

3107- JAWAHAR ENGINEERING COLLEGE

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Subject Title- AI 101- Artificial Intelligence

Project Title-Building a Smarter AI-Powered Spam Classifier: Phase-3

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Code

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2425 lines (2425 loc) · 311 KB

Preview

Code

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Raw



```
In [1]: import numpy as np
import pandas as pd
```

```
In [2]: dataset = pd.read_csv('spam.csv')
```

```
In [3]: dataset.sample(5)
```

	v1	v2	Unnamed: 2	Unnamed: 3	Unnamed: 4
1246	ham I do know what u mean, is the king of not hav...		NaN	NaN	NaN
2339	ham Cheers for the message Zogtorius. Iâ€ve been s...		NaN	NaN	NaN
3340	ham Still i have not checked it da...		NaN	NaN	NaN
1351	ham Yo theres no class tmrw right?		NaN	NaN	NaN
2997	ham No b4 Thursday		NaN	NaN	NaN

```
In [4]: dataset.shape
```

```
Out[4]: (5572, 5)
```

```
#1.Data Cleaning
#2.EDA
#3.Text Preprocessing
#4.Model Building
#5.Evaluation
#6.Improvement
#7.Website
#8.Deploy
```

1.Data Cleaning

```
In [6]: dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5572 entries, 0 to 5571
Data columns (total 5 columns):
 #   Column      Non-Null Count  Dtype  
--- 
 0   v1          5572 non-null   object 
 1   v2          5572 non-null   object 
 2   Unnamed: 2   50 non-null    object 
 3   Unnamed: 3   12 non-null    object 
 4   Unnamed: 4   6 non-null     object 
dtypes: object(5)
memory usage: 217.8+ KB
```

```
In [7]: #drop last three columns
dataset.drop(columns=['Unnamed: 2','Unnamed: 3','Unnamed: 4'],inplace=True)
```

```
In [8]: dataset.sample(5)
```

	v1	v2
--	----	----

```
1934 ham          Hope you are having a great day.
196 ham          Did u got that persons story
3346 ham          No problem baby. Is this is a good time to tal...
2049 ham          How much is blackberry bold2 in nigeria.
1220 spam         No. 1 Nokia Tone 4 ur mob every week! Just txt...
```

In [9]:

```
#rename the columns
dataset.rename(columns={'v1':'type', 'v2':'text'}, inplace=True)
dataset.sample(5)
```

Out[9]:

	type	text
1273	spam	network operator. The service is free. For T &...
3946	ham	Sorry, went to bed early, nightnight
1440	ham	Cool breeze... Bright sun... Fresh flower... T...
3519	ham	No it will reach by 9 only. She telling she wi...
1722	ham	Thought praps you meant another one. Goodo! I'...

In [10]:

```
from sklearn.preprocessing import LabelEncoder
encoder = LabelEncoder()
```

In [11]:

```
encoder.fit_transform(dataset['type'])
```

Out[11]:

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

In [12]:

```
dataset['type'] = encoder.fit_transform(dataset['type'])
dataset.head()
```

Out[12]:

	type	text
0	0	Go until jurong point, crazy.. Available only ...
1	0	Ok lar... Joking wif u oni...
2	1	Free entry in 2 a wkly comp to win FA Cup fina...
3	0	U dun say so early hor... U c already then say...
4	0	Nah I don't think he goes to usf, he lives aro...

In [13]:

```
#missing values
dataset.isnull().sum()
```

Out[13]:

```
type      0
text      0
dtype: int64
```

In [14]:

```
#check for duplicate values
dataset.duplicated().sum()
```

Out[14]:

```
403
```

In [15]:

```
#remove duplicates
dataset.drop_duplicates(keep='first')
```

Out[15]:

	type	text
0	0	Go until jurong point, crazy.. Available only ...
1	0	Ok lar... Joking wif u oni...
2	1	Free entry in 2 a wkly comp to win FA Cup fina...
3	0	U dun say so early hor... U c already then say...
4	0	Nah I don't think he goes to usf, he lives aro...
...
5567	1	This is the 2nd time we have tried 2 contact u...
5568	0	Will l_b going to esplanade fr home?
5569	0	Pity, * was in mood for that. So...any other s...
5570	0	The guy did some bitching but I acted like i'd...
5571	0	Rofl. Its true to its name

