from spacy) (8.2.3)
Requirement already satisfied: wasabi<1.2.0,>=0.9.1 in /usr/local/lib/python3.10/dist-packages (from spacy) (1.1.2)
Requirement already satisfied: srsly<3.0.0,>=2.4.3 in /usr/local/lib/python3.10/dist-packages (from spacy) (2.4.8)
Requirement already satisfied: catalogue<2.1.0,>=2.0.6 in /usr/local/lib/python3.10/dist-packages (from spacy) (2.0.10)
Requirement already satisfied: weasel<0.4.0,>=0.1.0 in /usr/local/lib/python3.10/dist-packages (from spacy) (0.3.4)
Requirement already satisfied: typer<0.10.0,>=0.3.0 in /usr/local/lib/python3.10/dist-packages (from spacy) (0.9.4)
Requirement already satisfied: smart-open<7.0.0,>=5.2.1 in /usr/local/lib/python3.10/dist-packages (from spacy) (6.4.0)
Requirement already satisfied: tqdm<5.0.0,>=4.38.0 in /usr/local/lib/python3.10/dist-packages (from spacy) (4.66.2)
Requirement already satisfied: requests<3.0.0,>=2.13.0 in /usr/local/lib/python3.10/dist-packages (from spacy) (2.31.0)
Requirement already satisfied: pydantic!=1.8,!=1.8.1,<3.0.0,>=1.7.4 in /usr/local/lib/python3.10/dist-packages (from spacy) (2.6.4)
Requirement already satisfied: jinja2 in /usr/local/lib/python3.10/dist-packages (from spacy) (3.1.3)
Requirement already satisfied: setuptools in /usr/local/lib/python3.10/dist-packages (from spacy) (67.7.2)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.10/dist-packages (from spacy) (24.0)
Requirement already satisfied: langcodes<4.0.0,>=3.2.0 in /usr/local/lib/python3.10/dist-packages (from spacy) (3.3.0)
Requirement already satisfied: annotated-types>=0.4.0 in /usr/local/lib/python3.10/dist-packages (from pydantic!=1.8,!=1.8.1,<3.0.0,>=1.
Requirement already satisfied: pydantic-core==2.16.3 in /usr/local/lib/python3.10/dist-packages (from pydantic!=1.8,!=1.8.1,<3.0.0,>=1.7
Requirement already satisfied: typing-extensions>=4.6.1 in /usr/local/lib/python3.10/dist-packages (from pydantic!=1.8,!=1.8.1,<3.0.0,>=
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests<3.0.0,>=2.13.0->spacy)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests<3.0.0,>=2.13.0->spacy) (3.6)
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests<3.0.0,>=2.13.0->spacy) (2.0.
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests<3.0.0,>=2.13.0->spacy) (2024
Requirement already satisfied: blis<0.8.0,>=0.7.8 in /usr/local/lib/python3.10/dist-packages (from thinc<8.3.0,>=8.2.2->spacy) (0.7.11)
Requirement already satisfied: confection<1.0.0,>=0.0.1 in /usr/local/lib/python3.10/dist-packages (from thinc<8.3.0,>=8.2.2->spacy) (0.
Requirement already satisfied: click<9.0.0,>=7.1.1 in /usr/local/lib/python3.10/dist-packages (from typer<0.10.0,>=0.3.0->spacy) (8.1.7)
Requirement already satisfied: cloudpathlib<0.17.0,>=0.7.0 in /usr/local/lib/python3.10/dist-packages (from weasel<0.4.0,>=0.1.0->spacy)
Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.10/dist-packages (from jinja2->spacy) (2.1.5)
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib->wordcloud) (1.2.1)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.10/dist-packages (from matplotlib->wordcloud) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib->wordcloud) (4.51.0)
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib->wordcloud) (1.4.5)
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib->wordcloud) (3.1.2)
Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.10/dist-packages (from matplotlib->wordcloud) (2.8.2)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages (from python-dateutil>=2.7->matplotlib->wordcloud) (1
```

```
import re
import string
import numpy as np
import random
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
from plotly import graph_objs as go
import plotly.express as px
import plotly.figure_factory as ff
from collections import Counter

from PIL import Image
from wordcloud import WordCloud, STOPWORDS, ImageColorGenerator


import nltk
from nltk.corpus import stopwords

from tqdm import tqdm
import os
import nltk
import spacy
import random
from spacy.util import compounding
from spacy.util import minibatch

import warnings
warnings.filterwarnings("ignore")
```

```
def random_colours(number_of_colors):
    '''
    Simple function for random colours generation.
    Input:
        number_of_colors - integer value indicating the number of colours which are going to be generated.
    Output:
        Color in the following format: ['#E86DA4'] .
    '''
    colors = []
    for i in range(number_of_colors):
        colors.append("#"+''.join([random.choice('0123456789ABCDEF') for j in range(6)]))
    return colors
```

```
from google.colab import drive
drive.mount('/content/drive')
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
```

Reading the Data

```
train = pd.read_csv('/content/drive/MyDrive/input/senti_analysis/train.csv')
test = pd.read_csv('/content/drive/MyDrive/input/senti_analysis/test.csv')
ss = pd.read_csv('/content/drive/MyDrive/input/senti_analysis/sample_submission.csv')
```

```
from google.colab import drive
drive.mount('/content/drive')
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
```

```
print(train.shape)
print(test.shape)
```

```
(27481, 4)
(3534, 3)
```

```
train.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 27481 entries, 0 to 27480
Data columns (total 4 columns):
 #   Column         Non-Null Count  Dtype 
---  ------         --------------  ----- 
 0   textID         27481 non-null  object
 1   text           27480 non-null  object
 2   selected_text  27480 non-null  object
 3   sentiment      27481 non-null  object
dtypes: object(4)
memory usage: 858.9+ KB
```

```
train.dropna(inplace=True)
```

```
test.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3534 entries, 0 to 3533
Data columns (total 3 columns):
 #   Column     Non-Null Count  Dtype 
---  ------     --------------  ----- 
 0   textID     3534 non-null   object
 1   text       3534 non-null   object
 2   sentiment  3534 non-null   object
dtypes: object(3)
memory usage: 83.0+ KB
```

EDA

```
train.head()
```

	textID	text	selected_text	sentiment
0	cb774db0d1	I`d have responded, if I were going	I`d have responded, if I were going	neutral
1	549e992a42	Sooo SAD I will miss you here in San Diego!!!	Sooo SAD	negative
2	088c60f138	my boss is bullying me...	bullying me	negative
3	9642c003ef	what interview! leave me alone	leave me alone	negative

Selected_text is a subset of text

```
train.describe()
```

	textID	text	selected_text	sentiment
count	27480	27480	27480	27480
unique	27480	27480	22463	3
top	6f7127d9d7	All this flirting going on - The ATG smiles...	good	neutral
freq	1	1	199	11117

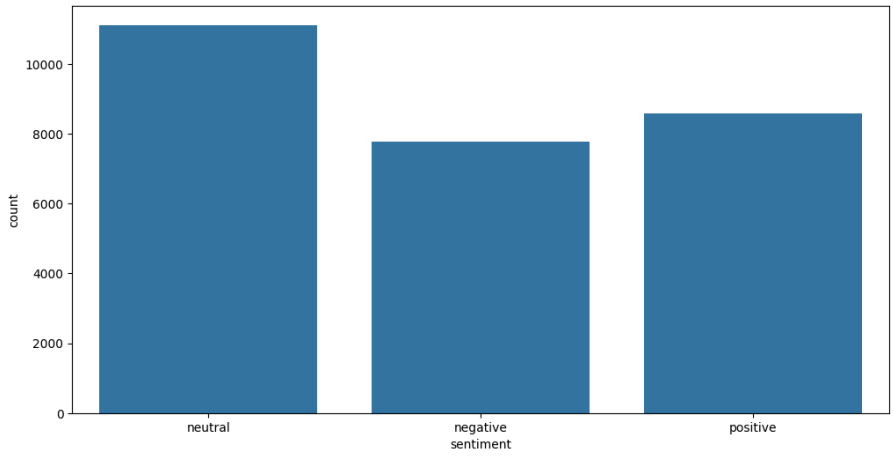
Lets look at the distribution of tweets in the train set

