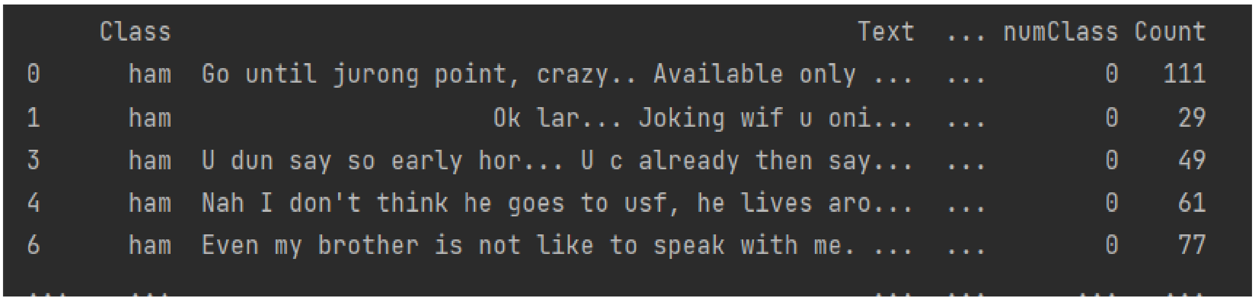
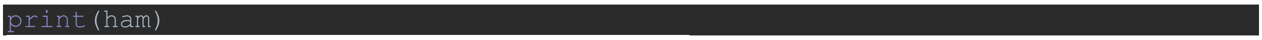
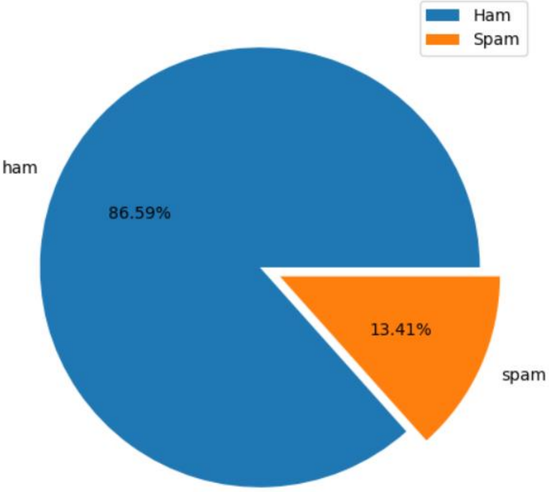
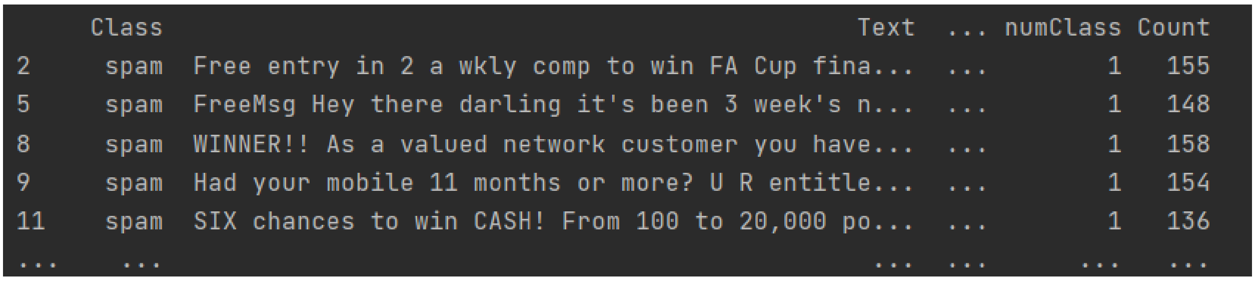


```
     Class                                               Text  ... numClass Count
0      ham  Go until jurong point, crazy.. Available only ...  ...        0   111
1      ham                      Ok lar... Joking wif u oni...  ...        0    29
3      ham  U dun say so early hor... U c already then say...  ...        0    49
4      ham  Nah I don't think he goes to usf, he lives aro...  ...        0    61
6      ham  Even my brother is not like to speak with me. ...  ...        0    77
...    ...                                                ...  ...      ...   ...
```