5169 rows × 2 columns

In [16]:

```
dataset = dataset.drop_duplicates(keep='first')
```

In [17]:

```
dataset.duplicated().sum()
```

Out[17]: 0

In [18]:

```
dataset.shape
```

Out[18]: (5169, 2)

2.EDA

In [19]:

```
dataset.head()
```

Out[19]:

	type	text
0	0	Go until jurong point, crazy.. Available only ...
1	0	Ok lar... Joking wif u oni...
2	1	Free entry in 2 a wkly comp to win FA Cup fina...
3	0	U dun say so early hor... U c already then say...
4	0	Nah I don't think he goes to usf, he lives aro...

In [20]:

```
dataset.value_counts()
```

Out[20]: type

0 &lt;#&gt; in mca. But not conform.

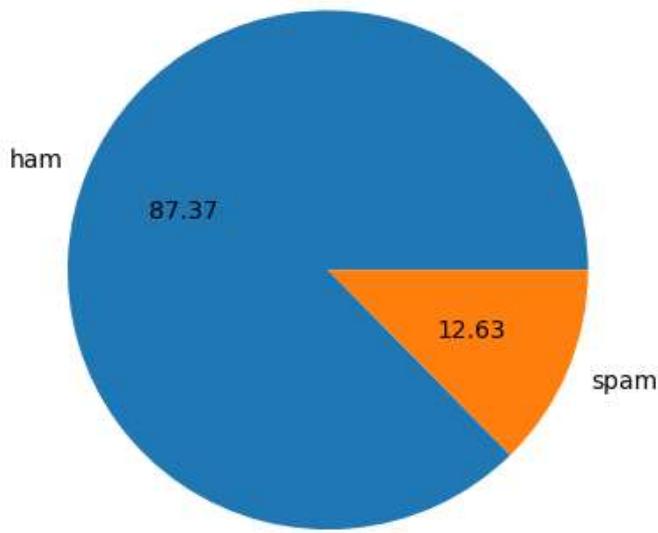
```
1 Thats cool. i liked your photos. You are very sexy!
1 That's good, because I need drugs
1 That's fine, have him give me a call if he knows what he wants or has any questions
1 That's fine, I'll bitch at you about it later then
1

..
I want to send something that can sell fast. &lt;#&gt; k is not easy money.
1 I want to see your pretty pussy...
1 I want to lick your pussy now...
1 I want to go to perumbavoor
1 we tried to contact you re your response to our offer of a new nokia fone and camcorder
hit reply or call 08000930705 for delivery 1
Name: count, Length: 5169, dtype: int64
```

```
In [21]: dataset['type'].value_counts()
```

```
Out[21]: type
0    4516
1    653
Name: count, dtype: int64
```

```
In [22]: import matplotlib.pyplot as plt
plt.pie(dataset['type'].value_counts(), labels=['ham', 'spam'], autopct="%0.2f")
plt.show()
```



```
In [23]: #Data is imbalanced
```

```
In [24]: import nltk
```

```
In [25]: nltk.download('punkt')
```

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

Out[25]: True

In [26]: `dataset['text'].apply(len)`

```
Out[26]: 0      111
1      29
2      155
3      49
4      61
...
5567    161
5568    37
5569    57
5570    125
5571    26
Name: text, Length: 5169, dtype: int64
```

In [27]: `dataset['num_characters'] = dataset['text'].apply(len)`
`dataset.head()`

	type	text	num_characters
0	0	Go until jurong point, crazy.. Available only ...	111
1	0	Ok lar... Joking wif u oni...	29
2	1	Free entry in 2 a wkly comp to win FA Cup fina...	155
3	0	U dun say so early hor... U c already then say...	49
4	0	Nah I don't think he goes to usf, he lives aro...	61

In [28]: `# num of words`
`dataset['text'].apply(lambda x:len(nltk.word_tokenize(x)))`

```
Out[28]: 0      24
1      8
2      37
3      13
4      15
...
5567    35
5568    9
5569    15
5570    27
5571    7
Name: text, Length: 5169, dtype: int64
```