```
temp = train.groupby('sentiment').count()['text'].reset_index().sort_values(by='text',ascending=False)
temp.style.background_gradient(cmap='Purples')
```

	sentiment	text
1	neutral	11117
2	positive	8582
0	negative	7781

```
plt.figure(figsize=(12,6))
sns.countplot(x='sentiment',data=train)
```

```
<Axes: xlabel='sentiment', ylabel='count'>
```



Let's draw a Funnel-Chart for better visualization

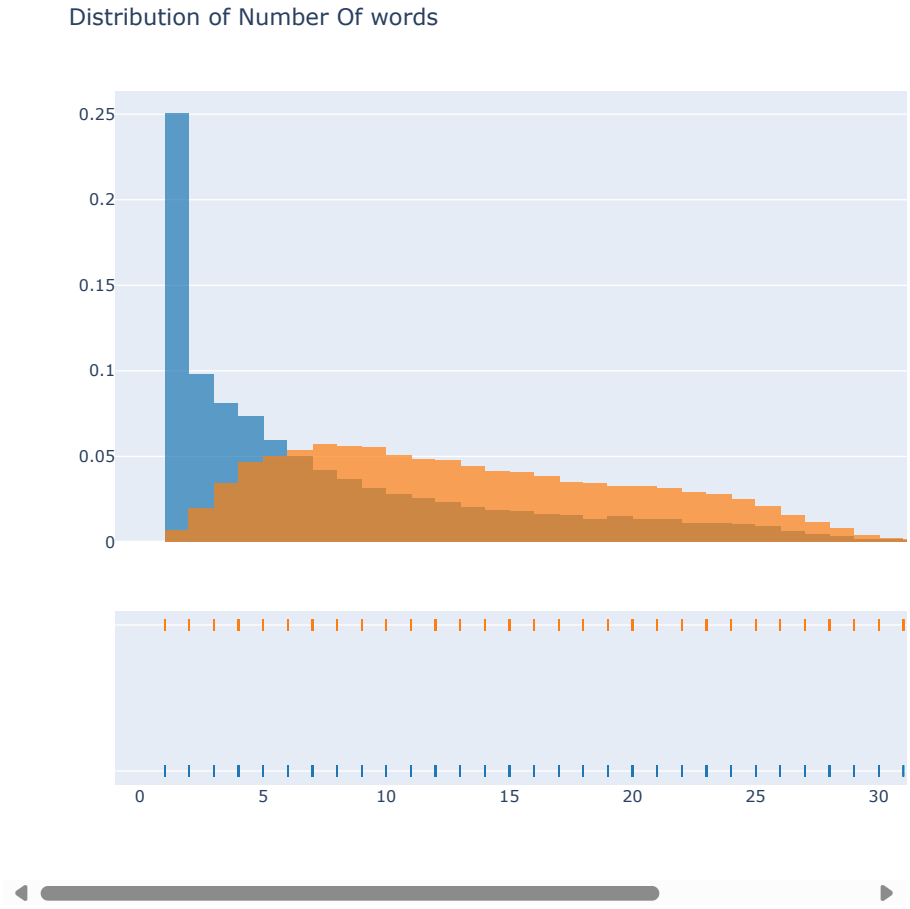
```
fig = go.Figure(go.Funnelarea(
    text =temp.sentiment,
    values = temp.text,
    title = {"position": "top center", "text": "Funnel-Chart of Sentiment Distribution"}
    ))
fig.show()
```

```
def jaccard(str1, str2):
    a = set(str1.lower().split())
    b = set(str2.lower().split())
    c = a.intersection(b)
    return float(len(c)) / (len(a) + len(b) - len(c))


results_jaccard=[]

for ind,row in train.iterrows():
    sentence1 = row.text
    sentence2 = row.selected_text

    jaccard_score = jaccard(sentence1,sentence2)
    results_jaccard.append([sentence1,sentence2,jaccard_score])


jaccard = pd.DataFrame(results_jaccard,columns=["text","selected_text","jaccard_score"])
train = train.merge(jaccard,how='outer')


train['Num_words_ST'] = train['selected_text'].apply(lambda x:len(str(x).split())) #Number Of words in Selected Text
train['Num_word_text'] = train['text'].apply(lambda x:len(str(x).split())) #Number Of words in main text
train['difference_in_words'] = train['Num_word_text'] - train['Num_words_ST'] #Difference in Number of words text and Selected Text


train.head()
```

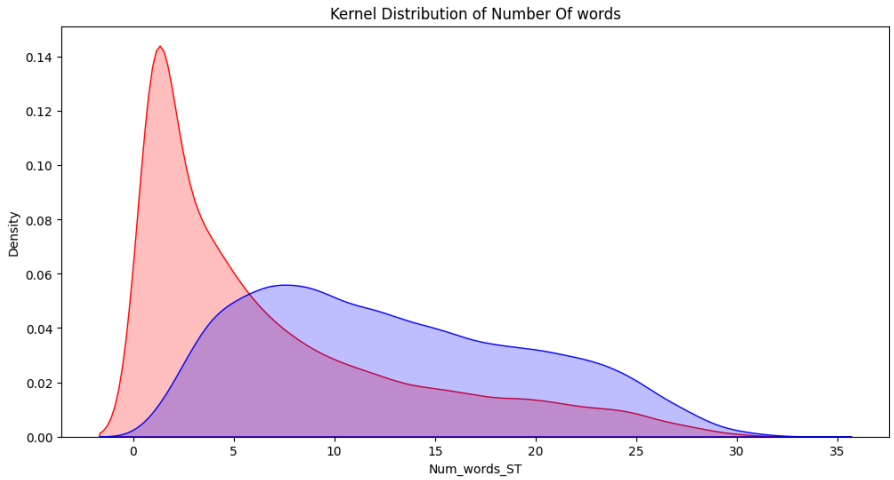
	textID	text	selected_text	sentiment	jaccard_score	Num_words_ST	Num_wor
0	cb774db0d1	I`d have responded, if I were going	I`d have responded, if I were going	neutral	1.000000	7	
1	549e992a42	Sooo SAD I will miss you here in	Sooo SAD	negative	0.200000	2	

Let's look at the distribution of Meta-Features

```
hist_data = [train['Num_words_ST'],train['Num_word_text']]

group_labels = ['Selected_Text', 'Text']

# Create distplot with custom bin_size
fig = ff.create_distplot(hist_data, group_labels,show_curve=False)
fig.update_layout(title_text='Distribution of Number Of words')
fig.update_layout(
    autosize=False,
    width=900,
    height=700,
    paper_bgcolor="LightSteelBlue",
)
fig.show()
```

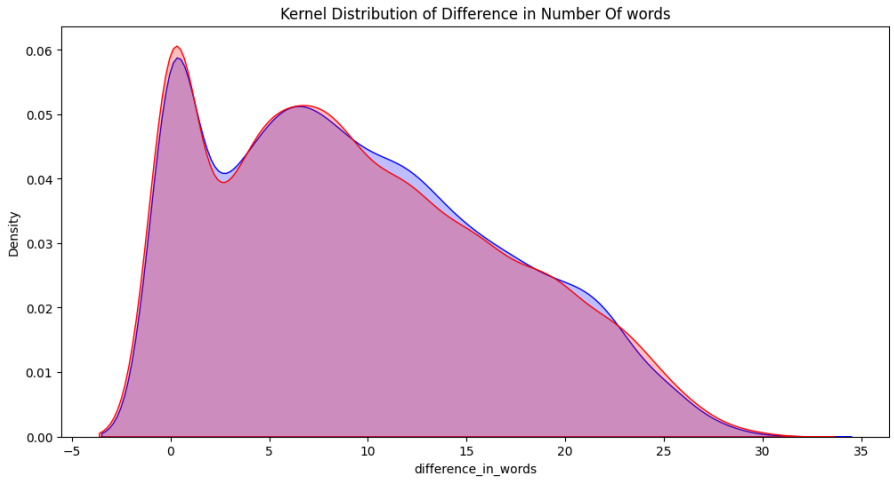