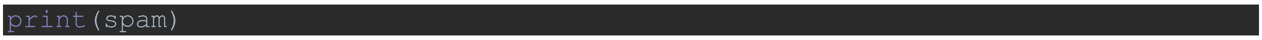


```
print(ham)
```

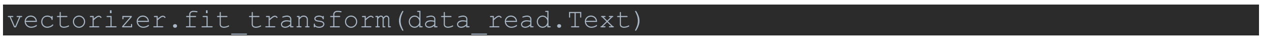




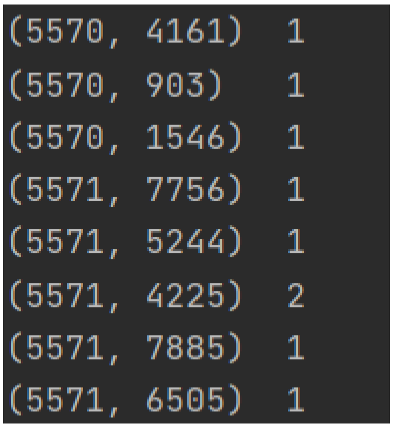
```
    Class                                               Text  ... numClass Count
2    spam  Free entry in 2 a wkly comp to win FA Cup fina...  ...        1   155
5    spam  FreeMsg Hey there darling it's been 3 week's n...  ...        1   148
8    spam  WINNER!! As a valued network customer you have...  ...        1   158
9    spam  Had your mobile 11 months or more? U R entitle...  ...        1   154
11   spam  SIX chances to win CASH! From 100 to 20,000 po...  ...        1   136
...   ...                                                ...  ...      ...   ...
```



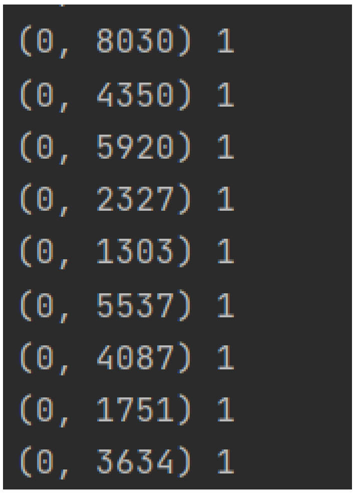
```
print(spam)
```



```
vectorizer.fit_transform(data_read.Text)
```

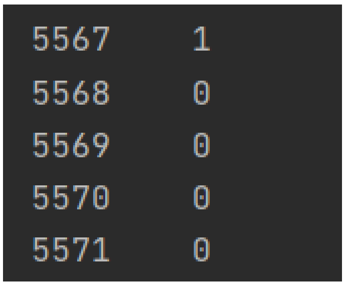


```
(5570, 4161)  1
(5570, 903)   1
(5570, 1546)  1
(5571, 7756)  1
(5571, 5244)  1
(5571, 4225)  2
(5571, 7885)  1
(5571, 6505)  1
```

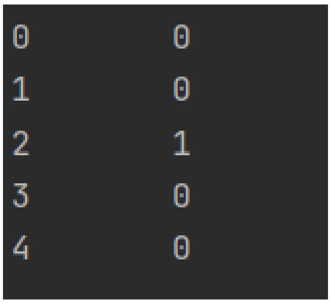


```
(0, 8030) 1
(0, 4350) 1
(0, 5920) 1
(0, 2327) 1
(0, 1303) 1
(0, 5537) 1
(0, 4087) 1
(0, 1751) 1
(0, 3634) 1
```