In [29]: `dataset['num_words']= dataset['text'].apply(lambda x:len(nltk.word_tokenize(x)))`

In [30]: `dataset.head()`

	type	text	num_characters	num_words
0	0	Go until jurong point, crazy.. Available only ...	111	24
1	0	Ok lar... Joking wif u oni...	29	8

2	1	Free entry in 2 a wkly comp to win FA Cup fina...	155	37
3	0	U dun say so early hor... U c already then say...	49	13
4	0	Nah I don't think he goes to usf, he lives aro...	61	15

In [31]: `dataset['text'].apply(lambda x:len(nltk.sent_tokenize(x)))`

Out[31]:

0	2
1	2
2	2
3	1
4	1
	..
5567	4
5568	1
5569	2
5570	1
5571	2
	Name: text, Length: 5169, dtype: int64

In [32]: `dataset['num_sentences'] = dataset['text'].apply(lambda x:len(nltk.sent_tokenize(x)))`
`dataset.head()`

Out[32]:

	type	text	num_characters	num_words	num_sentences
0	0	Go until jurong point, crazy.. Available only ...	111	24	2
1	0	Ok lar... Joking wif u oni...	29	8	2
2	1	Free entry in 2 a wkly comp to win FA Cup fina...	155	37	2
3	0	U dun say so early hor... U c already then say...	49	13	1
4	0	Nah I don't think he goes to usf, he lives aro...	61	15	1

In [33]: `dataset[['num_characters', 'num_words', 'num_sentences']].describe()`

Out[33]:

	num_characters	num_words	num_sentences
count	5169.000000	5169.000000	5169.000000
mean	78.977945	18.455794	1.965564
std	58.236293	13.324758	1.448541
min	2.000000	1.000000	1.000000
25%	36.000000	9.000000	1.000000
50%	60.000000	15.000000	1.000000
75%	117.000000	26.000000	2.000000
max	910.000000	220.000000	38.000000

In [34]: `#ham`
`dataset[dataset['type'] ==0][['num_characters', 'num_words', 'num_sentences']].describe()`

Out[34]:

	num_characters	num_words	num_sentences
count	4516.000000	4516.000000	4516.000000

mean	70.459256	17.123782	1.820195
std	56.358207	13.493970	1.383657
min	2.000000	1.000000	1.000000
25%	34.000000	8.000000	1.000000
50%	52.000000	13.000000	1.000000
75%	90.000000	22.000000	2.000000
max	910.000000	220.000000	38.000000

In [35]:

```
#spam  
dataset[dataset['type'] == 1][['num_characters', 'num_words', 'num_sentences']].describe()
```

Out[35]:

	num_characters	num_words	num_sentences
count	653.000000	653.000000	653.000000
mean	137.891271	27.667688	2.970904
std	30.137753	7.008418	1.488425
min	13.000000	2.000000	1.000000
25%	132.000000	25.000000	2.000000
50%	149.000000	29.000000	3.000000
75%	157.000000	32.000000	4.000000
max	224.000000	46.000000	9.000000