```
plt.figure(figsize=(12,6))
p1=sns.kdeplot(train['Num_words_ST'], shade=True, color="r").set_title('Kernel Distribution of Number Of words')
p1=sns.kdeplot(train['Num_word_text'], shade=True, color="b")
```



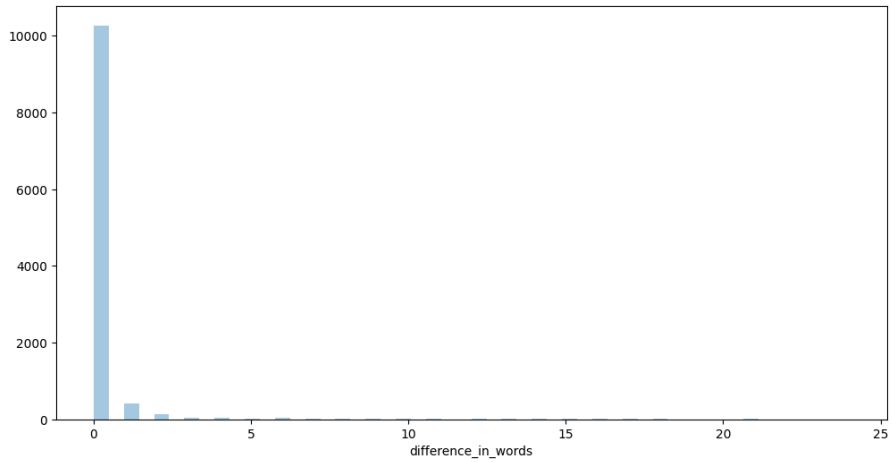
Now It will be more interesting to see the differnce in number of words and jaccard_scores across different Sentiments

```
plt.figure(figsize=(12,6))
p1=sns.kdeplot(train[train['sentiment']=='positive']['difference_in_words'], shade=True, color="b").set_title('Kernel Distribution of Differ
p2=sns.kdeplot(train[train['sentiment']=='negative']['difference_in_words'], shade=True, color="r")
```



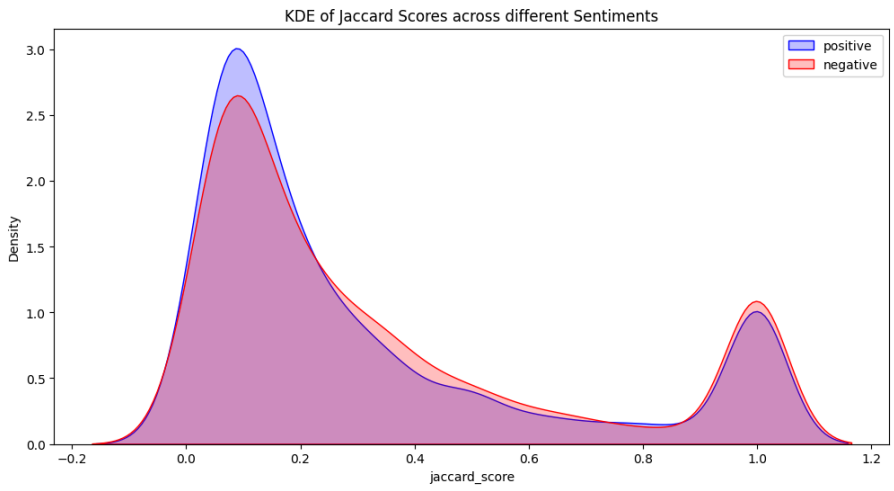

```
plt.figure(figsize=(12,6))
sns.distplot(train[train['sentiment']=='neutral']['difference_in_words'],kde=False)
```

```
<Axes: xlabel='difference_in_words'>
```




```
plt.figure(figsize=(12,6))
p1=sns.kdeplot(train[train['sentiment']=='positive']['jaccard_score'], shade=True, color="b").set_title('KDE of Jaccard Scores across differ
p2=sns.kdeplot(train[train['sentiment']=='negative']['jaccard_score'], shade=True, color="r")
plt.legend(labels=['positive','negative'])
```

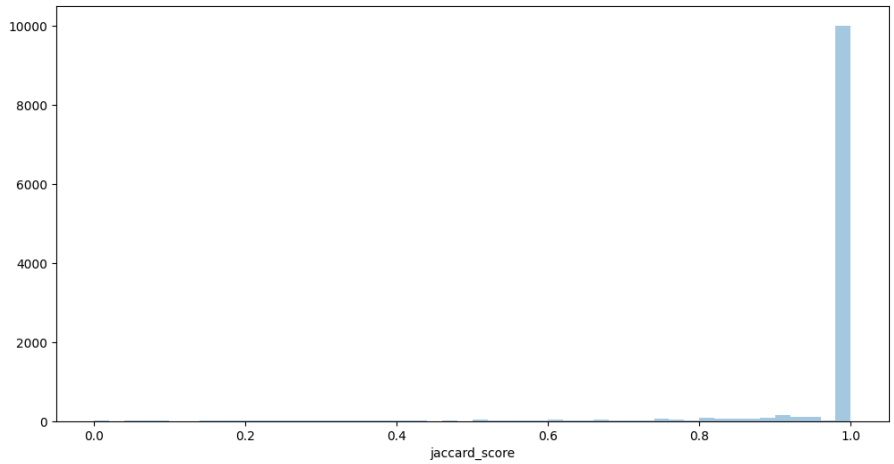
```
<matplotlib.legend.Legend at 0x7b531f54b580>
```



I was not able to plot kde of jaccard_scores of neutral tweets for the same reason,thus I will plot a distribution plot

```
plt.figure(figsize=(12,6))
sns.distplot(train[train['sentiment']=='neutral']['jaccard_score'],kde=False)
```

```
<Axes: xlabel='jaccard_score'>
```




```
k = train[train['Num_word_text']<=2]
```

```
k[k['sentiment']=='positive']
```

	textID	text	selected_text	sentime
68	fa2654e730	Chilliin	Chilliin	posit
80	bbbc46889b	THANK YYYYYYYYYOOOOOOOOOOUUUUU!	THANK YYYYYYYYYOOOOOOOOOOUUUUU!	posit
170	f3d95b57b1	good morning	good morning	posit
278	89d5b3f0b5	Thanks	Thanks	posit
429	a78ef3e0d0	Goodmorning	Goodmorning	posit
...	...	...	...	
26689	e80c242d6a	Goodnight;	Goodnight;	posit
26725	aad244f37d	*hug*	*hug*	posit
26842	a46571fe12	congrats!	congrats!	posit
26959	49a942e9b1	Happy birthday.	Happy birthday.	posit
27292	47c474aaf1	Good choice	Good	posit

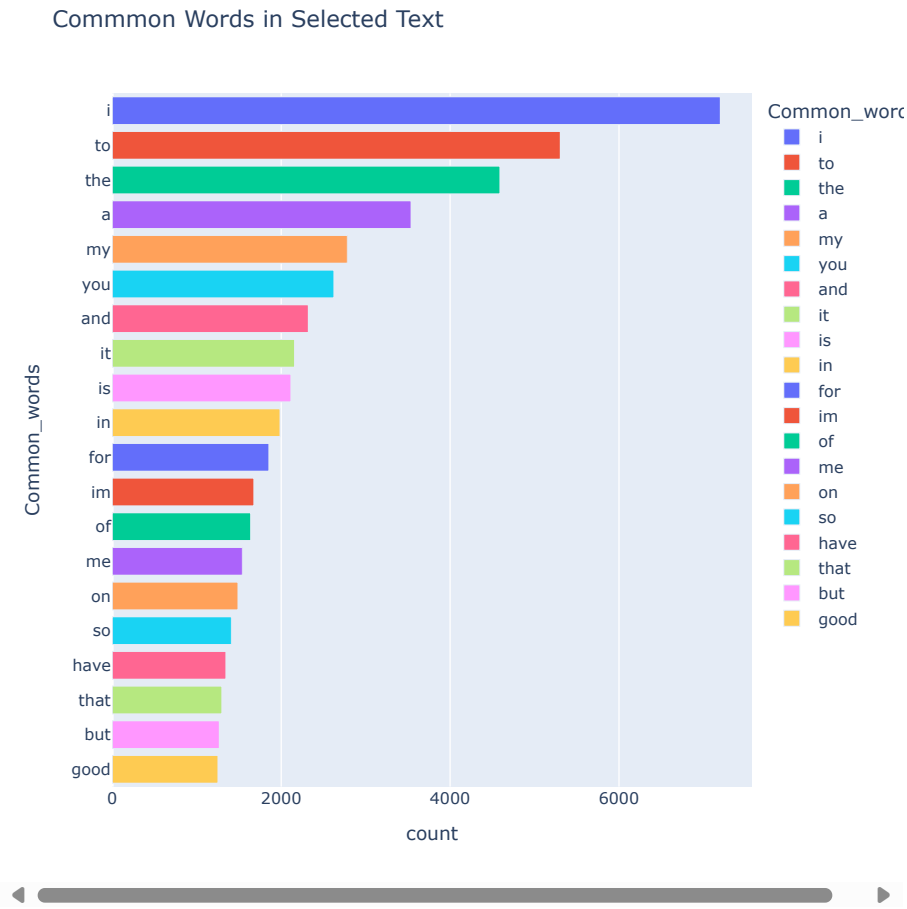
```
def clean_text(text):
    '''Make text lowercase, remove text in square brackets,remove links,remove punctuation
    and remove words containing numbers.'''
    text = str(text).lower()
    text = re.sub('\[.*?\]', '', text)
    text = re.sub('https?://\S+|www\.\S+', '', text)
    text = re.sub('<.*?>+', '', text)
    text = re.sub('[%s]' % re.escape(string.punctuation), '', text)
    text = re.sub('\n', '', text)
    text = re.sub('\w*\d\w*', '', text)
    return text