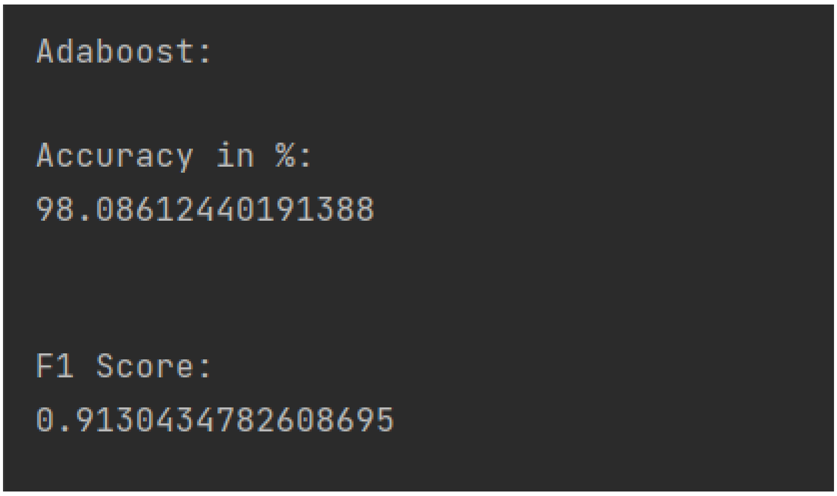
```
data_read.numClass
```



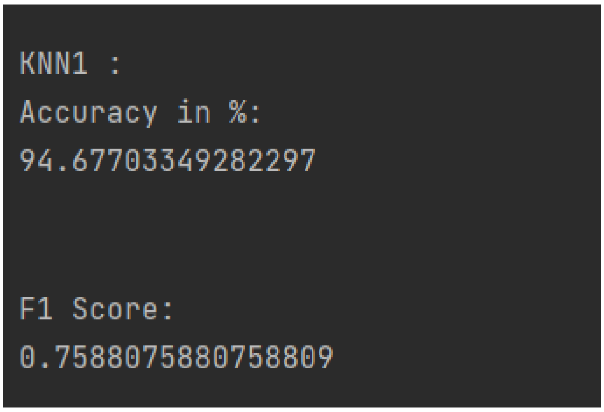
```
 5567    1
 5568    0
 5569    0
 5570    0
 5571    0
```



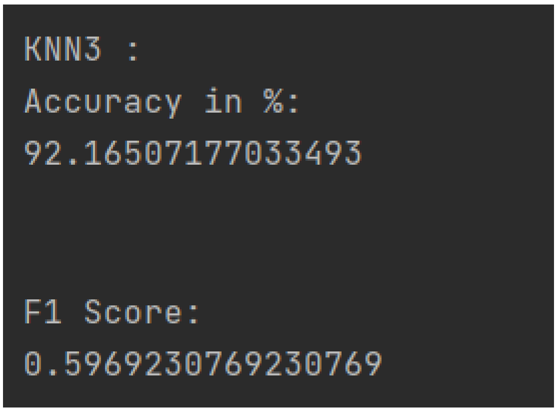
```
0        0
1        0
2        1
3        0
4        0
```



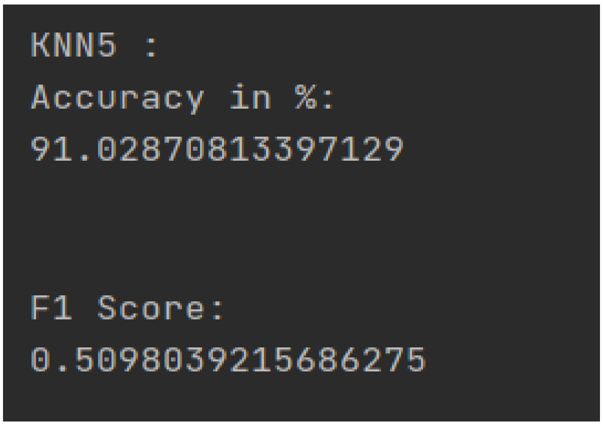
```
Adaboost:

Accuracy in %:
98.08612440191388



F1 Score:
0.9130434782608695
```



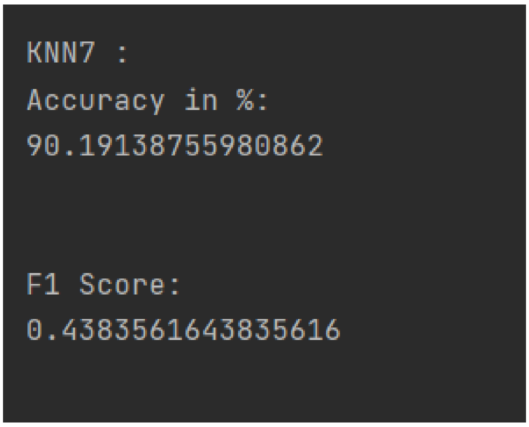
```
KNN1 :
Accuracy in %:
94.67703349282297


F1 Score:
0.7588075880758809
```