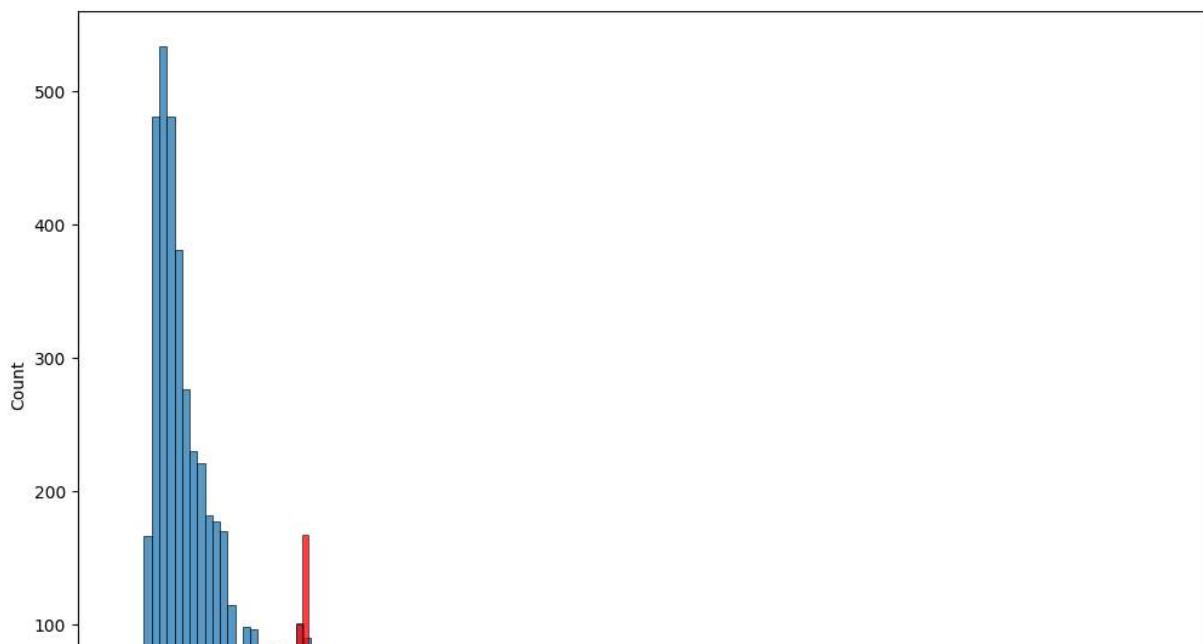
In [36]:

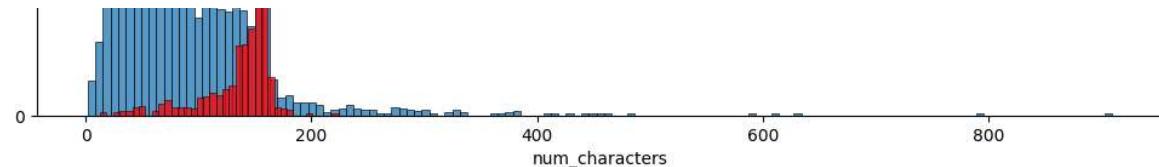
```
import seaborn as sns
```

In [37]:

```
plt.figure(figsize = (12,8))  
sns.histplot(dataset[dataset['type'] == 0]['num_characters'])  
sns.histplot(dataset[dataset['type'] == 1]['num_characters'], color='red')
```