train['text'] = train['text'].apply(lambda x:clean_text(x))
train['selected_text'] = train['selected_text'].apply(lambda x:clean_text(x))


train.head()
```

	textID	text	selected_text	sentiment	jaccard_score	Num_words_ST	Num_wor
0	cb774db0d1	id have responded if i were going	id have responded if i were going	neutral	1.000000	7	
1	549e992a42	sooo sad i will miss you here	sooo sad	negative	0.200000	2	

```
train['temp_list'] = train['selected_text'].apply(lambda x:str(x).split())
top = Counter([item for sublist in train['temp_list'] for item in sublist])
temp = pd.DataFrame(top.most_common(20))
temp.columns = ['Common_words','count']
temp.style.background_gradient(cmap='Blues')
```

	Common_words	count
0	i	7200
1	to	5305
2	the	4590
3	a	3538
4	my	2783
5	you	2624
6	and	2321
7	it	2158
8	is	2115
9	in	1986
10	for	1854
11	im	1676
12	of	1638
13	me	1540
14	on	1488
15	so	1410
16	have	1345
17	that	1297
18	but	1267
19	good	1251

```
fig = px.bar(temp, x="count", y="Common_words", title='Commmon Words in Selected Text', orientation='h',
             width=700, height=700,color='Common_words')
fig.show()
```



OOPS!While we cleaned our dataset we didnt remove the stop words and hence we can see the most coomon word is 'to' . Let's try again after removing the stopwords

```
import nltk
nltk.download('stopwords')
```

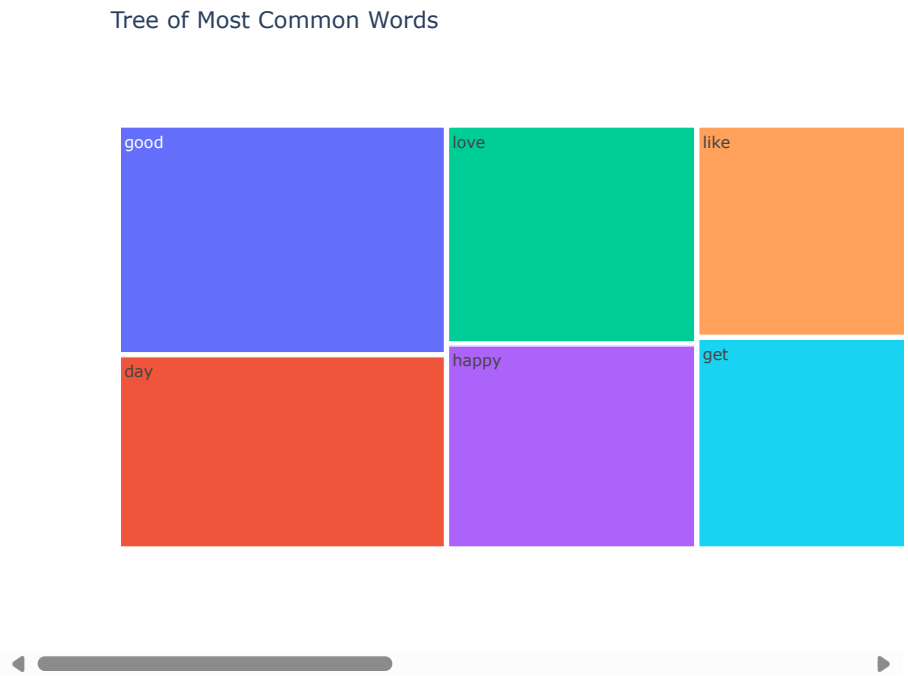
```
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
True
```

```
def remove_stopword(x):
    return [y for y in x if y not in stopwords.words('english')]
train['temp_list'] = train['temp_list'].apply(lambda x:remove_stopword(x))
```

```
top = Counter([item for sublist in train['temp_list'] for item in sublist])
temp = pd.DataFrame(top.most_common(20))
temp = temp.iloc[1:,:]
temp.columns = ['Common_words','count']
temp.style.background_gradient(cmap='Purples')
```

	Common_words	count
1	good	1251
2	day	1058
3	love	909
4	happy	852
5	like	774
6	get	772
7	dont	765
8	go	700
9	cant	613
10	work	612
11	going	592
12	today	564
13	got	558
14	one	538
15	time	534
16	thanks	532
17	lol	528
18	really	520
19	u	519

```
fig = px.treemap(temp, path=['Common_words'], values='count',title='Tree of Most Common Words')
fig.show()
```

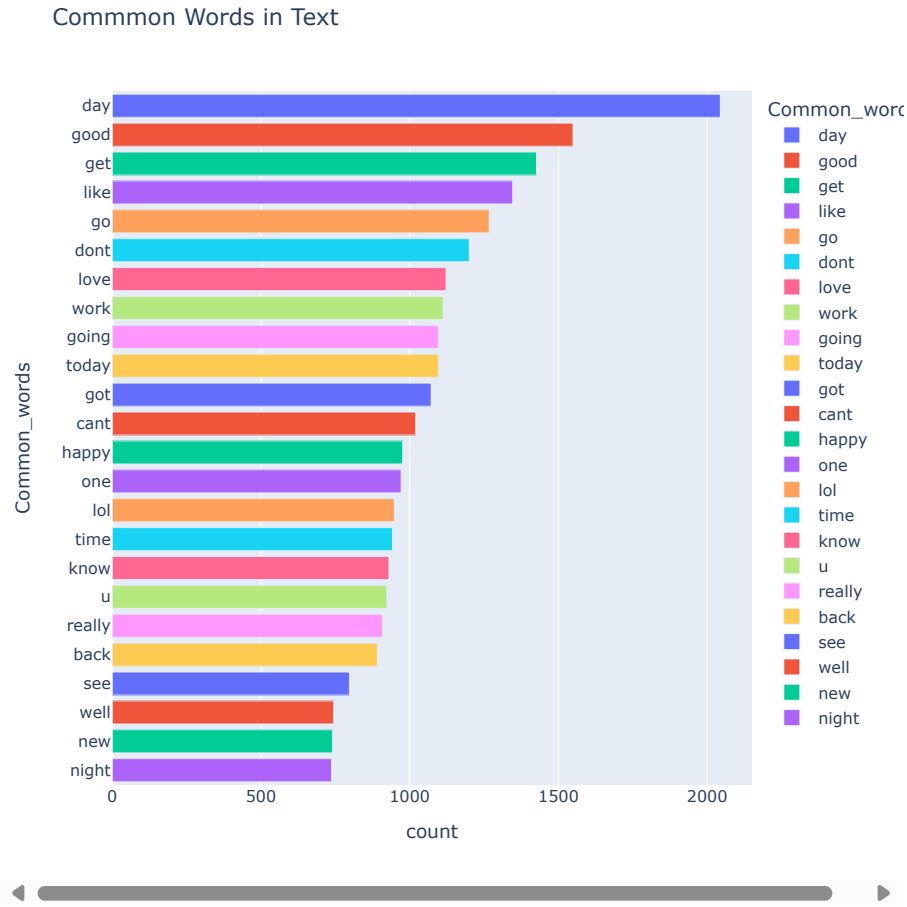