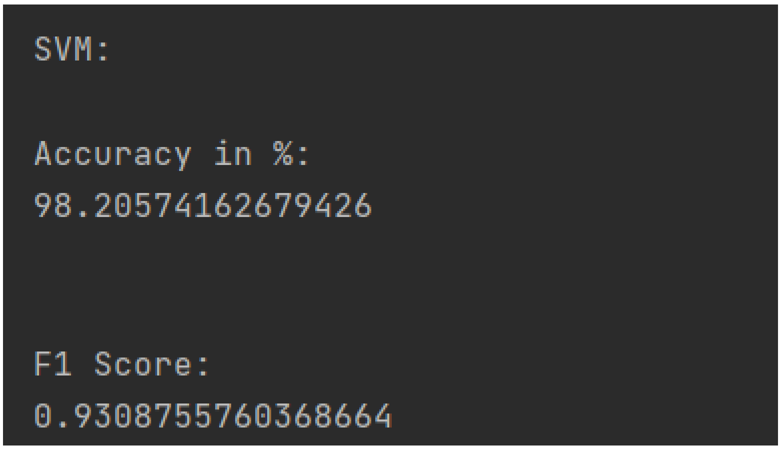
```
KNN3 :
Accuracy in %:
92.16507177033493


F1 Score:
0.5969230769230769
```



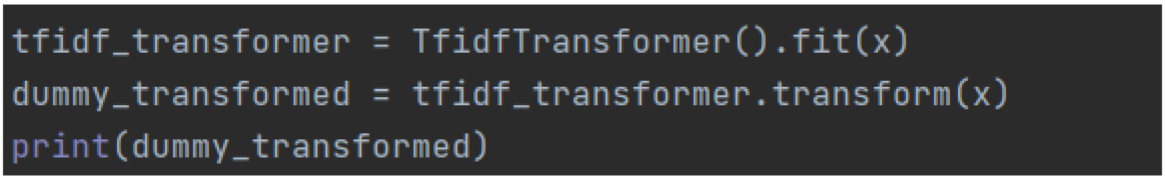
```
KNN5 :
Accuracy in %:
91.02870813397129


F1 Score:
0.5098039215686275
```



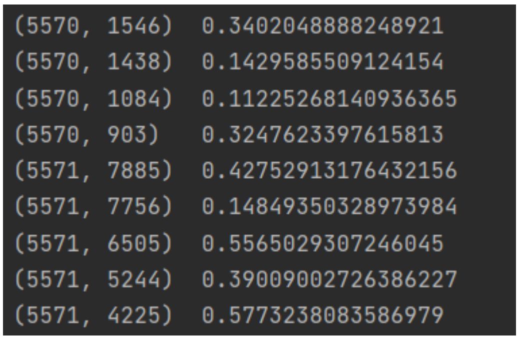
```
KNN7 :
Accuracy in %:
90.19138755980862


F1 Score:
0.4383561643835616
```



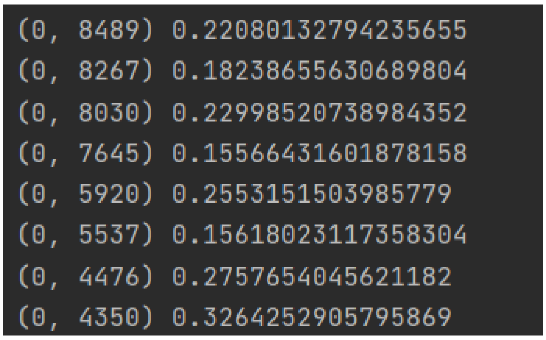
```
SVM:

Accuracy in %:
98.2057416267942 6


F1 Score:
0.9308755760368664
```



```
tfidf_transformer = TfidfTransformer().fit(x)
dummy_transformed = tfidf_transformer.transform(x)
print(dummy_transformed)
```

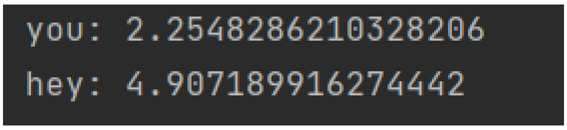


```
(5570, 1546)  0.3402048888248921
(5570, 1438)  0.1429585509124154
(5570, 1084)  0.11225268140936365
(5570, 903)   0.3247623397615813
(5571, 7885)  0.42752913176432156
(5571, 7756)  0.14849350328973984
(5571, 6505)  0.5565029307246045
(5571, 5244)  0.39009002726386227
(5571, 4225)  0.5773238083586979
```