Out[37]: <Axes: xlabel='num_characters', ylabel='Count'>

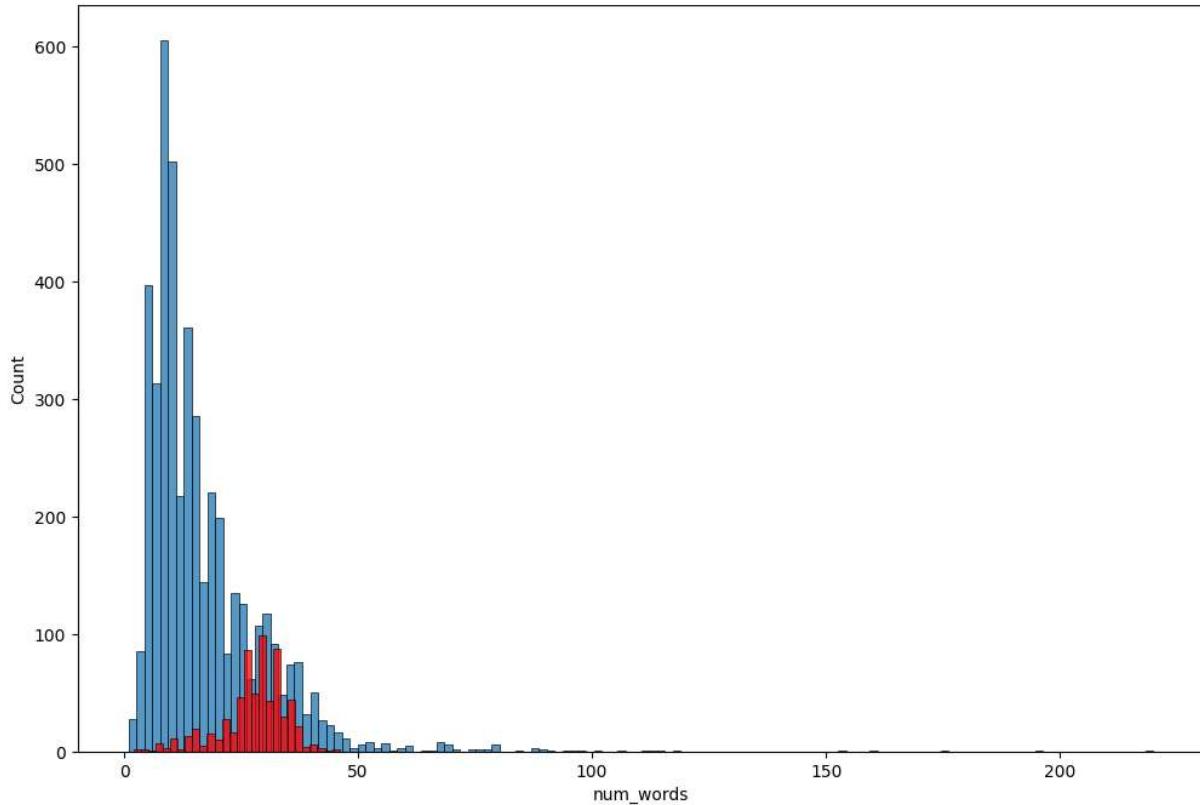




In [38]:

```
plt.figure(figsize = (12,8))
sns.histplot(dataset[dataset['type'] == 0]['num_words'])
sns.histplot(dataset[dataset['type'] == 1]['num_words'],color='red')
```

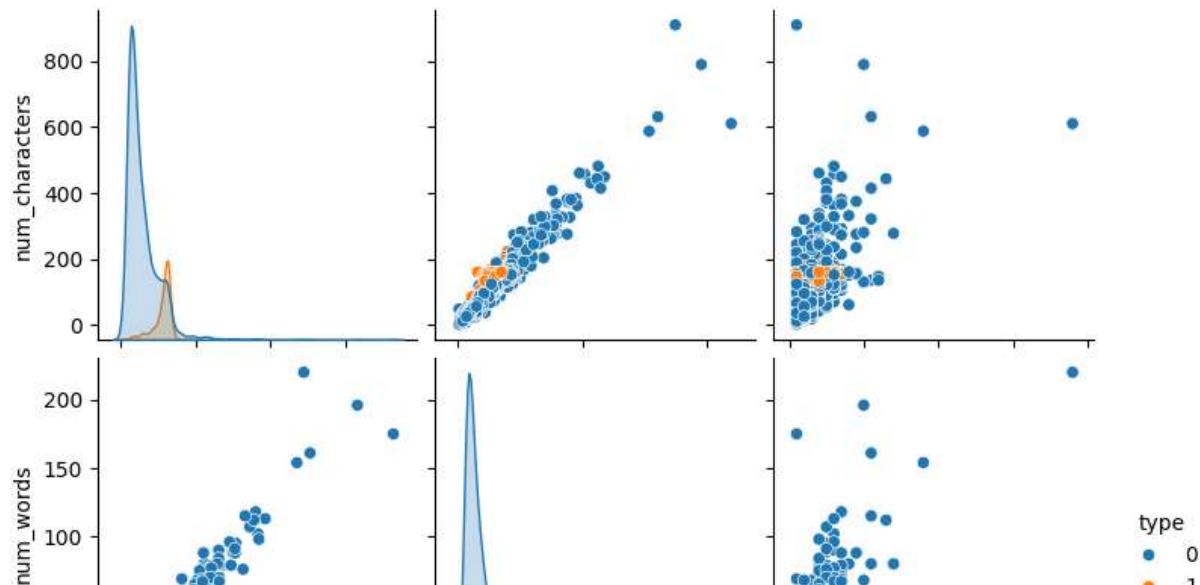
Out[38]: <Axes: xlabel='num_words', ylabel='Count'>