```
train['temp_list1'] = train['text'].apply(lambda x:str(x).split()) #List of words in every row for text
train['temp_list1'] = train['temp_list1'].apply(lambda x:remove_stopword(x)) #Removing Stopwords


top = Counter([item for sublist in train['temp_list1'] for item in sublist])
temp = pd.DataFrame(top.most_common(25))
temp = temp.iloc[1:,:]
temp.columns = ['Common_words','count']
temp.style.background_gradient(cmap='Blues')
```

	Common_words	count
1	day	2044
2	good	1549
3	get	1426
4	like	1346
5	go	1267
6	dont	1200
7	love	1122
8	work	1112
9	going	1096
10	today	1096
11	got	1072
12	cant	1020
13	happy	976
14	one	971
15	lol	948
16	time	942
17	know	930
18	u	923
19	really	908
20	back	891
21	see	797
22	well	744
23	new	740
24	night	737

So the first two common word was I'm so I removed it and took data from second row

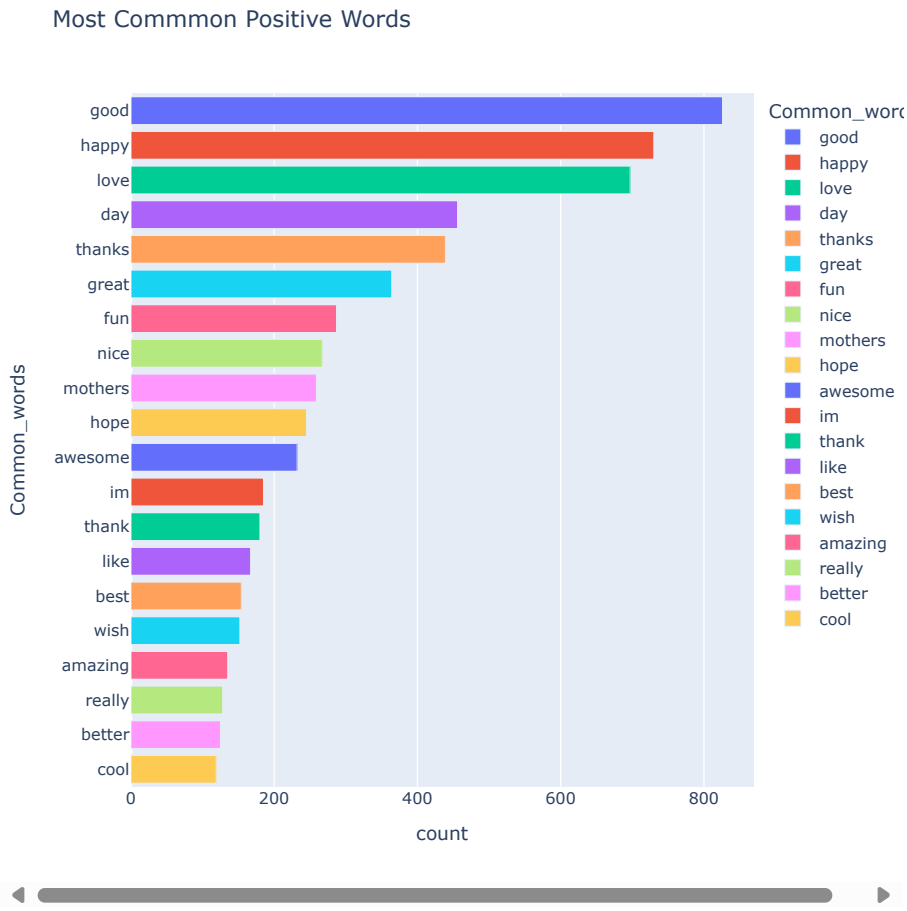
```
fig = px.bar(temp, x="count", y="Common_words", title='Commmon Words in Text', orientation='h',
             width=700, height=700,color='Common_words')
fig.show()
```




```
Positive_sent = train[train['sentiment']=='positive']
Negative_sent = train[train['sentiment']=='negative']
Neutral_sent = train[train['sentiment']=='neutral']


#MosT common positive words
top = Counter([item for sublist in Positive_sent['temp_list'] for item in sublist])
temp_positive = pd.DataFrame(top.most_common(20))
temp_positive.columns = ['Common_words','count']
temp_positive.style.background_gradient(cmap='Greens')
```

	Common_words	count
0	good	826
1	happy	730
2	love	697
3	day	456
4	thanks	439
5	great	364
6	fun	287
7	nice	267
8	mothers	259
9	hope	245
10	awesome	232
11	im	185
12	thank	180
13	like	167
14	best	154
15	wish	152
16	amazing	135
17	really	128
18	better	125
19	cool	119

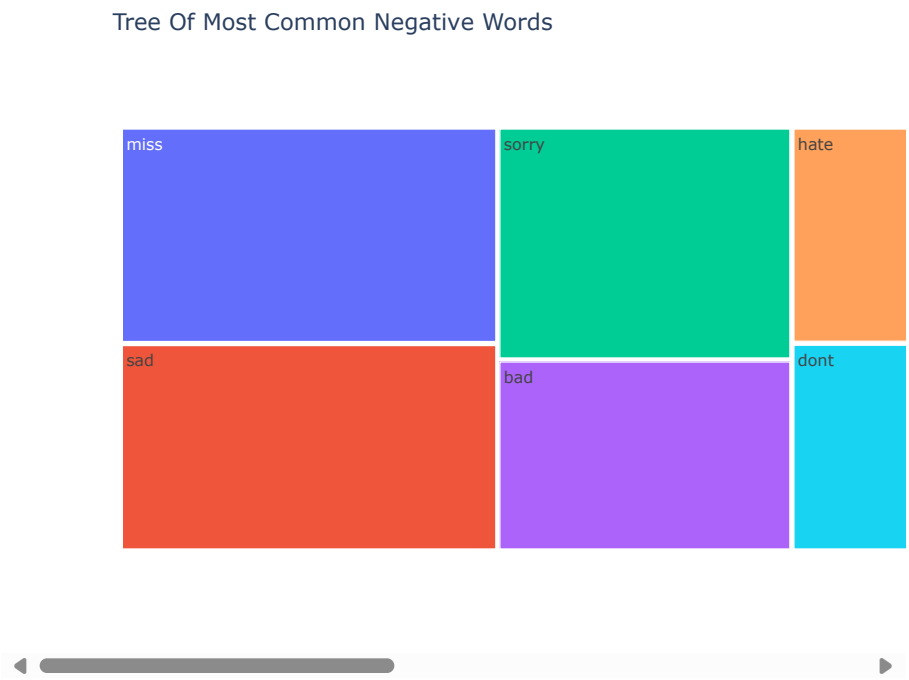
```
fig = px.bar(temp_positive, x="count", y="Common_words", title='Most Commmon Positive Words', orientation='h',
             width=700, height=700,color='Common_words')
fig.show()
```