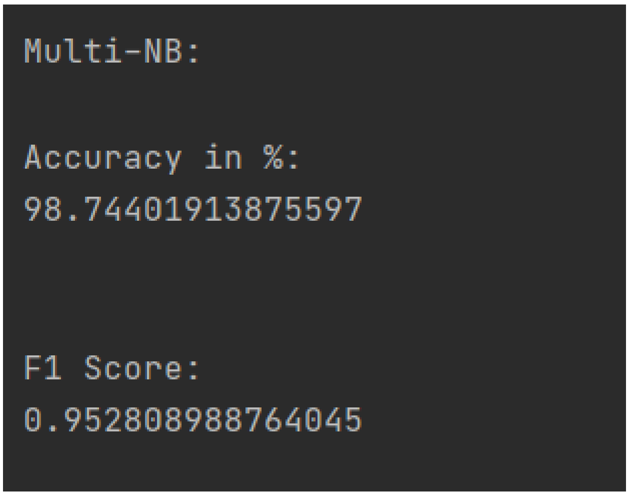
```
(0, 8489) 0.22080132794235655
(0, 8267) 0.18238655630689804
(0, 8030) 0.22998520738984352
(0, 7645) 0.15566431601878158
(0, 5920) 0.2553151503985779
(0, 5537) 0.15618023117358304
(0, 4476) 0.2757654045621182
(0, 4350) 0.3264252905795869
```

Now, lets check IDF for *you*, the most frequently repeated word in the message against *hey*, a least repeated word

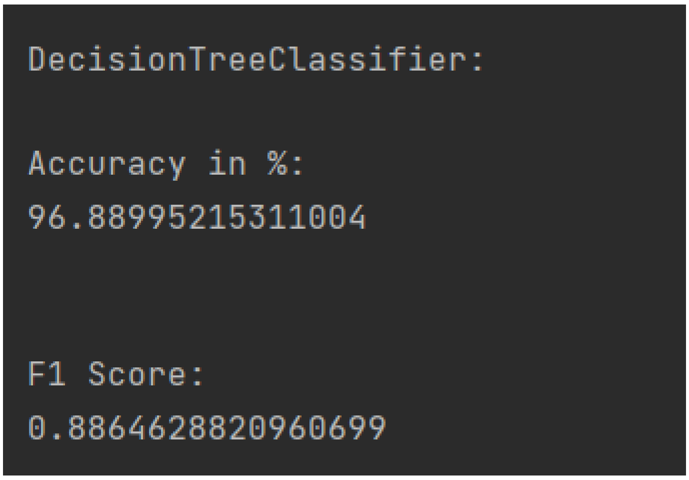


```
you: 2.2548286210328206
hey: 4.907189916274442
```

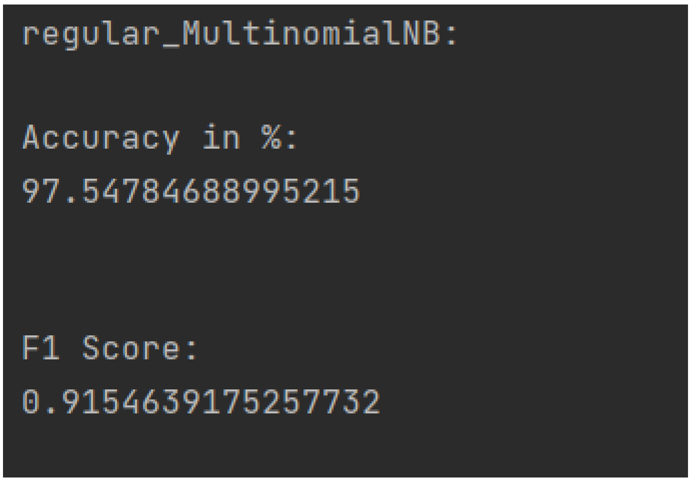
As you can see, words with lower frequency are weighed higher than words with higher frequency in the dataset.



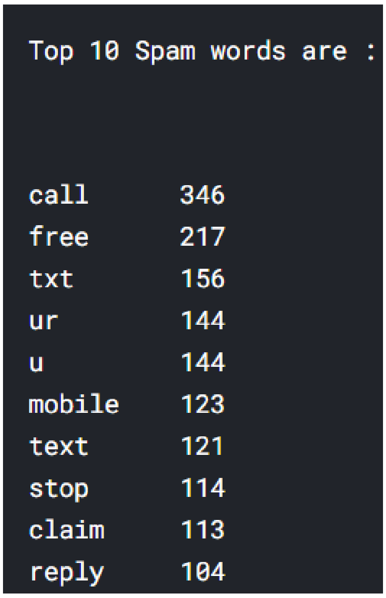
```
Multi-NB:

Accuracy in %:
98.74401913875597



F1 Score:
0.952808988764045
```