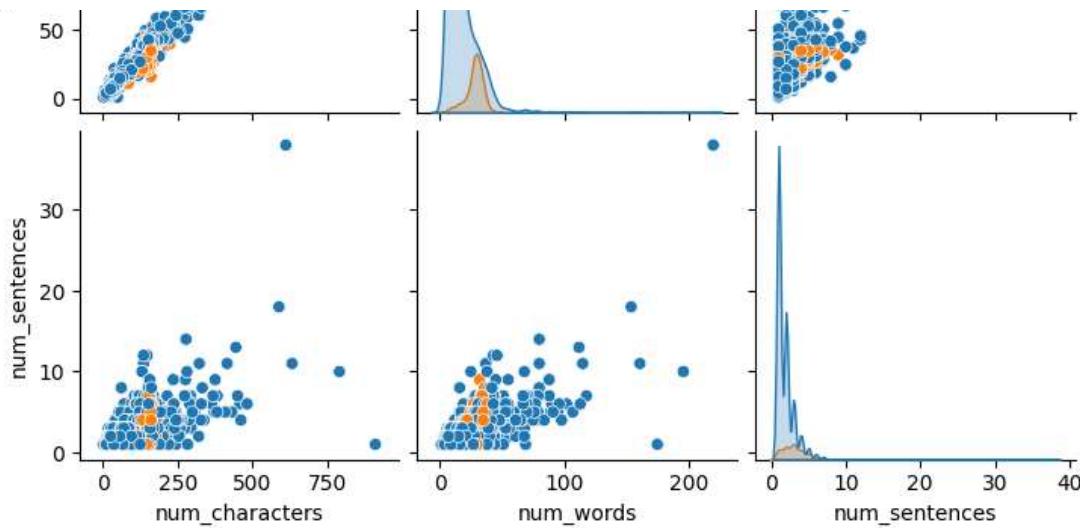


In [39]:

```
sns.pairplot(dataset, hue = 'type')
```

Out[39]: <seaborn.axisgrid.PairGrid at 0x241040d6ed0>





3. Data Preprocessing

```
In [40]: def transform_text(text):
    text = text.lower()
    text = nltk.word_tokenize(text)

    y = []
    for i in text:
        if i.isalnum():
            y.append(i)

    return y
```

```
In [41]: transform_text('Hi How Are You %%')
```

```
Out[41]: ['hi', 'how', 'are', 'you']
```

```
In [42]: dataset['text'][2000]
```

```
Out[42]: "But i'll b going 2 sch on mon. My sis need 2 take smth."
```

```
In [43]: from nltk.corpus import stopwords
stopwords.words('english')
```

```
Out[43]: ['i',
'me',
'my',
'myself',
'we',
'our',
'ours',
'ourselves',
'you',
"you're",
"you've",
"you'll",
"you'd",
'your',
'yours',
'yourself',
'yourselves',
'he',
...']
```

```
'him',
'his',
'himself',
'she',
"she's",
'her',
'hers',
'herself',
'it',
"it's",
'its',
'itself',
'they',
'them',
'their',
'theirs',
'themselves',
'what',
'which',
'who',
'whom',
'this',
'that',
"that'll",
'these',
'those',
'am',
'is',
'are',
'was',
'were',
'be',
'veen',
'being',
'have',
'has',
'had',
'having',
'do',
'does',
'did',
'doing',
'a',
'an',
'the',
'and',
'but',
'if',
'or',
'because',
'as',
'until',
'while',
'of',
'at',
'by',
'for',
'with',
'about',
'against',
'between',
'into',
'through',
'during',
'before',
'after',
'above',
'below',
'to',
```

```
'from',
'up',
'down',
'in',
'out',
'on',
'off',
'over',
'under',
'again',
'further',
'then',
'once',
'here',
'there',
'when',
'where',
'why',
'how',
'all',
'any',
'both',
'each',
'few',
'more',
'most',
'other',
'some',
'such',
'no',
'nor',
'not',
'only',
'own',
'same',
'so',
'than',
'too',
'very',
's',
't',
'can',
'will',
'just',
'don',
"don't",
'should',
"should've",
'now',
'd',
'll',
'm',
'o',
're',
've',
'y',
'ain',
'aren',
"aren't",
'couldn',
"couldn't",
'didn',
"didn't",
'doesn',
"doesn't",
'hadn',
"hadn't",
'hasn',
"hasn't",
```

```
'haven',
'haven\'t',
'isn',
"isn't",
'ma',
'mightn',
"mightn't",
'mustn',
"mustn't",
'needn',
"needn't",
'shan',
"shan't",
'shouldn',
"shouldn't",
'wasn',
"wasn't",
'weren',
"weren't",
>won',
>won't",
>wouldn',
>wouldn't']
```