```
#MosT common negative words
top = Counter([item for sublist in Negative_sent['temp_list'] for item in sublist])
temp_negative = pd.DataFrame(top.most_common(20))
temp_negative = temp_negative.iloc[1:,:]
temp_negative.columns = ['Common_words','count']
temp_negative.style.background_gradient(cmap='Reds')
```

	Common_words	count
1	miss	358
2	sad	343
3	sorry	300
4	bad	246
5	hate	230
6	dont	221
7	cant	201
8	sick	166
9	like	162
10	sucks	159
11	feel	158
12	tired	144
13	really	137
14	good	127
15	bored	115
16	day	110
17	hurts	108
18	work	99
19	get	97

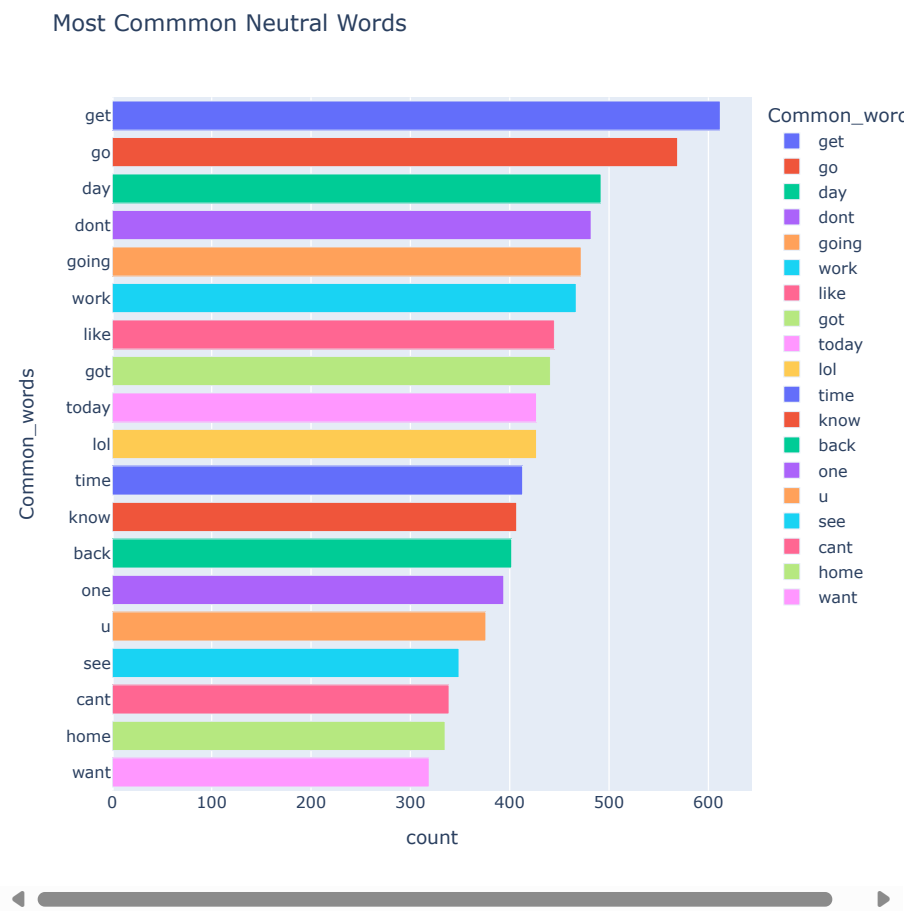
```
fig = px.treemap(temp_negative, path=['Common_words'], values='count',title='Tree Of Most Common Negative Words')
fig.show()
```



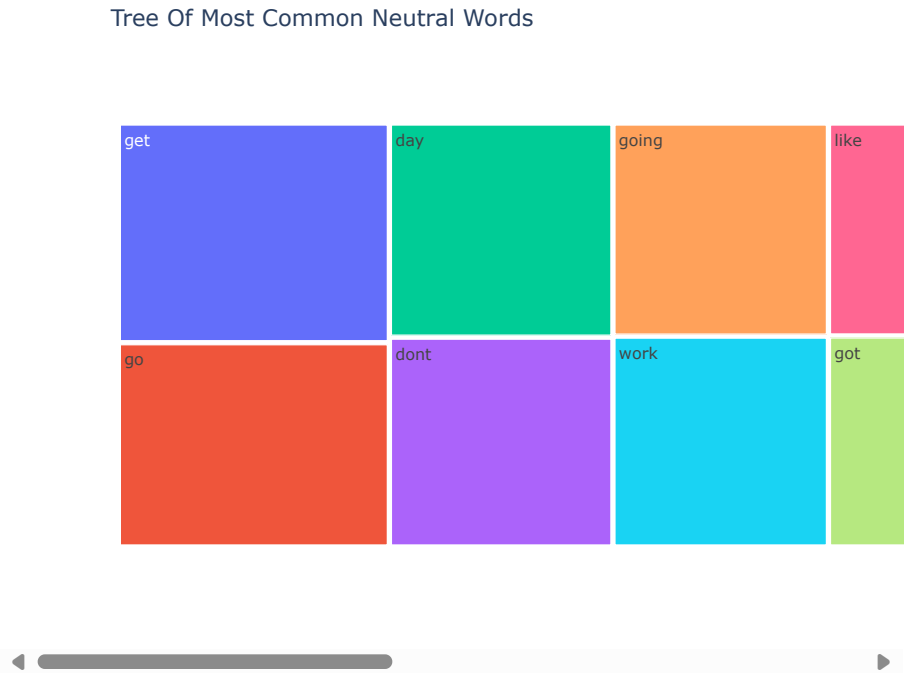

```
#MosT common Neutral words
top = Counter([item for sublist in Neutral_sent['temp_list'] for item in sublist])
temp_neutral = pd.DataFrame(top.most_common(20))
temp_neutral = temp_neutral.loc[1:,:]
temp_neutral.columns = ['Common_words','count']
temp_neutral.style.background_gradient(cmap='Reds')
```

	Common_words	count
1	get	612
2	go	569
3	day	492
4	dont	482
5	going	472
6	work	467
7	like	445
8	got	441
9	today	427
10	lol	427
11	time	413
12	know	407
13	back	402
14	one	394
15	u	376
16	see	349
17	cant	339
18	home	335
19	want	319

```
fig = px.bar(temp_neutral, x="count", y="Common_words", title='Most Commmon Neutral Words', orientation='h',
             width=700, height=700,color='Common_words')
fig.show()
```



```
fig = px.treemap(temp_neutral, path=['Common_words'], values='count',title='Tree Of Most Common Neutral Words')
fig.show()
```




```
raw_text = [word for word_list in train['temp_list1'] for word in word_list]


def words_unique(sentiment,numwords,raw_words):
    '''
    Input:
        segment - Segment category (ex. 'Neutral');
        numwords - how many specific words do you want to see in the final result;
        raw_words - list  for item in train_data[train_data.segments == segments]['temp_list1']:
    Output:
        dataframe giving information about the name of the specific ingredient and how many times it occurs in the chosen cuisine (in descen

    '''
    allother = []
    for item in train[train.sentiment != sentiment]['temp_list1']:
        for word in item:
            allother .append(word)
    allother  = list(set(allother ))

    specificnonly = [x for x in raw_text if x not in allother]

    mycounter = Counter()

    for item in train[train.sentiment == sentiment]['temp_list1']:
        for word in item:
            mycounter[word] += 1
    keep = list(specificnonly)

    for word in list(mycounter):
        if word not in keep:
            del mycounter[word]

    Unique_words = pd.DataFrame(mycounter.most_common(numwords), columns = ['words','count'])

    return Unique_words
```

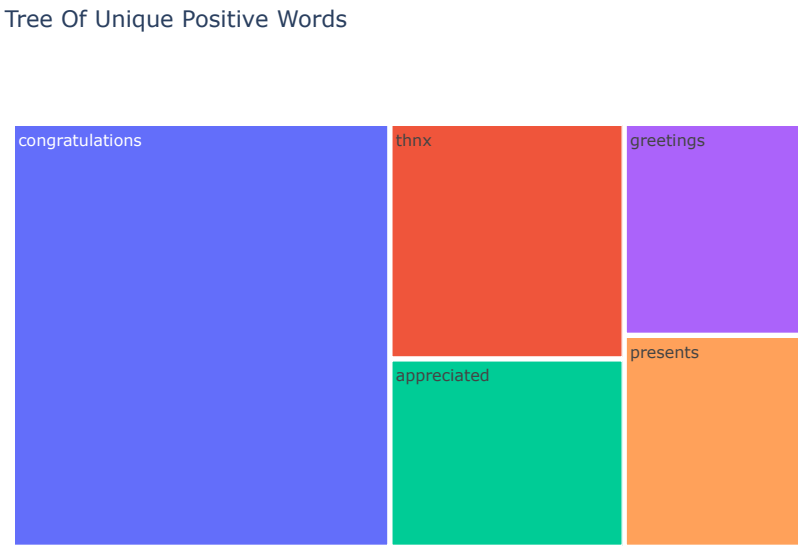
Positive Tweets