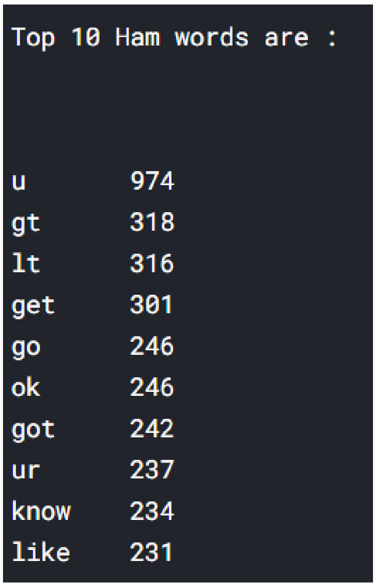
```
DecisionTreeClassifier:

Accuracy in %:
96.88995215311004



F1 Score:
0.8864628820960699
```



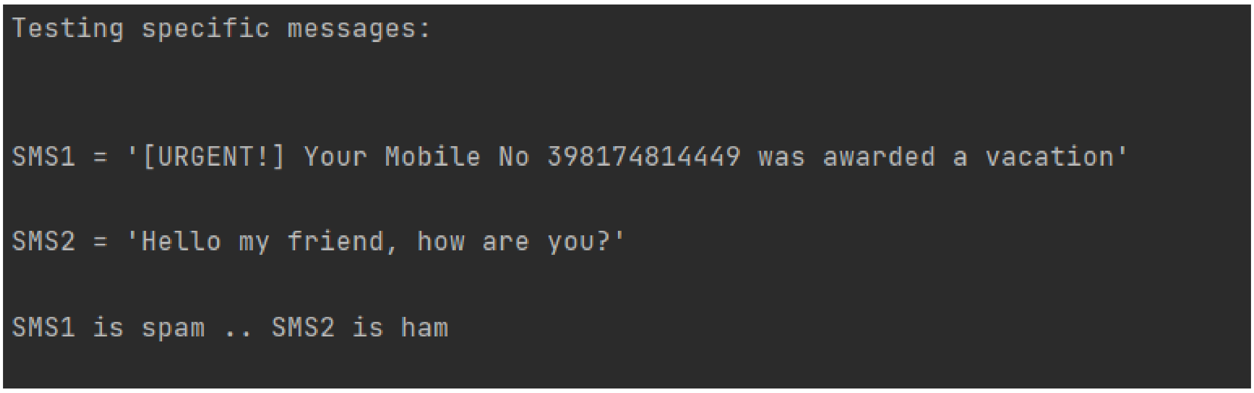
```
regular_MultinomialNB:

Accuracy in %:
97.54784688995215


F1 Score:
0.9154639175257732
```



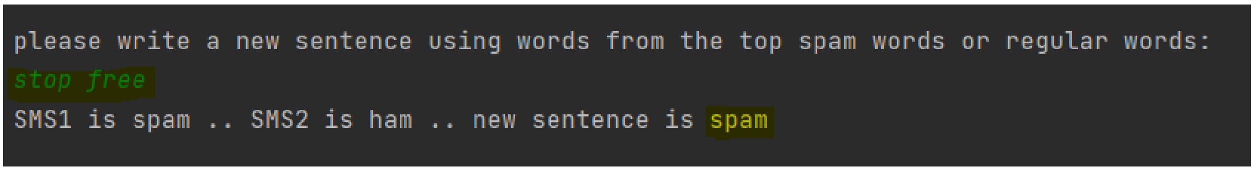
```
Top 10 Spam words are :


call      346
free      217
txt       156
ur        144
u         144
mobile    123
text      121
stop      114
claim     113
reply     104
```



```
Top 10 Ham words are :


u        974
gt       318
lt       316
get      301
go       246
ok       246
got      242
ur       237
know     234
like     231
```



```
Testing specific messages:


SMS1 = '[URGENT!] Your Mobile No 398174814449 was awarded a vacation'

SMS2 = 'Hello my friend, how are you?'

SMS1 is spam .. SMS2 is ham
```



```
please write a new sentence using words from the top spam words or regular words:
stop free
SMS1 is spam .. SMS2 is ham .. new sentence is spam
```