In [44]: `import string`

In [45]: `string.punctuation`

Out[45]: `'!"#$%&\'()*+,.-./:;<=>?@[\\]^_`{|}~'`

In [54]: `from nltk.stem.porter import PorterStemmer
ps = PorterStemmer()
ps.stem('dancing')`

Out[54]: `'danc'`

In [56]: `def transform_text(text):
 text = text.lower()
 text = nltk.word_tokenize(text)

 y=[]
 for i in text:
 if i.isalnum():
 y.append(i)
 text = y[:]
 y.clear()

 for i in text:
 if i not in stopwords.words('english') and i not in string.punctuation:
 y.append(i)

 text = y[:]
 y.clear()

 for i in text:
 y.append(ps.stem(i))

 return " ".join(y)`

In [57]: `transform_text('I love the lectures on machine learning')`

Out[57]: `'love lectur machin learn'`

In [58]: `dataset['text'][10]`

Out[58]: "I'm gonna be home soon and i don't want to talk about this stuff anymore tonight, k? I've cried enough today."

In [59]: `dataset['transformed_text'] = dataset['text'].apply(transform_text)`

In [60]: `dataset.head()`

	type	text	num_characters	num_words	num_sentences	transformed_text
0	0	Go until jurong point, crazy.. Available only ...	111	24	2	go jurong point crazi avail bugi n great world...
1	0	Ok lar... Joking wif u oni...	29	8	2	ok lar joke wif u oni
2	1	Free entry in 2 a wkly comp to win FA Cup fina...	155	37	2	free entri 2 wkli comp win fa cup final tkt 21...
3	0	U dun say so early hor... U c already then say...	49	13	1	u dun say earli hor u c alreadi say
4	0	Nah I don't think he goes to usf, he lives aro...	61	15	1	nah think goe usf live around though

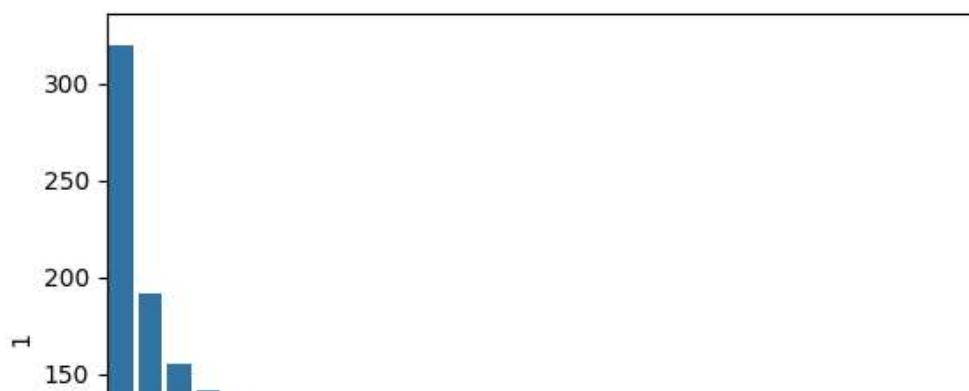
In [61]: `spam_corpus = []
for msg in dataset[dataset['type'] == 1]['transformed_text'].tolist():
 for word in msg.split():
 spam_corpus.append(word)`