```
Unique_Positive= words_unique('positive', 20, raw_text)
print("The top 20 unique words in Positive Tweets are:")
Unique_Positive.style.background_gradient(cmap='Greens')
```

The top 20 unique words in Positive Tweets are:

	words	count
0	congratulations	29
1	thnx	10
2	appreciated	8
3	shared	7
4	presents	7
5	greetings	7
6	blessings	6
7	mothersday	6
8	mcr	6
9	coolest	6
10	honored	6
11	goood	6
12	wango	5
13	actress	5
14	mint	5
15	dayyyy	5
16	ciara	5
17	twin	5
18	kudos	5
19	hurray	5

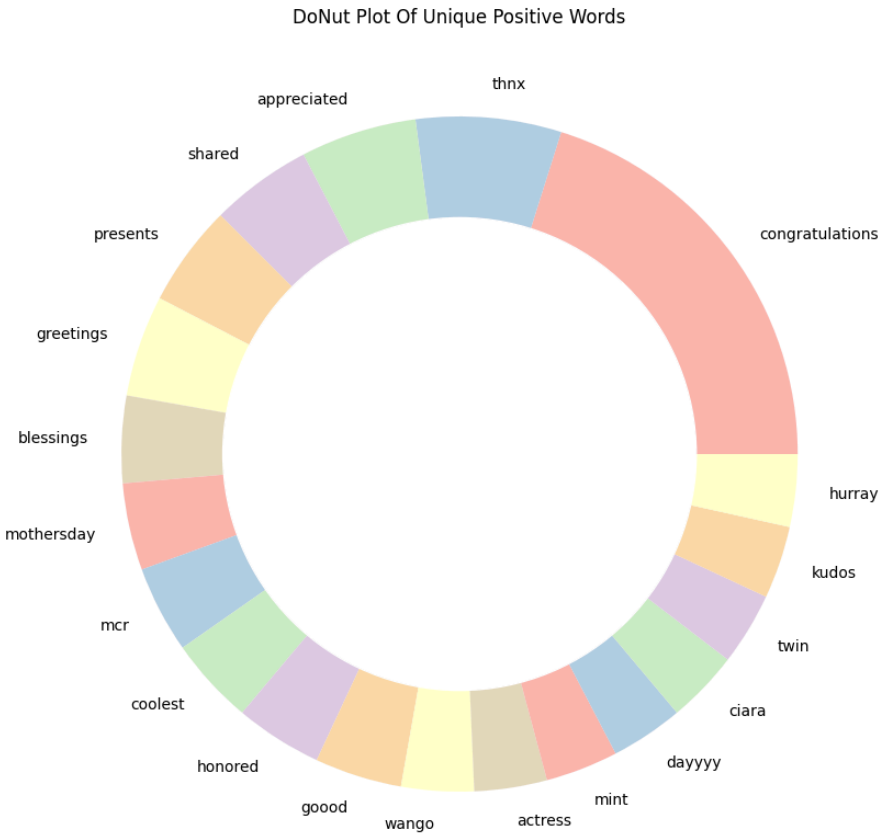
```
fig = px.treemap(Unique_Positive, path=['words'], values='count',title='Tree Of Unique Positive Words')
fig.show()
```




```
!pip install palettable
```

```
Requirement already satisfied: palettable in /usr/local/lib/python3.10/dist-packages (3.3.3)
```

```
from palettable.colorbrewer.qualitative import Pastel1_7
plt.figure(figsize=(16,10))
my_circle=plt.Circle((0,0), 0.7, color='white')
plt.pie(Unique_Positive['count'], labels=Unique_Positive.words, colors=Pastel1_7.hex_colors)
p=plt.gcf()
p.gca().add_artist(my_circle)
plt.title('DoNut Plot Of Unique Positive Words')
plt.show()
```

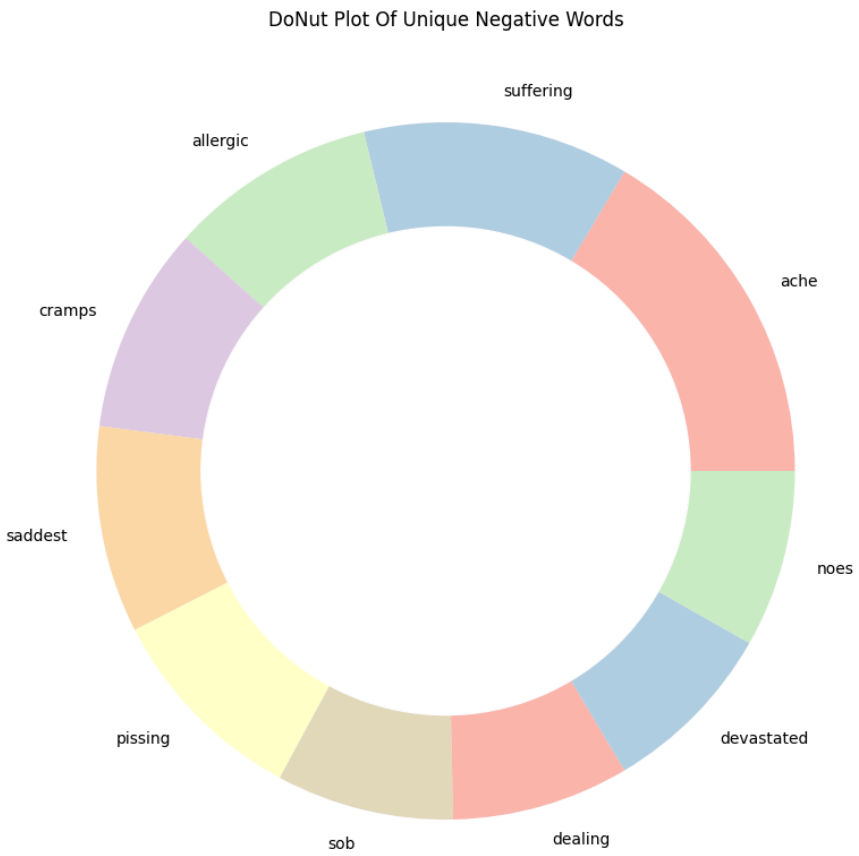



```
Unique_Negative= words_unique('negative', 10, raw_text)
print("The top 10 unique words in Negative Tweets are:")
Unique_Negative.style.background_gradient(cmap='Reds')
```

The top 10 unique words in Negative Tweets are:

	words	count
0	ache	12
1	suffering	9
2	allergic	7
3	cramps	7
4	saddest	7
5	pissing	7
6	sob	6
7	dealing	6
8	devastated	6
9	noes	6

```
from palettable.colorbrewer.qualitative import Pastel1_7
plt.figure(figsize=(16,10))
my_circle=plt.Circle((0,0), 0.7, color='white')
plt.rcParams['text.color'] = 'black'
plt.pie(Unique_Negative['count'], labels=Unique_Negative.words, colors=Pastel1_7.hex_colors)
p=plt.gcf()
p.gca().add_artist(my_circle)
plt.title('DoNut Plot Of Unique Negative Words')
plt.show()
```

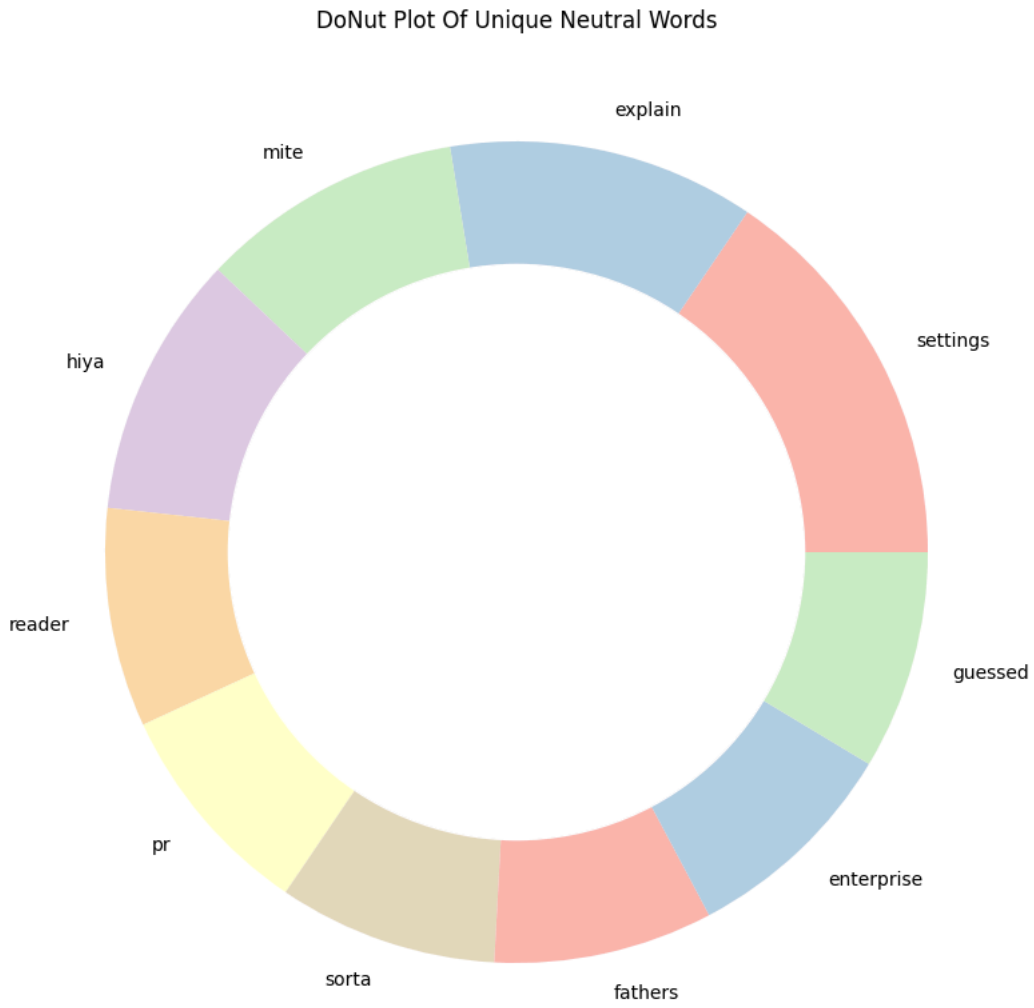


```
Unique_Neutral= words_unique('neutral', 10, raw_text)
print("The top 10 unique words in Neutral Tweets are:")
Unique_Neutral.style.background_gradient(cmap='Oranges')
```

```
The top 10 unique words in Neutral Tweets are:
```

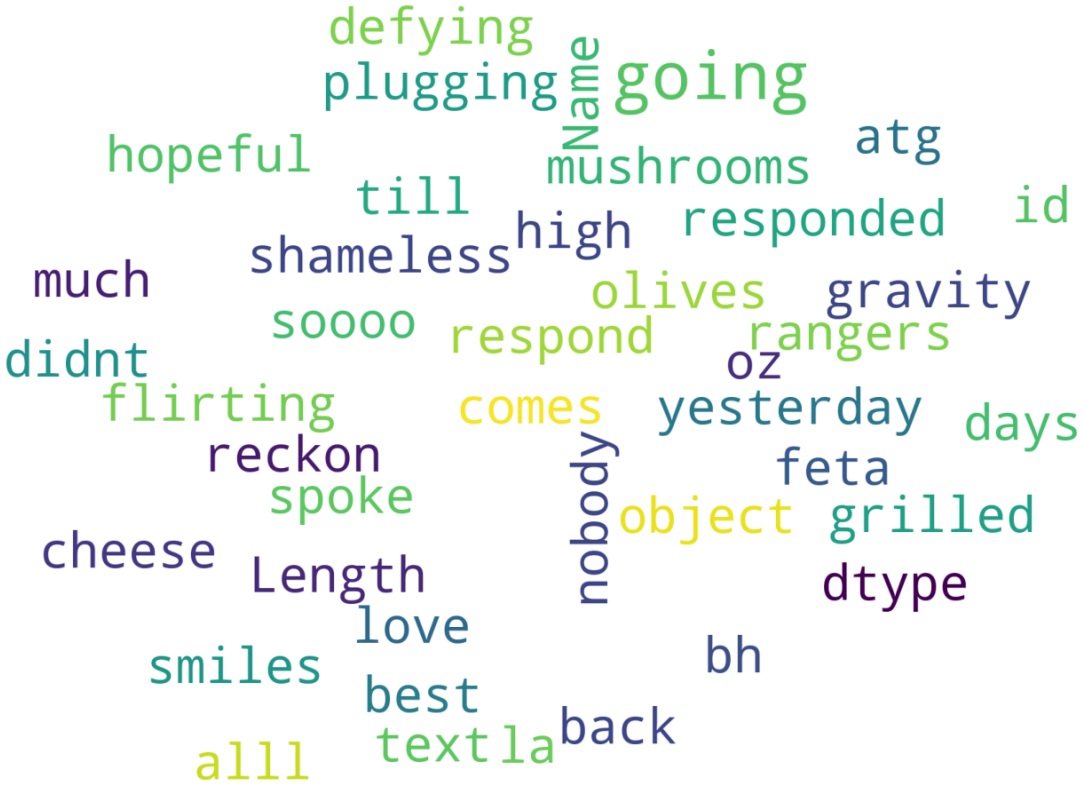
	words	count
0	settings	9
1	explain	7
2	mite	6
3	hiya	6
4	reader	5
5	pr	5
6	sorta	5
7	fathers	5
8	enterprise	5
9	guessed	5

```
from palettable.colorbrewer.qualitative import Pastel1_7
plt.figure(figsize=(16,10))
my_circle=plt.Circle((0,0), 0.7, color='white')
plt.pie(Unique_Neutral['count'], labels=Unique_Neutral.words, colors=Pastel1_7.hex_colors)
p=plt.gcf()
p.gca().add_artist(my_circle)
plt.title('DoNut Plot Of Unique Neutral Words')
plt.show()
```



```
def plot_wordcloud(text, mask=None, max_words=200, max_font_size=100, figure_size=(24.0,16.0), color = 'white',
                   title = None, title_size=40, image_color=False):
    stopwords = set(STOPWORDS)
    more_stopwords = {'u', "im"}
    stopwords = stopwords.union(more_stopwords)

    wordcloud = WordCloud(background_color=color,
                    stopwords = stopwords,
                    max_words = max_words,
                    max_font_size = max_font_size,
                    random_state = 42,
                    width=400,
                    height=200,
                    mask = mask)
    wordcloud.generate(str(text))

    plt.figure(figsize=figure_size)
    if image_color:
        image_colors = ImageColorGenerator(mask);
        plt.imshow(wordcloud.recolor(color_func=image_colors), interpolation="bilinear");
        plt.title(title, fontdict={'size': title_size,
                                   'verticalalignment': 'bottom'})
    else:
        plt.imshow(wordcloud);
        plt.title(title, fontdict={'size': title_size, 'color': 'black',
                                   'verticalalignment': 'bottom'})
    plt.axis('off');
    plt.tight_layout()
d = '/content/drive/MyDrive/input/senti_analysis/'


pos_mask = np.array(Image.open(d+ 'comment.png'))
plot_wordcloud(Neutral_sent.text,mask=pos_mask,color='white',max_font_size=100,title_size=30,title="WordCloud of Neutral Tweets")
```

WordCloud of Neutral Tweets



```
plot_wordcloud(Positive_sent.text,mask=pos_mask,title="Word Cloud Of Positive tweets",title_size=30)
```