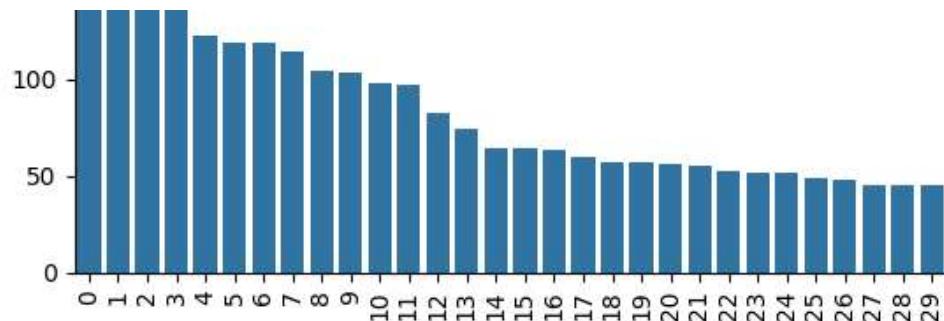
In [64]: `len(spam_corpus)`

Out[64]: 9939

In [82]: `from collections import Counter
sns.barplot(pd.DataFrame(Counter(spam_corpus).most_common(30))[1])
plt.xticks(rotation='vertical')
plt.show`

Out[82]: <function matplotlib.pyplot.show(close=None, block=None)>





In [84]:

```
ham_corpus = []
for msg in dataset[dataset['type'] == 1]['transformed_text'].tolist():
    for word in msg.split():
        ham_corpus.append(word)
```

In [85]:

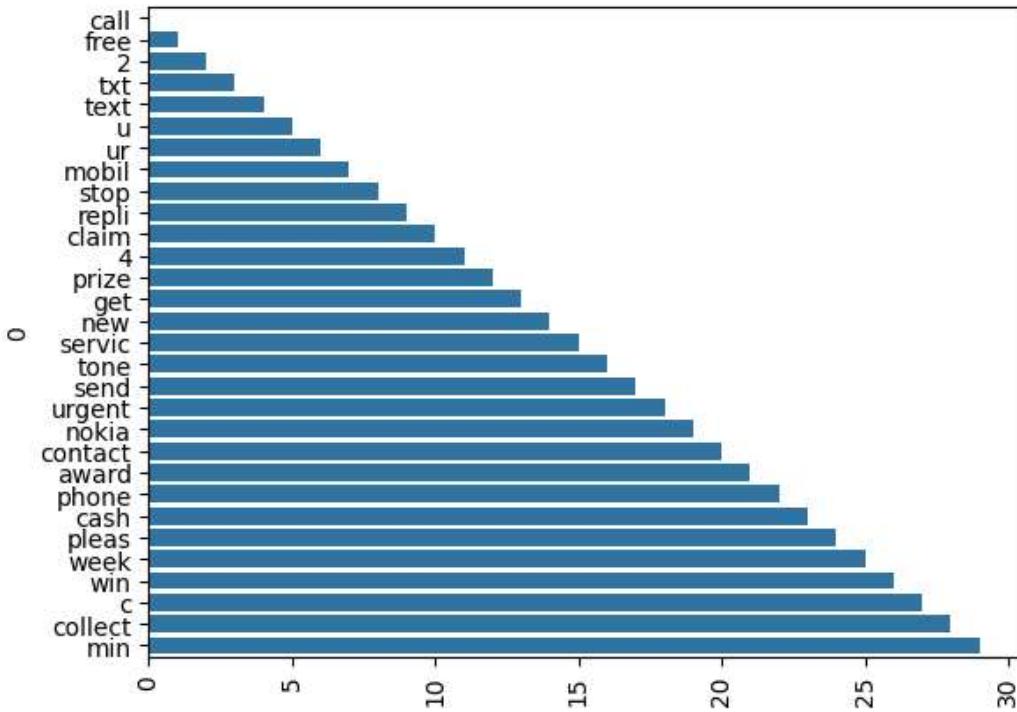
```
len(ham_corpus)
```

Out[85]: 9939

In [87]:

```
from collections import Counter
sns.barplot(pd.DataFrame(Counter(ham_corpus).most_common(30))[0])
plt.xticks(rotation='vertical')
plt.show
```

Out[87]: <function matplotlib.pyplot.show(close=None, block=None)>



In []:

