

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ . شروعِ اللہ کے پاک نام سے جو بڑا مہربان
نہایت رحم والا ہے

Import Libraries

```
In [1]: import re
import string
import scipy
import pickle
import pandas as pd
import numpy as np
from sklearn.feature_extraction.text import *
from sklearn.preprocessing import LabelEncoder
from sklearn.linear_model import LogisticRegression
from sklearn.naive_bayes import BernoulliNB
from sklearn.ensemble import RandomForestClassifier
from sklearn.svm import LinearSVC
from sklearn.metrics import accuracy_score
from astropy.table import Table, Column
from prettytable import PrettyTable
import warnings
import nltk
nltk.download('stopwords')

from sklearn.exceptions import DataConversionWarning
warnings.filterwarnings(action='ignore', category=DataConversionWarning)

from sklearn.exceptions import ConvergenceWarning
warnings.filterwarnings(action='ignore', category=ConvergenceWarning)

from warnings import simplefilter
# ignore all future warnings
simplefilter(action='ignore', category=FutureWarning)
```

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

Read and Understand Train and Test Data

```
In [2]: df = pd.read_csv (r'C:\Users\Muhammad Umair Ali\Desktop\Assignment#3\train.csv')

df.columns.name = 'index'

print (df)
```

index	Text	Type
0	\tGo until jurong point crazy.. Available only...	NotSpam
1	\tOk lar... Joking wif u oni...	NotSpam
2	\tFree entry in 2 a wkly comp to win FA Cup fi...	Spam
3	\tU dun say so early hor... U c already then s...	NotSpam
4	\tNah I don't think he goes to usf he lives ar...	NotSpam
5	\tFreeMsg Hey there darling it's been 3 week's...	Spam
6	\tEven my brother is not like to speak with me...	NotSpam
7	\tAs per your request 'Melle Melle (Oru Minnam...	NotSpam
8	\tWINNER!! As a valued network customer you ha...	Spam
9	\tHad your mobile 11 months or more? U R entit...	Spam
10	\tI'm gonna be home soon and i don't want to t...	NotSpam
11	\tSIX chances to win CASH! From 100 to 20000 p...	Spam
12	\tURGENT! You have won a 1 week FREE membershi...	Spam
13	\tI've been searching for the right words to t...	NotSpam
14	\tI HAVE A DATE ON SUNDAY WITH WILL!!	NotSpam
15	\tXXXMobileMovieClub: To use your credit click...	Spam
16	\tOh k...i'm watching here:)	NotSpam
17	\tEh u remember how 2 spell his name... Yes i ...	NotSpam
18	\tFine if that's the way u feel. That's the wa...	NotSpam
19	\tEngland v Macedonia - dont miss the goals/te...	Spam
20	\tIs that seriously how you spell his name?	NotSpam
21	\tI'm going to try for 2 months ha ha only joking	NotSpam
22	\tSo ü pay first lar... Then when is da stock ...	NotSpam
23	\tAft i finish my lunch then i go str down lor...	NotSpam
24	\tFfffffffff. Alright no way I can meet up wit...	NotSpam
25	\tJust forced myself to eat a slice. I'm reall...	NotSpam
26	\tLol your always so convincing.	NotSpam
27	\tDid you catch the bus ? Are you frying an eg...	NotSpam
28	\tI'm back & we're packing the car now I'l...	NotSpam
29	\tAhhh. Work. I vaguely remember that! What do...	NotSpam
..
180	\tHi! You just spoke to MANEESHA V. We'd like ...	NotSpam
181	\tYou lifted my hopes with the offer of money....	NotSpam
182	\tLol no. U can trust me.	NotSpam
183	\tok. I am a gentleman and will treat you with...	NotSpam
184	\tHe will you guys close?	NotSpam
185	\tGoing on nothing great.bye	NotSpam
186	\tHello handsome ! Are you finding that job ? ...	NotSpam
187	\tHaha awesome be there in a minute	NotSpam
188	\tPlease call our customer service representat...	Spam
189	\tHave you got Xmas radio times. If not i will...	NotSpam
190	\tI jus reached home. I go bathe first. But my...	NotSpam
191	\tAre you unique enough? Find out from 30th Au...	Spam
192	\tI'm sorry. I've joined the league of people ...	NotSpam
193	\tHi :)finally i completed the course:)	NotSpam
194	\tIt will stop on itself. I however suggest sh...	NotSpam
195	\tHow are you doing? Hope you've settled in fo...	NotSpam
196	\tGud mrng dear hav a nice day	NotSpam
197	\tDid u got that persons story	NotSpam

```
198 \tis your NotSpamster dead? Hey so tmr i meet ... NotSpam
199 \tHi its Kate how is your evening? I hope i ca... NotSpam
200 \tFound it ENC &lt;#&gt; where you at? NotSpam
201 \tI sent you &lt;#&gt; bucks NotSpam
202 \tHello darlin ive finished college now so txt... NotSpam
203 \tYour account has been refilled successfully ... NotSpam
204 \tGoodmorning sleeping ga. NotSpam
205 \tU call me alter at 11 ok. NotSpam
206 \tÜ say until like dat i dun buy ericsson oso ... NotSpam
207 \tAs I entered my cabin my PA said '' Happy B'... NotSpam
208 \tAight yo dats straight dogg NotSpam
209 \tYou please give us connection today itself b... NotSpam
```

[210 rows x 2 columns]

```
In [3]: df['Text']=df['Text'].map(lambda x : str(x)[1:])
```

In [4]: `print(df)`

index	Text	Type
0	Go until jurong point crazy.. Available only i...	NotSpam
1	Ok lar... Joking wif u oni...	NotSpam
2	Free entry in 2 a wkly comp to win FA Cup fina...	Spam
3	U dun say so early hor... U c already then say...	NotSpam
4	Nah I don't think he goes to usf he lives arou...	NotSpam
5	FreeMsg Hey there darling it's been 3 week's n...	Spam
6	Even my brother is not like to speak with me. ...	NotSpam
7	As per your request 'Melle Melle (Oru Minnamin...	NotSpam
8	WINNER!! As a valued network customer you have...	Spam
9	Had your mobile 11 months or more? U R entitle...	Spam
10	I'm gonna be home soon and i don't want to tal...	NotSpam
11	SIX chances to win CASH! From 100 to 20000 pou...	Spam
12	URGENT! You have won a 1 week FREE membership ...	Spam
13	I've been searching for the right words to tha...	NotSpam
14	I HAVE A DATE ON SUNDAY WITH WILL!!	NotSpam
15	XXXMobileMovieClub: To use your credit click t...	Spam
16	Oh k...i'm watching here:)	NotSpam
17	Eh u remember how 2 spell his name... Yes i di...	NotSpam
18	Fine if that's the way u feel. That's the way ...	NotSpam
19	England v Macedonia - dont miss the goals/team...	Spam
20	Is that seriously how you spell his name?	NotSpam
21	I'm going to try for 2 months ha ha only joking	NotSpam
22	So ü pay first lar... Then when is da stock co...	NotSpam
23	Aft i finish my lunch then i go str down lor. ...	NotSpam
24	Ffffffffff. Alright no way I can meet up with ...	NotSpam
25	Just forced myself to eat a slice. I'm really ...	NotSpam
26	Lol your always so convincing.	NotSpam
27	Did you catch the bus ? Are you frying an egg ...	NotSpam
28	I'm back & we're packing the car now I'll ...	NotSpam
29	Ahhh. Work. I vaguely remember that! What does...	NotSpam
..
180	Hi! You just spoke to MANEESHA V. We'd like to...	NotSpam
181	You lifted my hopes with the offer of money. I...	NotSpam
182	Lol no. U can trust me.	NotSpam
183	ok. I am a gentleman and will treat you with d...	NotSpam
184	He will you guys close?	NotSpam
185	Going on nothing great.bye	NotSpam
186	Hello handsome ! Are you finding that job ? No...	NotSpam
187	Haha awesome be there in a minute	NotSpam
188	Please call our customer service representativ...	Spam
189	Have you got Xmas radio times. If not i will g...	NotSpam
190	I jus reached home. I go bathe first. But my s...	NotSpam
191	Are you unique enough? Find out from 30th Augu...	Spam
192	I'm sorry. I've joined the league of people th...	NotSpam
193	Hi :)finally i completed the course:)	NotSpam
194	It will stop on itself. I however suggest she ...	NotSpam
195	How are you doing? Hope you've settled in for ...	NotSpam
196	Gud mrng dear hav a nice day	NotSpam
197	Did u got that persons story	NotSpam
198	is your NotSpamster dead? Hey so tmr i meet yo...	NotSpam
199	Hi its Kate how is your evening? I hope i can ...	NotSpam
200	Found it ENC & where you at?	NotSpam
201	I sent you & bucks	NotSpam
202	Hello darlin ive finished college now so txt m...	NotSpam

```
203 Your account has been refilled successfully by... NotSpam
204 Goodmorning sleeping ga. NotSpam
205 U call me alter at 11 ok. NotSpam
206 Ü say until like dat i dun buy ericsson oso ca... NotSpam
207 As I entered my cabin my PA said '' Happy B'da... NotSpam
208 Aight yo dats straight dogg NotSpam
209 You please give us connection today itself bef... NotSpam
```

[210 rows x 2 columns]

```
In [5]: print('\n')
print('\n Train Dataset Columns \n ')
print (df.columns)

print('\n Number of Instances in Dataset  ')

print(len(df.index))
```

Train Dataset Columns

Index(['Text', 'Type'], dtype='object', name='index')

Number of Instances in Dataset
210

```
In [6]: print ('Test DataSet:\n')
dftest = pd.read_csv (r'C:\Users\Muhammad Umair Ali\Desktop\Assignment#3\Test.csv')
print (dftest)
dftest.columns.name = 'index'
print('\n')
print('\n Test Dataset Columns \n ')
print (dftest.columns)

print('\n Number of Instances in Test Dataset  ')

print(len(dftest.index))
```

Test DataSet:

	Text	Type
0	\tBoth :) i shoot big loads so get ready!	NotSpam
1	\tWhat's up bruv hope you had a great break. D...	NotSpam
2	\tHome so we can always chat	NotSpam
3	\tK:)k:)good:)study well.	NotSpam
4	\tYup... How ü noe leh...	NotSpam
5	\tSounds great! Are you home now?	NotSpam
6	\tFinally the match heading towards draw as yo...	NotSpam
7	\tTired. I haven't slept well the past few nig...	NotSpam
8	\tEasy ah?sen got selected means its good..	NotSpam
9	\tI have to take exam with march 3	NotSpam
10	\tYeah you should. I think you can use your gt...	NotSpam
11	\tOk no prob. Take ur time.	NotSpam
12	\tThere is os called ubandu which will run wit...	NotSpam
13	\tSorry I'll call later	NotSpam
14	\tU say leh... Of course nothing happen lar. N...	NotSpam
15	\t500 New Mobiles from 2004 MUST GO! Txt: NOKI...	Spam
16	\tWould really appreciate if you call me. Just...	NotSpam
17	\tWill u meet ur dream partner soon? Is ur car...	Spam
18	\tHey company elama po mudyadhu.	NotSpam
19	\tLife is more strict than teacher... Bcoz Tea...	NotSpam
20	\tDear good morning now only i am up	NotSpam
21	\tGet down in gandhipuram and walk to cross cu...	NotSpam
22	\tDear we are going to our rubber place	NotSpam
23	\tSorry battery died yeah I'm here	NotSpam
24	\tYes:)here tv is always available in work pla...	NotSpam
25	\tText & meet someone sexy today. U can find a...	Spam
26	\tI have printed it oh. So – come up...	NotSpam
27	\tOr ill be a little closer like at the bus st...	NotSpam
28	\tWhere are you?when wil you reach here?	NotSpam
29	\tNew Theory: Argument wins d SITUATION but lo...	NotSpam
..
60	\tRingtone Club: Get the UK singles chart on y...	Spam
61	\tCome to mu we're sorting out our narcotics s...	NotSpam
62	\tNight has ended for another day morning has ...	NotSpam
63	\tHMV BONUS SPECIAL 500 pounds of genuine HMV ...	Spam
64	\tUsf I guess might as well take 1 car	NotSpam
65	\tNo objection. My bf not coming.	NotSpam
66	\tThanx...	NotSpam
67	\tTell rob to mack his gf in the theater	NotSpam
68	\tAwesome I'll see you in a bit	NotSpam
69	\tJust sent it. So what type of food do you like?	NotSpam
70	\tAll done? All handed in? Celebrations in ful...	NotSpam

```

71          \tYou got called a tool? NotSpam
72 \t"Wen u miss someone the person is definitely... NotSpam
73          \tOk. I asked for money how far NotSpam
74          \tOkie... NotSpam
75 \tYeah I think my usual guy's still passed out... NotSpam
76 \tK I might come by tonight then if my class l... NotSpam
77          \tOk.. NotSpam
78 \thi baby im cruisin with my girl friend what ... NotSpam
79 \tMy life Means a lot to me Not because I love... NotSpam
80 \tDearshall mail tonite.busy in the streetshal... NotSpam
81          \tHey you told your name to gautNotSpam ah? NotSpam
82 \tHaf u found him? I feel so stupid da v cam w... NotSpam
83          \tOops. 4 got that bit. NotSpam
84          \tAre you this much buzy NotSpam
85 \tI accidentally deleted the message. Resend p... NotSpam
86 \tT-Mobile customer you may now claim your FRE... Spam
87 \tUnless it's a situation where YOU GO GURL wo... NotSpam
88 \tHurt me... Tease me... Make me cry... But in... NotSpam
89 \tI cant pick the phone right now. Pls send a ... NotSpam

```

[90 rows x 2 columns]

Test Dataset Columns

```
Index(['Text', 'Type'], dtype='object', name='index')
```

Number of Instances in Test Dataset

90

```
In [7]: dftest['Text']=dftest['Text'].map(lambda x : str(x)[1:])
print(dftest)
```

index	Text	Type
0	Both :) i shoot big loads so get ready!	NotSpam
1	What's up bruv hope you had a great break. Do ...	NotSpam
2	Home so we can always chat	NotSpam
3	K:)k:)good:)study well.	NotSpam
4	Yup... How ü noe leh...	NotSpam
5	Sounds great! Are you home now?	NotSpam
6	Finally the match heading towards draw as your...	NotSpam
7	Tired. I haven't slept well the past few nights.	NotSpam
8	Easy ah?sen got selected means its good..	NotSpam
9	I have to take exam with march 3	NotSpam
10	Yeah you should. I think you can use your gt a...	NotSpam
11	Ok no prob. Take ur time.	NotSpam
12	There is os called ubandu which will run witho...	NotSpam
13	Sorry I'll call later	NotSpam
14	U say leh... Of course nothing happen lar. Not...	NotSpam
15	500 New Mobiles from 2004 MUST GO! Txt: NOKIA ...	Spam
16	Would really appreciate if you call me. Just n...	NotSpam
17	Will u meet ur dream partner soon? Is ur caree...	Spam
18	Hey company elama po mudyadhu.	NotSpam
19	Life is more strict than teacher... Bcoz Teach...	NotSpam
20	Dear good morning now only i am up	NotSpam
21	Get down in gandhipuram and walk to cross cut ...	NotSpam
22	Dear we are going to our rubber place	NotSpam
23	Sorry battery died yeah I'm here	NotSpam
24	Yes:)here tv is always available in work place..	NotSpam
25	Text & meet someone sexy today. U can find a d...	Spam
26	I have printed it oh. So – come upst...	NotSpam
27	Or ill be a little closer like at the bus stop...	NotSpam
28	Where are you?when wil you reach here?	NotSpam
29	New Theory: Argument wins d SITUATION but lose...	NotSpam
..
60	Ringtone Club: Get the UK singles chart on you...	Spam
61	Come to mu we're sorting out our narcotics sit...	NotSpam
62	Night has ended for another day morning has co...	NotSpam
63	HMV BONUS SPECIAL 500 pounds of genuine HMV vo...	Spam
64	Usf I guess might as well take 1 car	NotSpam
65	No objection. My bf not coming.	NotSpam
66	Thanx...	NotSpam
67	Tell rob to mack his gf in the theater	NotSpam
68	Awesome I'll see you in a bit	NotSpam
69	Just sent it. So what type of food do you like?	NotSpam
70	All done? All handed in? Celebrations in full ...	NotSpam
71	You got called a tool?	NotSpam
72	"Wen u miss someone the person is definitely s...	NotSpam
73	Ok. I asked for money how far	NotSpam
74	Okie...	NotSpam
75	Yeah I think my usual guy's still passed out f...	NotSpam
76	K I might come by tonight then if my class let...	NotSpam
77	Ok..	NotSpam
78	hi baby im cruisin with my girl friend what r ...	NotSpam
79	My life Means a lot to me Not because I love m...	NotSpam
80	Dearshall mail tonite.busy in the streetshall ...	NotSpam
81	Hey you told your name to gautNotSpam ah?	NotSpam


```

82     Haf u found him? I feel so stupid da v cam was... NotSpam
83         Oops. 4 got that bit. NotSpam
84         Are you this much buzy NotSpam
85     I accidentally deleted the message. Resend ple... NotSpam
86     T-Mobile customer you may now claim your FREE ... Spam
87     Unless it's a situation where YOU GO GURL woul... NotSpam
88     Hurt me... Tease me... Make me cry... But in t... NotSpam
89     I cant pick the phone right now. Pls send a me... NotSpam

```

[90 rows x 2 columns]

```

In [8]: dframe=pd.DataFrame(df)
print(len(dframe[dframe['Type'] == 'Spam']),"Type by 'Spam' in Train ")
print (dframe[dframe['Type'] == 'Spam'])

```

33 Type by 'Spam' in Train

index	Text	Type
2	Free entry in 2 a wkly comp to win FA Cup fina...	Spam
5	FreeMsg Hey there darling it's been 3 week's n...	Spam
8	WINNER!! As a valued network customer you have...	Spam
9	Had your mobile 11 months or more? U R entitle...	Spam
11	SIX chances to win CASH! From 100 to 20000 pou...	Spam
12	URGENT! You have won a 1 week FREE membership ...	Spam
15	XXMobileMovieClub: To use your credit click t...	Spam
19	England v Macedonia - dont miss the goals/team...	Spam
34	Thanks for your subscription to Ringtone UK yo...	Spam
42	07732584351 - Rodger Burns - MSG = We tried to...	Spam
54	SMS. ac Sptv: The New Jersey Devils and the De...	Spam
56	Congrats! 1 year special cinema pass for 2 is ...	Spam
65	As a valued customer I am pleased to advise yo...	Spam
67	Urgent UR awarded a complimentary trip to Euro...	Spam
68	Did you hear about the new "Divorce Barbie"? I...	Spam
93	Please call our customer service representativ...	Spam
95	Your free ringtone is waiting to be collected....	Spam
114	GENT! We are trying to contact you. Last weeke...	Spam
117	You are a winner U have been specially selecte...	Spam
120	PRIVATE! Your 2004 Account Statement for 07742...	Spam
121	URGENT! Your Mobile No. was awarded £2000 Bonu...	Spam
123	Todays Voda numbers ending 7548 are selected t...	Spam
134	Sunshine Quiz Wkly Q! Win a top Sony DVD playe...	Spam
135	Want 2 get laid tonight? Want real Dogging loc...	Spam
139	You'll not rcv any more msgs from the chat svc...	Spam
147	FreeMsg Why haven't you replied to my text? I'...	Spam
159	Customer service announcement. You have a New Y...	Spam
160	You are a winner U have been specially selecte...	Spam
164	-PLS STOP bootydelious (32/F) is inviting you ...	Spam
165	BangBabes Ur order is on the way. U SHOULD rec...	Spam
167	URGENT! We are trying to contact you. Last wee...	Spam
188	Please call our customer service representativ...	Spam
191	Are you unique enough? Find out from 30th Augu...	Spam

```
In [9]: print(len(dframe[dframe['Type'] == 'NotSpam']), "Type by 'NotSpam' in Train ")
print (dframe[dframe['Type'] == 'NotSpam'])
```

177 Type by 'NotSpam' in Train

index	Text	Type
0	Go until jurong point crazy.. Available only i...	NotSpam
1	Ok lar... Joking wif u oni...	NotSpam
3	U dun say so early hor... U c already then say...	NotSpam
4	Nah I don't think he goes to usf he lives arou...	NotSpam
6	Even my brother is not like to speak with me. ...	NotSpam
7	As per your request 'Melle Melle (Oru Minnamin...	NotSpam
10	I'm gonna be home soon and i don't want to tal...	NotSpam
13	I've been searching for the right words to tha...	NotSpam
14	I HAVE A DATE ON SUNDAY WITH WILL!!	NotSpam
16	Oh k...i'm watching here:)	NotSpam
17	Eh u remember how 2 spell his name... Yes i di...	NotSpam
18	Fine if that's the way u feel. That's the way ...	NotSpam
20	Is that seriously how you spell his name?	NotSpam
21	I'm going to try for 2 months ha ha only joking	NotSpam
22	So ü pay first lar... Then when is da stock co...	NotSpam
23	Aft i finish my lunch then i go str down lor. ...	NotSpam
24	Ffffffffff. Alright no way I can meet up with ...	NotSpam
25	Just forced myself to eat a slice. I'm really ...	NotSpam
26	Lol your always so convincing.	NotSpam
27	Did you catch the bus ? Are you frying an egg ...	NotSpam
28	I'm back & we're packing the car now I'll ...	NotSpam
29	Ahhh. Work. I vaguely remember that! What does...	NotSpam
30	Wait that's still not all that clear were you ...	NotSpam
31	Yeah he got in at 2 and was v apologetic. n ha...	NotSpam
32	K tell me anything about you.	NotSpam
33	For fear of fainting with the of all that hous...	NotSpam
35	Yup... Ok i go home look at the timings then i...	NotSpam
36	Oops I'll let you know when my roommate's done	NotSpam
37	I see the letter B on my car	NotSpam
38	Anything lor... U decide...	NotSpam
..
178	Turns out my friends are staying for the whole...	NotSpam
179	Text her. If she doesnt reply let me know so i...	NotSpam
180	Hi! You just spoke to MANEESHA V. We'd like to...	NotSpam
181	You lifted my hopes with the offer of money. I...	NotSpam
182	Lol no. U can trust me.	NotSpam
183	ok. I am a gentleman and will treat you with d...	NotSpam
184	He will you guys close?	NotSpam
185	Going on nothing great.bye	NotSpam
186	Hello handsome ! Are you finding that job ? No...	NotSpam
187	Haha awesome be there in a minute	NotSpam
189	Have you got Xmas radio times. If not i will g...	NotSpam
190	I jus reached home. I go bathe first. But my s...	NotSpam
192	I'm sorry. I've joined the league of people th...	NotSpam
193	Hi :)finally i completed the course:)	NotSpam
194	It will stop on itself. I however suggest she ...	NotSpam
195	How are you doing? Hope you've settled in for ...	NotSpam
196	Gud mrng dear hav a nice day	NotSpam
197	Did u got that persons story	NotSpam
198	is your NotSpamster dead? Hey so tmr i meet yo...	NotSpam
199	Hi its Kate how is your evening? I hope i can ...	NotSpam
200	Found it ENC & where you at?	NotSpam

```

201          I sent you &#x26; bucks NotSpam
202 Hello darlin ive finished college now so txt m... NotSpam
203 Your account has been refilled successfully by... NotSpam
204          Goodmorning sleeping ga. NotSpam
205          U call me alter at 11 ok. NotSpam
206 Ü say until like dat i dun buy ericsson oso ca... NotSpam
207 As I entered my cabin my PA said '' Happy B'da... NotSpam
208          Aight yo dats straight dogg NotSpam
209 You please give us connection today itself bef... NotSpam

```

[177 rows x 2 columns]

```

In [10]: dframe2=pd.DataFrame(dfTest)
print(len(dframe2[dframe2['Type'] == 'Spam']),"Type by 'Spam' in Test ")
print (dframe2[dframe2['Type'] == 'Spam'])

```

11 Type by 'Spam' in Test

index	Text	Type
15	500 New Mobiles from 2004 MUST GO! Txt: NOKIA ...	Spam
17	Will u meet ur dream partner soon? Is ur caree...	Spam
25	Text & meet someone sexy today. U can find a d...	Spam
30	U 447801259231 have a secret admirer who is lo...	Spam
40	Congratulations ur awarded 500 of CD vouchers ...	Spam
49	We tried to contact you re your reply to our o...	Spam
54	Hey I am really horny want to chat or see me n...	Spam
58	Ur ringtone service has changed! 25 Free credi...	Spam
60	Ringtone Club: Get the UK singles chart on you...	Spam
63	HMV BONUS SPECIAL 500 pounds of genuine HMV vo...	Spam
86	T-Mobile customer you may now claim your FREE ...	Spam

```
In [11]: print(len(dframe2[dframe2['Type'] == 'NotSpam']), "Type by 'NotSpam' in Test ")
print (dframe2[dframe2['Type'] == 'NotSpam'])
```

79 Type by 'NotSpam' in Test

index	Text	Type
0	Both :) i shoot big loads so get ready!	NotSpam
1	What's up bruv hope you had a great break. Do ...	NotSpam
2	Home so we can always chat	NotSpam
3	K:)k:)good:)study well.	NotSpam
4	Yup... How ü noe leh...	NotSpam
5	Sounds great! Are you home now?	NotSpam
6	Finally the match heading towards draw as your...	NotSpam
7	Tired. I haven't slept well the past few nights.	NotSpam
8	Easy ah?sen got selected means its good..	NotSpam
9	I have to take exam with march 3	NotSpam
10	Yeah you should. I think you can use your gt a...	NotSpam
11	Ok no prob. Take ur time.	NotSpam
12	There is os called ubandu which will run witho...	NotSpam
13	Sorry I'll call later	NotSpam
14	U say leh... Of course nothing happen lar. Not...	NotSpam
16	Would really appreciate if you call me. Just n...	NotSpam
18	Hey company elama po mudyadhu.	NotSpam
19	Life is more strict than teacher... Bcoz Teach...	NotSpam
20	Dear good morning now only i am up	NotSpam
21	Get down in gandhipuram and walk to cross cut ...	NotSpam
22	Dear we are going to our rubber place	NotSpam
23	Sorry battery died yeah I'm here	NotSpam
24	Yes:)here tv is always available in work place..	NotSpam
26	I have printed it oh. So <#> come upst...	NotSpam
27	Or ill be a little closer like at the bus stop...	NotSpam
28	Where are you?when wil you reach here?	NotSpam
29	New Theory: Argument wins d SITUATION but lose...	NotSpam
31	Tomarrow final hearing on my laptop case so i ...	NotSpam
32	PLEASSSSSSSEEEEEEE TEL ME V AVENT DONE SPORTSx	NotSpam
33	Okay. No no just shining on. That was meant to...	NotSpam
..
56	Same. Wana plan a trip sometme then	NotSpam
57	Not sure yet still trying to get a hold of him	NotSpam
59	The evo. I just had to download flash. Jealous?	NotSpam
61	Come to mu we're sorting out our narcotics sit...	NotSpam
62	Night has ended for another day morning has co...	NotSpam
64	Usf I guess might as well take 1 car	NotSpam
65	No objection. My bf not coming.	NotSpam
66	Thanx...	NotSpam
67	Tell rob to mack his gf in the theater	NotSpam
68	Awesome I'll see you in a bit	NotSpam
69	Just sent it. So what type of food do you like?	NotSpam
70	All done? All handed in? Celebrations in full ...	NotSpam
71	You got called a tool?	NotSpam
72	"Wen u miss someone the person is definitely s...	NotSpam
73	Ok. I asked for money how far	NotSpam
74	Okie...	NotSpam
75	Yeah I think my usual guy's still passed out f...	NotSpam
76	K I might come by tonight then if my class let...	NotSpam
77	Ok..	NotSpam
78	hi baby im cruisin with my girl friend what r ...	NotSpam

79	My life Means a lot to me Not because I love m...	NotSpam
80	Dearshall mail tonite.busy in the streetshall ...	NotSpam
81	Hey you told your name to gautNotSpam ah?	NotSpam
82	Haf u found him? I feel so stupid da v cam was...	NotSpam
83	Oops. 4 got that bit.	NotSpam
84	Are you this much buzy	NotSpam
85	I accidentally deleted the message. Resend ple...	NotSpam
87	Unless it's a situation where YOU GO GURL woul...	NotSpam
88	Hurt me... Tease me... Make me cry... But in t...	NotSpam
89	I cant pick the phone right now. Pls send a me...	NotSpam

[79 rows x 2 columns]

```
In [12]: print("Word used By 'Spam' in train Data")
         dframe[dframe['Type'] == 'Spam'].Text.str.split(expand=True).stack().value_count;
```

Word used By 'Spam' in train Data

```
Out[12]: to                37
         a                 22
         you              16
         the              12
         call            10
         or               9
         have             9
         2                9
         for              8
         claim            6
         on               6
         are              6
         is               6
         your             6
         our              5
         U                5
         and              5
         Please           5
         receive          5
         £1000            5
         mobile           4
         be               4
         Call             4
         selected         4
         To               4
         If               4
         been             4
         customer         4
         with             4
         You              4
         ..
         nokia            1
         4742             1
         svc.             1
         Or               1
         Cost             1
         145              1
         UK's             1
         09066364589      1
         You'll           1
         http://wap. (http://wap.)    1
         up               1
         MSG              1
         review           1
         player           1
         Incorrect?       1
         internet/service 1
         Stop             1
         GRAVEL           1
         Usher            1
         150PPM           1
         hours            1
```

link	1
Service	1
it	1
collected.	1
Had	1
0871277810810	1
txt>	1
award.	1
Ltd	1

Length: 513, dtype: int64

```
In [13]: print("Word used By 'NotSpam' in train Data")
         dframe[dframe['Type'] == 'NotSpam'].Text.str.split(expand=True).stack().value_counts()
```

Word used By 'NotSpam' in train Data

```
Out[13]: you          72
         I            71
         to          54
         my          39
         the         38
         a           35
         i           33
         and         32
         for         30
         in          28
         that        26
         me          23
         on          20
         your        20
         of          19
         have        19
         I'm         18
         is          18
         so          17
         u           16
         not         15
         all         15
         with        14
         will        14
         when        13
         at          13
         like        13
         it          13
         U           12
         ?           11
         ..          ..
         wishin       1
         hospital.    1
         V.           1
         SUM          1
         left         1
         name?        1
         msg          1
         WANNA        1
         Toll         1
         Send         1
         need.        1
         &            1
         steed        1
         bus          1
         Dont         1
         "the         1
         Spamnish     1
         Hi.          1
         cried        1
         Double       1
         letter       1
```


bucks	1
typical	1
Good	1
earn	1
back?	1
Go	1
Xmas	1
Mr	1
str	1

Length: 1201, dtype: int64

```
In [14]: print("Word used By 'Spam' in test Data")
         dframe2[dframe2['Type'] == 'Spam'].Text.str.split(expand=True).stack().value_coun
```

Word used By 'Spam' in test Data

```
Out[14]: to          13
         &           6
         a           5
         your        4
         or          4
         of          4
         ur          4
         2           4
         txt         3
         HMV         3
         text        3
         on          3
         who         3
         500         3
         contact     2
         vouchers    2
         find        2
         is          2
         69698       2
         you         2
         choose      2
         with        2
         HORO        2
         4           2
         U           2
         meet        2
         Free        2
         out         2
         free        2
         start?      1
         ..
         Video       1
         the         1
         Just        1
         89545       1
         Ringtone    1
         stop        1
         anytime     1
         partner     1
         collect     1
         CAMERA      1
         message     1
         naked       1
         More        1
         dream       1
         pounds      1
         08000930705 1
         MUST        1
         its         1
         Club:       1
         sign        1
         Ur          1
```

see	1
followed	1
networks	1
our	1
content	1
reply	1
Mobiles	1
claim	1
flirt	1

Length: 227, dtype: int64

```
In [15]: print("Word used By 'NotSpam' in test Data")
         dframe2[dframe2['Type'] == 'NotSpam'].Text.str.split(expand=True).stack().value_
```

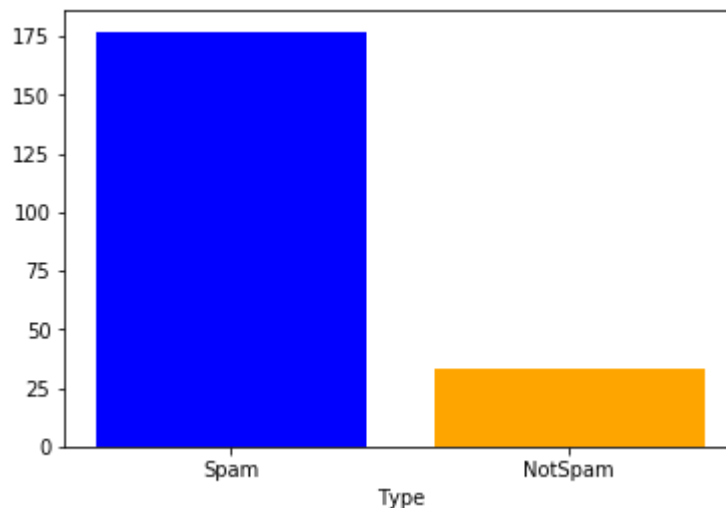
Word used By 'NotSpam' in test Data

```
Out[15]: you          25
         to           22
         I            21
         the          21
         a            17
         in           15
         my           11
         and          10
         have         9
         i            9
         are          8
         is           8
         so           7
         u            7
         now          6
         me           6
         it           6
         if           6
         be           5
         of           5
         on           5
         your         5
         but          5
         that         5
         call         5
         But          5
         .            5
         get          5
         just         4
         I'm          4
         ..
         Or           1
         though       1
         MISS         1
         Both         1
         us.          1
         yet          1
         money        1
         me.          1
         plan         1
         register.    1
         U..          1
         0125698789   1
         New          1
         shop..       1
         Make         1
         plz          1
         cal          1
         walk         1
         Get          1
         xxx          1
         lesson       1
```

```
cant.      1
Tired.     1
IN         1
tonight    1
Yup...     1
being      1
Nice       1
Dun        1
What's     1
Length: 616, dtype: int64
```

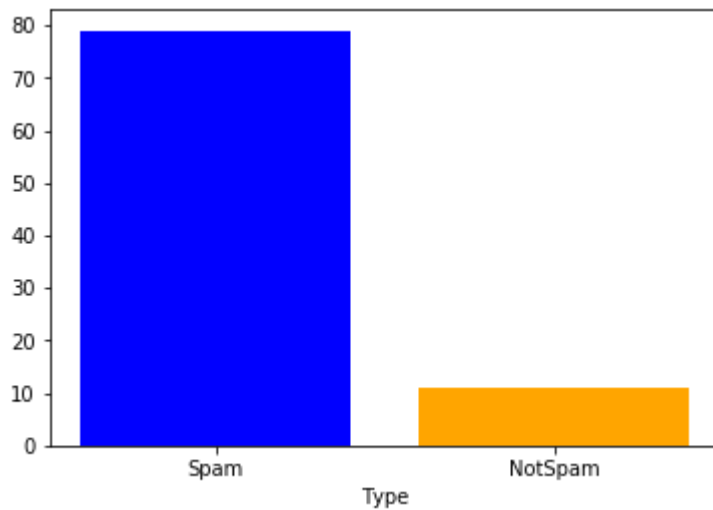
```
In [17]: import matplotlib.pyplot as plt
print("Total Number of 'Spam' and 'NotSpam' in Train Data ")
sizefe=len(dframe[dframe['Type'] == 'Spam'])
sizem=len(dframe[dframe['Type'] == 'NotSpam'])
height=[sizem,sizefe]
bars = ('Spam', 'NotSpam')
y_pos = np.arange(len(bars))
# Create bars
plt.bar(y_pos, height,color=('blue','orange'))
# Create names on the x-axis
plt.xticks(y_pos, bars)
plt.xlabel('Type')
# Show graphic
plt.show()
```

Total Number of 'Spam' and 'NotSpam' in Train Data



```
In [18]: print("Total Number of 'Male' and 'Female' in Test Data ")
sizefe2=len(dframe2[dframe2['Type'] == 'Spam'])
sizem2=len(dframe2[dframe2['Type'] == 'NotSpam'])
height=[sizem2,sizefe2]
bars = ('Spam', 'NotSpam')
y_pos = np.arange(len(bars))
# Create bars
plt.bar(y_pos, height,color=('blue','orange'))
# Create names on the x-axis
plt.xticks(y_pos, bars)
plt.xlabel('Type')
# Show graphic
plt.show()
```

Total Number of 'Male' and 'Female' in Test Data



Pre-Process Data

```
In [19]: print("Train Dataset before preprocessing")
print(dframe)
```

Train Dataset before preprocessing

index	Text	Type
0	Go until jurong point crazy.. Available only i...	NotSpam
1	Ok lar... Joking wif u oni...	NotSpam
2	Free entry in 2 a wkly comp to win FA Cup fina...	Spam
3	U dun say so early hor... U c already then say...	NotSpam
4	Nah I don't think he goes to usf he lives arou...	NotSpam
5	FreeMsg Hey there darling it's been 3 week's n...	Spam
6	Even my brother is not like to speak with me. ...	NotSpam
7	As per your request 'Melle Melle (Oru Minnamin...	NotSpam
8	WINNER!! As a valued network customer you have...	Spam
9	Had your mobile 11 months or more? U R entitle...	Spam
10	I'm gonna be home soon and i don't want to tal...	NotSpam
11	SIX chances to win CASH! From 100 to 20000 pou...	Spam
12	URGENT! You have won a 1 week FREE membership ...	Spam
13	I've been searching for the right words to tha...	NotSpam
14	I HAVE A DATE ON SUNDAY WITH WILL!!	NotSpam
15	XXXMobileMovieClub: To use your credit click t...	Spam
16	Oh k...i'm watching here:)	NotSpam
17	Eh u remember how 2 spell his name... Yes i di...	NotSpam
18	Fine if that's the way u feel. That's the way ...	NotSpam
19	England v Macedonia - dont miss the goals/team...	Spam
20	Is that seriously how you spell his name?	NotSpam
21	I'm going to try for 2 months ha ha only joking	NotSpam
22	So ü pay first lar... Then when is da stock co...	NotSpam
23	Aft i finish my lunch then i go str down lor. ...	NotSpam
24	Ffffffffff. Alright no way I can meet up with ...	NotSpam
25	Just forced myself to eat a slice. I'm really ...	NotSpam
26	Lol your always so convincing.	NotSpam
27	Did you catch the bus ? Are you frying an egg ...	NotSpam
28	I'm back & we're packing the car now I'll ...	NotSpam
29	Ahhh. Work. I vaguely remember that! What does...	NotSpam
..
180	Hi! You just spoke to MANEESHA V. We'd like to...	NotSpam
181	You lifted my hopes with the offer of money. I...	NotSpam
182	Lol no. U can trust me.	NotSpam
183	ok. I am a gentleman and will treat you with d...	NotSpam
184	He will you guys close?	NotSpam
185	Going on nothing great.bye	NotSpam
186	Hello handsome ! Are you finding that job ? No...	NotSpam
187	Haha awesome be there in a minute	NotSpam
188	Please call our customer service representativ...	Spam
189	Have you got Xmas radio times. If not i will g...	NotSpam
190	I jus reached home. I go bathe first. But my s...	NotSpam
191	Are you unique enough? Find out from 30th Augu...	Spam
192	I'm sorry. I've joined the league of people th...	NotSpam
193	Hi :)finally i completed the course:)	NotSpam
194	It will stop on itself. I however suggest she ...	NotSpam
195	How are you doing? Hope you've settled in for ...	NotSpam
196	Gud mrng dear hav a nice day	NotSpam
197	Did u got that persons story	NotSpam
198	is your NotSpamster dead? Hey so tmr i meet yo...	NotSpam
199	Hi its Kate how is your evening? I hope i can ...	NotSpam
200	Found it ENC & where you at?	NotSpam

201	I sent you &	NotSpam
202	Hello darlin ive finished college now so txt m...	NotSpam
203	Your account has been refilled successfully by...	NotSpam
204	Goodmorning sleeping ga.	NotSpam
205	U call me alter at 11 ok.	NotSpam
206	Ü say until like dat i dun buy ericsson oso ca...	NotSpam
207	As I entered my cabin my PA said '' Happy B'da...	NotSpam
208	Aight yo dats straight dogg	NotSpam
209	You please give us connection today itself bef...	NotSpam

[210 rows x 2 columns]


```
In [20]: print("Test Dataset before preprocessing")
print(dfame2)
```

Test Dataset before preprocessing

index	Text	Type
0	Both :) i shoot big loads so get ready!	NotSpam
1	What's up bruv hope you had a great break. Do ...	NotSpam
2	Home so we can always chat	NotSpam
3	K:)k:)good:)study well.	NotSpam
4	Yup... How ü noe leh...	NotSpam
5	Sounds great! Are you home now?	NotSpam
6	Finally the match heading towards draw as your...	NotSpam
7	Tired. I haven't slept well the past few nights.	NotSpam
8	Easy ah?sen got selected means its good..	NotSpam
9	I have to take exam with march 3	NotSpam
10	Yeah you should. I think you can use your gt a...	NotSpam
11	Ok no prob. Take ur time.	NotSpam
12	There is os called ubandu which will run witho...	NotSpam
13	Sorry I'll call later	NotSpam
14	U say leh... Of course nothing happen lar. Not...	NotSpam
15	500 New Mobiles from 2004 MUST GO! Txt: NOKIA ...	Spam
16	Would really appreciate if you call me. Just n...	NotSpam
17	Will u meet ur dream partner soon? Is ur caree...	Spam
18	Hey company elama po mudyadhu.	NotSpam
19	Life is more strict than teacher... Bcoz Teach...	NotSpam
20	Dear good morning now only i am up	NotSpam
21	Get down in gandhipuram and walk to cross cut ...	NotSpam
22	Dear we are going to our rubber place	NotSpam
23	Sorry battery died yeah I'm here	NotSpam
24	Yes:)here tv is always available in work place..	NotSpam
25	Text & meet someone sexy today. U can find a d...	Spam
26	I have printed it oh. So & come upst...	NotSpam
27	Or ill be a little closer like at the bus stop...	NotSpam
28	Where are you?when wil you reach here?	NotSpam
29	New Theory: Argument wins d SITUATION but lose...	NotSpam
..
60	Ringtone Club: Get the UK singles chart on you...	Spam
61	Come to mu we're sorting out our narcotics sit...	NotSpam
62	Night has ended for another day morning has co...	NotSpam
63	HMV BONUS SPECIAL 500 pounds of genuine HMV vo...	Spam
64	Usf I guess might as well take 1 car	NotSpam
65	No objection. My bf not coming.	NotSpam
66	Thanx...	NotSpam
67	Tell rob to mack his gf in the theater	NotSpam
68	Awesome I'll see you in a bit	NotSpam
69	Just sent it. So what type of food do you like?	NotSpam
70	All done? All handed in? Celebrations in full ...	NotSpam
71	You got called a tool?	NotSpam
72	"Wen u miss someone the person is definitely s...	NotSpam
73	Ok. I asked for money how far	NotSpam
74	Okie...	NotSpam
75	Yeah I think my usual guy's still passed out f...	NotSpam
76	K I might come by tonight then if my class let...	NotSpam
77	Ok..	NotSpam
78	hi baby im cruisin with my girl friend what r ...	NotSpam
79	My life Means a lot to me Not because I love m...	NotSpam
80	Dearshall mail tonite.busy in the streetshall ...	NotSpam

```

81         Hey you told your name to gautNotSpam ah? NotSpam
82     Haf u found him? I feel so stupid da v cam was... NotSpam
83         Oops. 4 got that bit. NotSpam
84         Are you this much buzy NotSpam
85     I accidentally deleted the message. Resend ple... NotSpam
86     T-Mobile customer you may now claim your FREE ... Spam
87     Unless it's a situation where YOU GO GURL woul... NotSpam
88     Hurt me... Tease me... Make me cry... But in t... NotSpam
89     I cant pick the phone right now. Pls send a me... NotSpam

```

[90 rows x 2 columns]

```

In [21]: import logging
from numpy import random
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import CountVectorizer, TfidfVectorizer
from sklearn.metrics import accuracy_score, confusion_matrix
import matplotlib.pyplot as plt
from nltk.corpus import stopwords
import re
from bs4 import BeautifulSoup
REPLACE_BY_SPACE_RE = re.compile('[/(){}\\[\]\\\\|@,;]')
BAD_SYMBOLS_RE = re.compile('[^0-9a-z #+_]')
STOPWORDS = set(stopwords.words('english'))

def clean_text(text):
    """
    text: a string

    return: modified initial string
    """
    text = BeautifulSoup(text, "lxml").text # HTML decoding
    text = text.lower() # Lowercase text
    text = REPLACE_BY_SPACE_RE.sub(' ', text) # replace REPLACE_BY_SPACE_RE symbols with space
    text = BAD_SYMBOLS_RE.sub('', text) # delete symbols which are in BAD_SYMBOLS_RE
    text = ' '.join(word for word in text.split() if word not in STOPWORDS) # delete stopwords
    return text

dframe['Text'] = dframe['Text'].apply(clean_text)

dframe2['Text'] = dframe2['Text'].apply(clean_text)

```

```
In [22]: print("Train Dataset After preprocessing")
print(dframe)
```

Train Dataset After preprocessing

index	Text	Type
0	go jurong point crazy available bugis n great ...	NotSpam
1	ok lar joking wif u oni	NotSpam
2	free entry 2 wkly comp win fa cup final tkts 2...	Spam
3	u dun say early hor u c already say	NotSpam
4	nah dont think goes usf lives around though	NotSpam
5	freemsg hey darling 3 weeks word back id like ...	Spam
6	even brother like speak treat like aids patent	NotSpam
7	per request melle melle oru minnamininginte nu...	NotSpam
8	winner valued network customer selected receiv...	Spam
9	mobile 11 months u r entitled update latest co...	Spam
10	im gonna home soon dont want talk stuff anymor...	NotSpam
11	six chances win cash 100 20000 pounds txt csh1...	Spam
12	urgent 1 week free membership 100000 prize jac...	Spam
13	ive searching right words thank breather promi...	NotSpam
14	date sunday	NotSpam
15	xxxmobilemovieclub use credit click wap link n...	Spam
16	oh kim watching	NotSpam
17	eh u remember 2 spell name yes v naughty make ...	NotSpam
18	fine thats way u feel thats way gota b	NotSpam
19	england v macedonia dont miss goals team news ...	Spam
20	seriously spell name	NotSpam
21	im going try 2 months ha ha joking	NotSpam
22	pay first lar da stock comin	NotSpam
23	aft finish lunch go str lor ard 3 smth lor u f...	NotSpam
24	ffffffffffff alright way meet sooner	NotSpam
25	forced eat slice im really hungry tho sucks ma...	NotSpam
26	lol always convincing	NotSpam
27	catch bus frying egg make tea eating moms left...	NotSpam
28	im back packing car ill let know theres room	NotSpam
29	ahhh work vaguely remember feel like lol	NotSpam
..
180	hi spoke maneesha v wed like know satisfied ex...	NotSpam
181	lifted hopes offer money need especially end m...	NotSpam
182	lol u trust	NotSpam
183	ok gentleman treat dignity respect	NotSpam
184	guys close	NotSpam
185	going nothing greatbye	NotSpam
186	hello handsome finding job lazy working toward...	NotSpam
187	haha awesome minute	NotSpam
188	please call customer service representative fr...	Spam
189	got xmas radio times get	NotSpam
190	jus reached home go bathe first sis using net ...	NotSpam
191	unique enough find 30th august wwwareyouunique...	Spam
192	im sorry ive joined league people dont keep to...	NotSpam
193	hi finally completed course	NotSpam
194	stop however suggest stays someone able give o...	NotSpam
195	hope youve settled new school year wishin gr8 day	NotSpam
196	gud mrng dear hav nice day	NotSpam
197	u got persons story	NotSpam
198	notspamster dead hey tmr meet 1pm orchard mrt	NotSpam
199	hi kate evening hope see tomorrow bit bloody b...	NotSpam
200	found enc #	NotSpam

201		sent # bucks	NotSpam
202	hello darlin ive finished college txt u finish...		NotSpam
203	account refilled successfully inr decimal kera...		NotSpam
204		goodmorning sleeping ga	NotSpam
205		u call alter 11 ok	NotSpam
206	say like dat dun buy ericsson oso cannot oredi...		NotSpam
207	entered cabin pa said happy bday boss felt spe...		NotSpam
208		aight yo dats straight dogg	NotSpam
209	please give us connection today decimal refund...		NotSpam

[210 rows x 2 columns]

```
In [23]: print("Test Dataset After preprocessing")
print(dframe2)
```

Test Dataset After preprocessing

index	Text	Type
0	shoot big loads get ready	NotSpam
1	whats bruv hope great break rewarding semester	NotSpam
2	home always chat	NotSpam
3	k k good study well	NotSpam
4	yup noe leh	NotSpam
5	sounds great home	NotSpam
6	finally match heading towards draw prediction	NotSpam
7	tired havent slept well past nights	NotSpam
8	easy ahsen got selected means good	NotSpam
9	take exam march 3	NotSpam
10	yeah think use gt atm register sure theres any...	NotSpam
11	ok prob take ur time	NotSpam
12	os called ubandu run without installing hard d...	NotSpam
13	sorry ill call later	NotSpam
14	u say leh course nothing happen lar say v roma...	NotSpam
15	500 new mobiles 2004 must go txt nokia 89545 c...	Spam
16	would really appreciate call need someone talk	NotSpam
17	u meet ur dream partner soon ur career 2 flyng...	Spam
18	hey company elama po mudyadhu	NotSpam
19	life strict teacher bcoz teacher teaches lessso...	NotSpam
20	dear good morning	NotSpam
21	get gandhipuram walk cross cut road right side...	NotSpam
22	dear going rubber place	NotSpam
23	sorry battery died yeah im	NotSpam
24	yes tv always available work place	NotSpam
25	text meet someone sexy today u find date even ...	Spam
26	printed oh # come upstairs	NotSpam
27	ill little closer like bus stop street	NotSpam
28	youwhen wil reach	NotSpam
29	new theory argument wins situation loses perso...	NotSpam
..
60	ringtone club get uk singles chart mobile week...	Spam
61	come mu sorting narcotics situation	NotSpam
62	night ended another day morning come special w...	NotSpam
63	hmv bonus special 500 pounds genuine hmv vouch...	Spam
64	usf guess might well take 1 car	NotSpam
65	objection bf coming	NotSpam
66	thanx	NotSpam
67	tell rob mack gf theater	NotSpam
68	awesome ill see bit	NotSpam
69	sent type food like	NotSpam
70	done handed celebrations full swing yet	NotSpam
71	got called tool	NotSpam
72	wen u miss someone person definitely special u...	NotSpam
73	ok asked money far	NotSpam
74	okie	NotSpam
75	yeah think usual guys still passed last night ...	NotSpam
76	k might come tonight class lets early	NotSpam
77	ok	NotSpam
78	hi baby im cruisin girl friend r u 2 give call...	NotSpam
79	life means lot love life love people life worl...	NotSpam
80	dearshall mail tonitebusy streetshall update t...	NotSpam

81	hey told name gautnotspam ah	NotSpam
82	haf u found feel stupid da v cam working	NotSpam
83	oops 4 got bit	NotSpam
84	much buzy	NotSpam
85	accidentally deleted message resend please	NotSpam
86	tmobile customer may claim free camera phone u...	Spam
87	unless situation go gurl would appropriate	NotSpam
88	hurt tease make cry end life die plz keep one ...	NotSpam
89	cant pick phone right pls send message	NotSpam

[90 rows x 2 columns]

Label Encoding For Train/Test Data

```
In [24]: from sklearn.preprocessing import LabelEncoder
encode = LabelEncoder()
dframe["encoded_type"] = encode.fit_transform(dframe["Text"])
print("Type Attribute Encoding in Train Dataset\n")
print(dframe[["Text", "encoded_type"]])
```

Type Attribute Encoding in Train Dataset

index	Text	encoded_type
0	go jurong point crazy available bugis n great ...	0
1	ok lar joking wif u oni	0
2	free entry 2 wkly comp win fa cup final tkts 2...	1
3	u dun say early hor u c already say	0
4	nah dont think goes usf lives around though	0
5	freemsg hey darling 3 weeks word back id like ...	1
6	even brother like speak treat like aids patent	0
7	per request melle melle oru minnaminunginte nu...	0
8	winner valued network customer selected receiv...	1
9	mobile 11 months u r entitled update latest co...	1
10	im gonna home soon dont want talk stuff anymor...	0
11	six chances win cash 100 20000 pounds txt csh1...	1
12	urgent 1 week free membership 100000 prize jac...	1
13	ive searching right words thank breather promi...	0
14	date sunday	0
15	xxxmobilemovieclub use credit click wap link n...	1
16	oh kim watching	0
17	eh u remember 2 spell name yes v naughty make ...	0
18	fine thats way u feel thats way gota b	0
19	england v macedonia dont miss goals team news ...	1
20	seriously spell name	0
21	im going try 2 months ha ha joking	0
22	pay first lar da stock comin	0
23	aft finish lunch go str lor ard 3 smth lor u f...	0
24	fffffffffffff alright way meet sooner	0
25	forced eat slice im really hungry tho sucks ma...	0
26	lol always convincing	0
27	catch bus frying egg make tea eating moms left...	0
28	im back packing car ill let know theres room	0
29	ahhh work vaguely remember feel like lol	0
..
180	hi spoke maneesha v wed like know satisfied ex...	0
181	lifted hopes offer money need especially end m...	0
182	lol u trust	0
183	ok gentleman treat dignity respect	0
184	guys close	0
185	going nothing greatbye	0
186	hello handsome finding job lazy working toward...	0
187	haha awesome minute	0
188	please call customer service representative fr...	1
189	got xmas radio times get	0
190	jus reached home go bathe first sis using net ...	0
191	unique enough find 30th august wwwareyouunique...	1
192	im sorry ive joined league people dont keep to...	0
193	hi finally completed course	0
194	stop however suggest stays someone able give o...	0
195	hope youve settled new school year wishin gr8 day	0

196	gud mrng dear hav nice day	0
197	u got persons story	0
198	notspamster dead hey tmr meet 1pm orchard mrt	0
199	hi kate evening hope see tomorrow bit bloody b...	0
200	found enc #	0
201	sent # bucks	0
202	hello darlin ive finished college txt u finish...	0
203	account refilled successfully inr decimal kera...	0
204	goodmorning sleeping ga	0
205	u call alter 11 ok	0
206	say like dat dun buy ericsson oso cannot oredi...	0
207	entered cabin pa said happy bday boss felt spe...	0
208	aight yo dats straight dogg	0
209	please give us connection today decimal refund...	0

[210 rows x 2 columns]


```
In [25]: encodetest = LabelEncoder()
dframe2["encoded_type"] = encodetest.fit_transform(dframe2["Type"])
print("Type Attribute Encoding in Train Dataset\n")
print(dframe2[["Text", "encoded_type"]])
```

Type Attribute Encoding in Train Dataset

index	Text	encoded_type
0	shoot big loads get ready	0
1	whats bruv hope great break rewarding semester	0
2	home always chat	0
3	k k good study well	0
4	yup noe leh	0
5	sounds great home	0
6	finally match heading towards draw prediction	0
7	tired havent slept well past nights	0
8	easy ahsen got selected means good	0
9	take exam march 3	0
10	yeah think use gt atm register sure theres any...	0
11	ok prob take ur time	0
12	os called ubandu run without installing hard d...	0
13	sorry ill call later	0
14	u say leh course nothing happen lar say v roma...	0
15	500 new mobiles 2004 must go txt nokia 89545 c...	1
16	would really appreciate call need someone talk	0
17	u meet ur dream partner soon ur career 2 flyng...	1
18	hey company elama po mudyadhu	0
19	life strict teacher bcoz teacher teaches lessso...	0
20	dear good morning	0
21	get gandhipuram walk cross cut road right side...	0
22	dear going rubber place	0
23	sorry battery died yeah im	0
24	yes tv always available work place	0
25	text meet someone sexy today u find date even ...	1
26	printed oh # come upstairs	0
27	ill little closer like bus stop street	0
28	youwhen wil reach	0
29	new theory argument wins situation loses perso...	0
..
60	ringtone club get uk singles chart mobile week...	1
61	come mu sorting narcotics situation	0
62	night ended another day morning come special w...	0
63	hmv bonus special 500 pounds genuine hmv vouch...	1
64	usf guess might well take 1 car	0
65	objection bf coming	0
66	thanx	0
67	tell rob mack gf theater	0
68	awesome ill see bit	0
69	sent type food like	0
70	done handed celebrations full swing yet	0
71	got called tool	0
72	wen u miss someone person definitely special u...	0
73	ok asked money far	0
74	okie	0
75	yeah think usual guys still passed last night ...	0
76	k might come tonight class lets early	0
77	ok	0

78	hi baby im cruisin girl friend r u 2 give call...	0
79	life means lot love life love people life worl...	0
80	dearshall mail tonitebusy streetshall update t...	0
81	hey told name gautnotspam ah	0
82	haf u found feel stupid da v cam working	0
83	oops 4 got bit	0
84	much buzy	0
85	accidentally deleted message resend please	0
86	tmobile customer may claim free camera phone u...	1
87	unless situation go gurl would appropriate	0
88	hurt tease make cry end life die plz keep one ...	0
89	cant pick phone right pls send message	0

[90 rows x 2 columns]

```
In [26]: dframe['Type']=dframe['encoded_type']
dframe2['Type']=dframe2['encoded_type']
dframe.pop('encoded_type')
dframe2.pop('encoded_type')
...
```

Out[26]: Ellipsis

```
In [27]: print("Combine Both Train and Test\n")
d1 = pd.DataFrame(dframe)
d2 = pd.DataFrame(dframe2)
temp=pd.concat([d1, d2])
print(temp)
```

Combine Both Train and Test

index	Text	Type
0	go jurong point crazy available bugis n great ...	0
1	ok lar joking wif u oni	0
2	free entry 2 wkly comp win fa cup final tkts 2...	1
3	u dun say early hor u c already say	0
4	nah dont think goes usf lives around though	0
5	freemsg hey darling 3 weeks word back id like ...	1
6	even brother like speak treat like aids patent	0
7	per request melle melle oru minnamininginte nu...	0
8	winner valued network customer selected receiv...	1
9	mobile 11 months u r entitled update latest co...	1
10	im gonna home soon dont want talk stuff anymor...	0
11	six chances win cash 100 20000 pounds txt csh1...	1
12	urgent 1 week free membership 100000 prize jac...	1
13	ive searching right words thank breather promi...	0
14	date sunday	0
15	xxxmobilemovieclub use credit click wap link n...	1
16	oh kim watching	0
17	eh u remember 2 spell name yes v naughty make ...	0
18	fine thats way u feel thats way gota b	0
19	england v macedonia dont miss goals team news ...	1
20	seriously spell name	0
21	im going try 2 months ha ha joking	0
22	pay first lar da stock comin	0
23	aft finish lunch go str lor ard 3 smth lor u f...	0
24	ffffffffffff alright way meet sooner	0
25	forced eat slice im really hungry tho sucks ma...	0
26	lol always convincing	0
27	catch bus frying egg make tea eating moms left...	0
28	im back packing car ill let know theres room	0
29	ahhh work vaguely remember feel like lol	0
..
60	ringtone club get uk singles chart mobile week...	1
61	come mu sorting narcotics situation	0
62	night ended another day morning come special w...	0
63	hmv bonus special 500 pounds genuine hmv vouch...	1
64	usf guess might well take 1 car	0
65	objection bf coming	0
66	thanx	0
67	tell rob mack gf theater	0
68	awesome ill see bit	0
69	sent type food like	0
70	done handed celebrations full swing yet	0
71	got called tool	0
72	wen u miss someone person definitely special u...	0
73	ok asked money far	0
74	okie	0
75	yeah think usual guys still passed last night ...	0
76	k might come tonight class lets early	0

```

77                                     ok      0
78    hi baby im cruisin girl friend r u 2 give call... 0
79    life means lot love life love people life worl... 0
80    dearshall mail tonitebusy streetshall update t... 0
81                                     hey told name gautnotspam ah 0
82             haf u found feel stupid da v cam working 0
83                                     oops 4 got bit 0
84                                     much buzy 0
85             accidentally deleted message resend please 0
86    tmobile customer may claim free camera phone u... 1
87             unless situation go gurl would appropriate 0
88    hurt tease make cry end life die plz keep one ... 0
89             cant pick phone right pls send message 0

```

[300 rows x 2 columns]

```

In [28]: from sklearn.feature_extraction.text import CountVectorizer
vectorizer = CountVectorizer(analyzer='word', binary=False, decode_error='strict',
                             encoding='utf-8', input='content',
                             lowercase=True, max_df=1.0, max_features=100, min_df=1,
                             ngram_range=(1, 1), preprocessor=None, stop_words=None,
                             strip_accents=None, token_pattern='(?u)\\b\\w\\w+\\b',
                             tokenizer=None, vocabulary=None)
print(vectorizer)

```

```

CountVectorizer(analyzer='word', binary=False, decode_error='strict',
                dtype=<class 'numpy.int64'>, encoding='utf-8', input='content',
                lowercase=True, max_df=1.0, max_features=100, min_df=1,
                ngram_range=(1, 1), preprocessor=None, stop_words=None,
                strip_accents=None, token_pattern='(?u)\\b\\w\\w+\\b',
                tokenizer=None, vocabulary=None)

```

```

In [29]: X = vectorizer.fit(temp['Text'])

train_feacture=X.transform(dframe['Text'])
test_feacture=X.transform(dframe2['Text'])
print("Check Shape of the Features\n")
print("Train Feature Shape:",train_feacture.shape)
print("Test Feature Shape:",test_feacture.shape)

```

Check Shape of the Features

```

Train Feature Shape: (210, 100)
Test Feature Shape: (90, 100)

```

```
In [30]: train_vector=pd.DataFrame(train_feacture.toarray(),columns=vectorizer.get_feature_names())
         tpred_vector=pd.DataFrame(train_feacture.toarray(),columns=vectorizer.get_feature_names())

         print("Train features before Assigning 'Type' Column\n")
         print(train_vector)
```

Train features before Assigning 'Type' Column

\	1000	already	always	anything	back	bit	call	callertune	cant	car
0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0
3	0	1	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	1	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	2	0	0
8	0	0	0	0	0	0	1	0	0	0
9	0	0	0	0	0	0	1	0	0	0
10	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0

```
In [31]: test_vector=pd.DataFrame(test_feacture.toarray(),columns=vectorizer.get_feature_names())
         predvector=pd.DataFrame(test_feacture.toarray(),columns=vectorizer.get_feature_names())

         print("Test features before Assigning 'Type' Column\n")
         print(test_vector)
```

Test features before Assigning 'Type' Column

\	1000	already	always	anything	back	bit	call	callertune	cant	car
0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0
2	0	0	1	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	1	0	0	0
14	0	0	0	0	0	1	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0

```
In [32]: train_vector['Type']=dframe['Type']
print("Train features After Assigning 'Type' Column\n")
print(train_vector)
```

Train features After Assigning 'Type' Column

	1000	already	always	anything	back	bit	call	callertune	cant	car
\										
0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0
3	0	1	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	1	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	2	0	0
8	0	0	0	0	0	0	1	0	0	0
9	0	0	0	0	0	0	1	0	0	0
10	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0

```
In [33]: test_vector['Type']=dframe2['Type']
print("Test features After Assigning 'Type' Column\n")
print(test_vector)
```

	1000	already	always	anything	back	bit	call	callertune	cant	car
71	0	0	0	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	1	0	0	0
79	0	0	0	0	0	0	1	0	0	0
80	0	0	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0	0	0	0
83	0	0	0	0	0	1	0	0	0	0
84	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0	0	0
86	0	0	0	0	0	0	1	0	0	0
87	0	0	0	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0	0	0	0
89	0	0	0	0	0	0	0	0	1	0

```
In [34]: print("Check Shape of the Features\n")
print("Train Feature Shape:", train_vector.shape)
print("Test Feature Shape:", test_vector.shape)
```

Check Shape of the Features

Train Feature Shape: (210, 101)
Test Feature Shape: (90, 101)

```
In [35]: from sklearn import datasets, linear_model, metrics
# create Logistic Regression object
reg = linear_model.LogisticRegression(solver='lbfgs')
print(reg)
```

LogisticRegression(C=1.0, class_weight=None, dual=False, fit_intercept=True, intercept_scaling=1, max_iter=100, multi_class='warn', n_jobs=None, penalty='l2', random_state=None, solver='lbfgs', tol=0.0001, verbose=0, warm_start=False)

```
In [36]: from sklearn.ensemble import RandomForestClassifier
# create Random forest object
random = RandomForestClassifier()
print(random)
```

RandomForestClassifier(bootstrap=True, class_weight=None, criterion='gini', max_depth=None, max_features='auto', max_leaf_nodes=None, min_impurity_decrease=0.0, min_impurity_split=None, min_samples_leaf=1, min_samples_split=2, min_weight_fraction_leaf=0.0, n_estimators='warn', n_jobs=None, oob_score=False, random_state=None, verbose=0, warm_start=False)

```
In [37]: from sklearn.svm import LinearSVC
# create LinearSV object
LSV = LinearSVC(C=1.0, class_weight=None, dual=True, fit_intercept=True,
intercept_scaling=1, loss='squared_hinge', max_iter=1000,
multi_class='ovr', penalty='l2', random_state=0, tol=1e-05, verbose=0)
print(LSV)
```

LinearSVC(C=1.0, class_weight=None, dual=True, fit_intercept=True, intercept_scaling=1, loss='squared_hinge', max_iter=1000, multi_class='ovr', penalty='l2', random_state=0, tol=1e-05, verbose=0)

```
In [38]: from sklearn.naive_bayes import BernoulliNB
# create BernoulliNB object
Ber = BernoulliNB()
print(Ber)
```

BernoulliNB(alpha=1.0, binarize=0.0, class_prior=None, fit_prior=True)

```
In [39]: print('Before Prediction using Logistic Regression\n')
df_test = pd.read_csv (r'C:\Users\Muhammad Umail Ali\Desktop\Assignment#3\test.csv')

df_test.columns.name = 'index'

df_test['Text']=df_test['Text'].map(lambda x : str(x)[1:])
df_test['Text']=df_test['Text'].apply(clean_text)

print (df_test)
```

Before Prediction using Logistic Regression

index	Text	Type
0	shoot big loads get ready	NotSpam
1	whats bruv hope great break rewarding semester	NotSpam
2	home always chat	NotSpam
3	k k good study well	NotSpam
4	yup noe leh	NotSpam
5	sounds great home	NotSpam
6	finally match heading towards draw prediction	NotSpam
7	tired havent slept well past nights	NotSpam
8	easy ahsen got selected means good	NotSpam
9	take exam march 3	NotSpam
10	yeah think use gt atm register sure theres any...	NotSpam
11	ok prob take ur time	NotSpam
12	os called ubandu run without installing hard d...	NotSpam
13	sorry ill call later	NotSpam
14	u say leh course nothing happen lar say v roma...	NotSpam
15	500 new mobiles 2004 must go txt nokia 89545 c...	Spam
16	would really appreciate call need someone talk	NotSpam
17	u meet ur dream partner soon ur career 2 flyng...	Spam
18	hey company elama po mudyadhu	NotSpam
19	life strict teacher bcoz teacher teaches lessso...	NotSpam
20	dear good morning	NotSpam
21	get gandhipuram walk cross cut road right side...	NotSpam
22	dear going rubber place	NotSpam
23	sorry battery died yeah im	NotSpam
24	yes tv always available work place	NotSpam
25	text meet someone sexy today u find date even ...	Spam
26	printed oh # come upstairs	NotSpam
27	ill little closer like bus stop street	NotSpam
28	youwhen wil reach	NotSpam
29	new theory argument wins situation loses perso...	NotSpam
..
60	ringtone club get uk singles chart mobile week...	Spam
61	come mu sorting narcotics situation	NotSpam
62	night ended another day morning come special w...	NotSpam
63	hmv bonus special 500 pounds genuine hmv vouch...	Spam
64	usf guess might well take 1 car	NotSpam
65	objection bf coming	NotSpam
66	thanx	NotSpam
67	tell rob mack gf theater	NotSpam
68	awesome ill see bit	NotSpam
69	sent type food like	NotSpam
70	done handed celebrations full swing yet	NotSpam
71	got called tool	NotSpam
72	wen u miss someone person definitely special u...	NotSpam


```

73             ok asked money far NotSpam
74             okie NotSpam
75     yeah think usual guys still passed last night ... NotSpam
76             k might come tonight class lets early NotSpam
77             ok NotSpam
78     hi baby im cruisin girl friend r u 2 give call... NotSpam
79     life means lot love life love people life worl... NotSpam
80     dearshall mail tonitebusy streetshall update t... NotSpam
81             hey told name gautnotspam ah NotSpam
82             haf u found feel stupid da v cam working NotSpam
83             oops 4 got bit NotSpam
84             much buzy NotSpam
85     accidentally deleted message resend please NotSpam
86     tmobile customer may claim free camera phone u... Spam
87     unless situation go gurl would appropriate NotSpam
88     hurt tease make cry end life die plz keep one ... NotSpam
89             cant pick phone right pls send message NotSpam

```

[90 rows x 2 columns]

In [40]:

```

reg.fit(tpred_vector,train_vector['Type'])
y_pred = reg.predict(predvector)

```

In [41]:

```

from sklearn.ensemble import RandomForestClassifier
# create Random forest object
random = RandomForestClassifier()
# train the model using the training sets
random.fit(tpred_vector,train_vector['Type'])
# making predictions on the testing set
y_predrandom = random.predict(predvector)

```

In [42]:

```

from sklearn.svm import LinearSVC
# create LinearSV object
LSV = LinearSVC(C=1.0, class_weight=None, dual=True, fit_intercept=True,
intercept_scaling=1, loss='squared_hinge', max_iter=1000,
multi_class='ovr', penalty='l2', random_state=0, tol=1e-05, verbose=0)

# train the model using the training sets
LSV.fit(tpred_vector,train_vector['Type'])

# making predictions on the testing set
LSV_pred = LSV.predict(predvector)

```

In [43]:

```

from sklearn.naive_bayes import BernoulliNB
# create BernoulliNB object
Ber =BernoulliNB()
# train the model using the training sets
Ber.fit(tpred_vector,train_vector['Type'])
# making predictions on the testing set
Ber_pred = Ber.predict(predvector)

```

In [44]:

```
decodeg=encodetest.inverse_transform(y_pred)
decodeg2=encodetest.inverse_transform(y_predrandom)
decodeg3=encodetest.inverse_transform(LSV_pred)
decodeg4=encodetest.inverse_transform(Ber_pred)
```

```
In [45]: print('After Prediction using Logistic Regression\n')
df_test['Pred_Type']=decodeg
print(df_test[['Text','Type','Pred_Type']])
print("Logistic Regression model accuracy:",
accuracy_score(test_vector['Type'], y_pred ))
```

After Prediction using Logistic Regression

index	Text	Type	Pred_Type
0	shoot big loads get ready	NotSpam	NotSpam
1	whats bruv hope great break rewarding semester	NotSpam	NotSpam
2	home always chat	NotSpam	NotSpam
3	k k good study well	NotSpam	NotSpam
4	yup noe leh	NotSpam	NotSpam
5	sounds great home	NotSpam	NotSpam
6	finally match heading towards draw prediction	NotSpam	NotSpam
7	tired havent slept well past nights	NotSpam	NotSpam
8	easy ahsen got selected means good	NotSpam	NotSpam
9	take exam march 3	NotSpam	NotSpam
10	yeah think use gt atm register sure theres any...	NotSpam	NotSpam
11	ok prob take ur time	NotSpam	NotSpam
12	os called ubandu run without installing hard d...	NotSpam	NotSpam
13	sorry ill call later	NotSpam	NotSpam
14	u say leh course nothing happen lar say v roma...	NotSpam	NotSpam
15	500 new mobiles 2004 must go txt nokia 89545 c...	Spam	NotSpam
16	would really appreciate call need someone talk	NotSpam	NotSpam
17	u meet ur dream partner soon ur career 2 flyng...	Spam	Spam
18	hey company elama po mudyadhu	NotSpam	NotSpam
19	life strict teacher bcoz teacher teaches lessso...	NotSpam	NotSpam
20	dear good morning	NotSpam	NotSpam
21	get gandhipuram walk cross cut road right side...	NotSpam	NotSpam
22	dear going rubber place	NotSpam	NotSpam
23	sorry battery died yeah im	NotSpam	NotSpam
24	yes tv always available work place	NotSpam	NotSpam
25	text meet someone sexy today u find date even ...	Spam	NotSpam
26	printed oh # come upstairs	NotSpam	NotSpam
27	ill little closer like bus stop street	NotSpam	NotSpam
28	youwhen wil reach	NotSpam	NotSpam
29	new theory argument wins situation loses perso...	NotSpam	NotSpam
..
60	ringtone club get uk singles chart mobile week...	Spam	Spam
61	come mu sorting narcotics situation	NotSpam	NotSpam
62	night ended another day morning come special w...	NotSpam	NotSpam
63	hmv bonus special 500 pounds genuine hmv vouch...	Spam	NotSpam
64	usf guess might well take 1 car	NotSpam	NotSpam
65	objection bf coming	NotSpam	NotSpam
66	thanx	NotSpam	NotSpam
67	tell rob mack gf theater	NotSpam	NotSpam
68	awesome ill see bit	NotSpam	NotSpam
69	sent type food like	NotSpam	NotSpam
70	done handed celebrations full swing yet	NotSpam	NotSpam
71	got called tool	NotSpam	NotSpam
72	wen u miss someone person definitely special u...	NotSpam	NotSpam
73	ok asked money far	NotSpam	NotSpam
74	okie	NotSpam	NotSpam
75	yeah think usual guys still passed last night ...	NotSpam	NotSpam
76	k might come tonight class lets early	NotSpam	NotSpam

77		ok	NotSpam	NotSpam
78	hi baby im cruisin girl friend r u 2 give call...		NotSpam	NotSpam
79	life means lot love life love people life worl...		NotSpam	NotSpam
80	dearshall mail tonitebusy streetshall update t...		NotSpam	NotSpam
81	hey told name gautnotspam ah		NotSpam	NotSpam
82	haf u found feel stupid da v cam working		NotSpam	NotSpam
83	oops 4 got bit		NotSpam	NotSpam
84	much buzy		NotSpam	NotSpam
85	accidentally deleted message resend please		NotSpam	NotSpam
86	tmobile customer may claim free camera phone u...	Spam		Spam
87	unless situation go gurl would appropriate		NotSpam	NotSpam
88	hurt tease make cry end life die plz keep one ...		NotSpam	NotSpam
89	cant pick phone right pls send message		NotSpam	NotSpam

[90 rows x 3 columns]

Logistic Regression model accuracy: 0.9555555555555556

```
In [46]: print('After Prediction using Random Forest\n')
df_test['Pred_TypeR']=decodeg2
print(df_test[['Text', 'Type', 'Pred_TypeR']])

print("Random Forest model accuracy:",
accuracy_score(test_vector['Type'], y_predrandom ))
```

After Prediction using Random Forest

index	Text	Type	Pred_TypeR
0	shoot big loads get ready	NotSpam	NotSpam
1	whats bruv hope great break rewarding semester	NotSpam	NotSpam
2	home always chat	NotSpam	NotSpam
3	k k good study well	NotSpam	NotSpam
4	yup noe leh	NotSpam	NotSpam
5	sounds great home	NotSpam	NotSpam
6	finally match heading towards draw prediction	NotSpam	NotSpam
7	tired havent slept well past nights	NotSpam	NotSpam
8	easy ahsen got selected means good	NotSpam	NotSpam
9	take exam march 3	NotSpam	NotSpam
10	yeah think use gt atm register sure theres any...	NotSpam	NotSpam
11	ok prob take ur time	NotSpam	NotSpam
12	os called ubandu run without installing hard d...	NotSpam	NotSpam
13	sorry ill call later	NotSpam	NotSpam
14	u say leh course nothing happen lar say v roma...	NotSpam	NotSpam
15	500 new mobiles 2004 must go txt nokia 89545 c...	Spam	Spam
16	would really appreciate call need someone talk	NotSpam	NotSpam
17	u meet ur dream partner soon ur career 2 flyng...	Spam	Spam
18	hey company elama po mudyadhu	NotSpam	NotSpam
19	life strict teacher bcoz teacher teaches lessso...	NotSpam	NotSpam
20	dear good morning	NotSpam	NotSpam
21	get gandhipuram walk cross cut road right side...	NotSpam	NotSpam
22	dear going rubber place	NotSpam	NotSpam
23	sorry battery died yeah im	NotSpam	NotSpam
24	yes tv always available work place	NotSpam	NotSpam
25	text meet someone sexy today u find date even ...	Spam	NotSpam
26	printed oh # come upstairs	NotSpam	NotSpam
27	ill little closer like bus stop street	NotSpam	NotSpam
28	youwhen wil reach	NotSpam	NotSpam
29	new theory argument wins situation loses perso...	NotSpam	NotSpam
..
60	ringtone club get uk singles chart mobile week...	Spam	Spam
61	come mu sorting narcotics situation	NotSpam	NotSpam
62	night ended another day morning come special w...	NotSpam	NotSpam
63	hmv bonus special 500 pounds genuine hmv vouch...	Spam	NotSpam
64	usf guess might well take 1 car	NotSpam	NotSpam
65	objection bf coming	NotSpam	NotSpam
66	thanx	NotSpam	NotSpam
67	tell rob mack gf theater	NotSpam	NotSpam
68	awesome ill see bit	NotSpam	NotSpam
69	sent type food like	NotSpam	NotSpam
70	done handed celebrations full swing yet	NotSpam	NotSpam
71	got called tool	NotSpam	NotSpam
72	wen u miss someone person definitely special u...	NotSpam	NotSpam
73	ok asked money far	NotSpam	NotSpam
74	okie	NotSpam	NotSpam
75	yeah think usual guys still passed last night ...	NotSpam	NotSpam

76	k might come tonight class lets early	NotSpam	NotSpam
77	ok	NotSpam	NotSpam
78	hi baby im cruisin girl friend r u 2 give call...	NotSpam	NotSpam
79	life means lot love life love people life worl...	NotSpam	NotSpam
80	dearshall mail tonitebusy streetshall update t...	NotSpam	NotSpam
81	hey told name gautnotspam ah	NotSpam	NotSpam
82	haf u found feel stupid da v cam working	NotSpam	NotSpam
83	oops 4 got bit	NotSpam	NotSpam
84	much buzy	NotSpam	NotSpam
85	accidentally deleted message resend please	NotSpam	NotSpam
86	tmobile customer may claim free camera phone u...	Spam	Spam
87	unless situation go gurl would appropriate	NotSpam	NotSpam
88	hurt tease make cry end life die plz keep one ...	NotSpam	NotSpam
89	cant pick phone right pls send message	NotSpam	NotSpam

[90 rows x 3 columns]

Random Forest model accuracy: 0.9333333333333333

```
In [47]: print('After Prediction using LinearSVC\n')
df_test['Pred_TypeL']=decodeg3
print(df_test[['Text', 'Type', 'Pred_TypeL']])

print("LinearSV model accuracy:",
accuracy_score(test_vector['Type'], LSV_pred ))
```

After Prediction using LinearSVC

index	Text	Type	Pred_TypeL
0	shoot big loads get ready	NotSpam	NotSpam
1	whats bruv hope great break rewarding semester	NotSpam	NotSpam
2	home always chat	NotSpam	NotSpam
3	k k good study well	NotSpam	NotSpam
4	yup noe leh	NotSpam	NotSpam
5	sounds great home	NotSpam	NotSpam
6	finally match heading towards draw prediction	NotSpam	NotSpam
7	tired havent slept well past nights	NotSpam	NotSpam
8	easy ahsen got selected means good	NotSpam	NotSpam
9	take exam march 3	NotSpam	NotSpam
10	yeah think use gt atm register sure theres any...	NotSpam	NotSpam
11	ok prob take ur time	NotSpam	NotSpam
12	os called ubandu run without installing hard d...	NotSpam	NotSpam
13	sorry ill call later	NotSpam	NotSpam
14	u say leh course nothing happen lar say v roma...	NotSpam	NotSpam
15	500 new mobiles 2004 must go txt nokia 89545 c...	Spam	Spam
16	would really appreciate call need someone talk	NotSpam	NotSpam
17	u meet ur dream partner soon ur career 2 flyng...	Spam	Spam
18	hey company elama po mudyadhu	NotSpam	NotSpam
19	life strict teacher bcoz teacher teaches lessso...	NotSpam	NotSpam
20	dear good morning	NotSpam	NotSpam
21	get gandhipuram walk cross cut road right side...	NotSpam	NotSpam
22	dear going rubber place	NotSpam	NotSpam
23	sorry battery died yeah im	NotSpam	NotSpam
24	yes tv always available work place	NotSpam	NotSpam
25	text meet someone sexy today u find date even ...	Spam	NotSpam
26	printed oh # come upstairs	NotSpam	NotSpam
27	ill little closer like bus stop street	NotSpam	NotSpam
28	youwhen wil reach	NotSpam	NotSpam
29	new theory argument wins situation loses perso...	NotSpam	NotSpam
..
60	ringtone club get uk singles chart mobile week...	Spam	Spam
61	come mu sorting narcotics situation	NotSpam	NotSpam
62	night ended another day morning come special w...	NotSpam	NotSpam
63	hmv bonus special 500 pounds genuine hmv vouch...	Spam	Spam
64	usf guess might well take 1 car	NotSpam	NotSpam
65	objection bf coming	NotSpam	NotSpam
66	thanx	NotSpam	NotSpam
67	tell rob mack gf theater	NotSpam	NotSpam
68	awesome ill see bit	NotSpam	NotSpam
69	sent type food like	NotSpam	NotSpam
70	done handed celebrations full swing yet	NotSpam	NotSpam
71	got called tool	NotSpam	NotSpam
72	wen u miss someone person definitely special u...	NotSpam	Spam
73	ok asked money far	NotSpam	NotSpam
74	okie	NotSpam	NotSpam
75	yeah think usual guys still passed last night ...	NotSpam	NotSpam

76	k might come tonight class lets early	NotSpam	NotSpam
77	ok	NotSpam	NotSpam
78	hi baby im cruisin girl friend r u 2 give call...	NotSpam	NotSpam
79	life means lot love life love people life worl...	NotSpam	NotSpam
80	dearshall mail tonitebusy streetshall update t...	NotSpam	NotSpam
81	hey told name gautnotspam ah	NotSpam	NotSpam
82	haf u found feel stupid da v cam working	NotSpam	NotSpam
83	oops 4 got bit	NotSpam	NotSpam
84	much buzy	NotSpam	NotSpam
85	accidentally deleted message resend please	NotSpam	NotSpam
86	tmobile customer may claim free camera phone u...	Spam	Spam
87	unless situation go gurl would appropriate	NotSpam	NotSpam
88	hurt tease make cry end life die plz keep one ...	NotSpam	NotSpam
89	cant pick phone right pls send message	NotSpam	NotSpam

[90 rows x 3 columns]

LinearSV model accuracy: 0.9666666666666667


```
In [48]: print('After Prediction using BernoulliNB\n')
df_test['Pred_TypeB']=decodeg4
print(df_test[['Text', 'Type', 'Pred_TypeB']])

print("BernoulliNB model accuracy:",
accuracy_score(test_vector['Type'], Ber_pred ))
```

After Prediction using BernoulliNB

index	Text	Type	Pred_TypeB
0	shoot big loads get ready	NotSpam	NotSpam
1	whats bruv hope great break rewarding semester	NotSpam	NotSpam
2	home always chat	NotSpam	NotSpam
3	k k good study well	NotSpam	NotSpam
4	yup noe leh	NotSpam	NotSpam
5	sounds great home	NotSpam	NotSpam
6	finally match heading towards draw prediction	NotSpam	NotSpam
7	tired havent slept well past nights	NotSpam	NotSpam
8	easy ahsen got selected means good	NotSpam	NotSpam
9	take exam march 3	NotSpam	NotSpam
10	yeah think use gt atm register sure theres any...	NotSpam	NotSpam
11	ok prob take ur time	NotSpam	NotSpam
12	os called ubandu run without installing hard d...	NotSpam	NotSpam
13	sorry ill call later	NotSpam	NotSpam
14	u say leh course nothing happen lar say v roma...	NotSpam	NotSpam
15	500 new mobiles 2004 must go txt nokia 89545 c...	Spam	NotSpam
16	would really appreciate call need someone talk	NotSpam	NotSpam
17	u meet ur dream partner soon ur career 2 flyng...	Spam	Spam
18	hey company elama po mudyadhu	NotSpam	NotSpam
19	life strict teacher bcoz teacher teaches lessso...	NotSpam	NotSpam
20	dear good morning	NotSpam	NotSpam
21	get gandhipuram walk cross cut road right side...	NotSpam	NotSpam
22	dear going rubber place	NotSpam	NotSpam
23	sorry battery died yeah im	NotSpam	NotSpam
24	yes tv always available work place	NotSpam	NotSpam
25	text meet someone sexy today u find date even ...	Spam	NotSpam
26	printed oh # come upstairs	NotSpam	NotSpam
27	ill little closer like bus stop street	NotSpam	NotSpam
28	youwhen wil reach	NotSpam	NotSpam
29	new theory argument wins situation loses perso...	NotSpam	NotSpam
..
60	ringtone club get uk singles chart mobile week...	Spam	Spam
61	come mu sorting narcotics situation	NotSpam	NotSpam
62	night ended another day morning come special w...	NotSpam	NotSpam
63	hmv bonus special 500 pounds genuine hmv vouch...	Spam	NotSpam
64	usf guess might well take 1 car	NotSpam	NotSpam
65	objection bf coming	NotSpam	NotSpam
66	thanx	NotSpam	NotSpam
67	tell rob mack gf theater	NotSpam	NotSpam
68	awesome ill see bit	NotSpam	NotSpam
69	sent type food like	NotSpam	NotSpam
70	done handed celebrations full swing yet	NotSpam	NotSpam
71	got called tool	NotSpam	NotSpam
72	wen u miss someone person definitely special u...	NotSpam	NotSpam
73	ok asked money far	NotSpam	NotSpam
74	okie	NotSpam	NotSpam
75	yeah think usual guys still passed last night ...	NotSpam	NotSpam

```

76          k might come tonight class lets early NotSpam NotSpam
77                                     ok NotSpam NotSpam
78    hi baby im cruisin girl friend r u 2 give call... NotSpam NotSpam
79    life means lot love life love people life worl... NotSpam NotSpam
80    dearshall mail tonitebusy streetshall update t... NotSpam NotSpam
81                                     hey told name gautnotspam ah NotSpam NotSpam
82          haf u found feel stupid da v cam working NotSpam NotSpam
83                                     oops 4 got bit NotSpam NotSpam
84                                     much buzy NotSpam NotSpam
85          accidentally deleted message resend please NotSpam NotSpam
86    tmobile customer may claim free camera phone u... Spam Spam
87          unless situation go gurl would appropriate NotSpam NotSpam
88    hurt tease make cry end life die plz keep one ... NotSpam NotSpam
89          cant pick phone right pls send message NotSpam NotSpam

```

[90 rows x 3 columns]

BernoulliNB model accuracy: 0.9555555555555556

Selection of Best Modal

```

In [49]: x = PrettyTable()
x.field_names = ["Modal", "Accuracy"]
x.add_row(["Logistic Regression",accuracy_score(test_vector['Type'], y_pred)])
x.add_row(["RandomForestClassifier",accuracy_score(test_vector['Type'], y_predra
x.add_row(["LinearSVC",accuracy_score(test_vector['Type'], LSV_pred )])
x.add_row(["BernoulliNB",accuracy_score(test_vector['Type'], Ber_pred )])
print("Detailed Performance of all modals")
print(x)
a=accuracy_score(test_vector['Type'], y_pred )
b=accuracy_score(test_vector['Type'], y_predrandom )
c=accuracy_score(test_vector['Type'], LSV_pred )
d=accuracy_score(test_vector['Type'], Ber_pred )
max(a,b,c,d)
y = PrettyTable()
y.field_names = ["Modal", "Accuracy"]
y.add_row(["LinearSVC",accuracy_score(test_vector['Type'], LSV_pred)])
print("Best Modal")
print(y)

```

Detailed Performance of all modals

Modal	Accuracy
Logistic Regression	0.9555555555555556
RandomForestClassifier	0.9333333333333333
LinearSVC	0.9666666666666667
BernoulliNB	0.9555555555555556

Best Modal

Modal	Accuracy
LinearSVC	0.9666666666666667

```
In [50]: print("All Features in the form of DataFrame\n")
d1 = pd.DataFrame(train_vector)
d2 = pd.DataFrame(test_vector)
temp1=pd.concat([d1, d2])
print(temp1)
```

77	0	0	0	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	1	0	0	0	0
79	0	0	0	0	0	0	1	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0	0	0	0	0
83	0	0	0	0	0	1	0	0	0	0	0
84	0	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0	0	0	0
86	0	0	0	0	0	0	1	0	0	0	0
87	0	0	0	0	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0	0	0	0	0
89	0	0	0	0	0	0	0	0	1	0	0

	...	txt	ur	want	way	well	work	yeah	yes	yet	Type
0	...	0	0	0	0	0	0	0	0	0	0
1	...	0	0	0	0	0	0	0	0	0	0
2	...	1	0	0	0	0	0	0	0	0	1
3	...	0	0	0	0	0	0	0	0	0	0
.	...	0	0	0	0	0	0	0	0	0	0

```
In [51]: out_test=temp1['Type']
temp1.pop('Type')
...
```

Out[51]: Ellipsis

Train Best Model on All Data

```
In [52]: FinalLSV = LinearSVC(C=1.0, class_weight=None, dual=True, fit_intercept=True,
intercept_scaling=1, loss='squared_hinge', max_iter=1000,
multi_class='ovr', penalty='l2', random_state=0, tol=1e-05, verbose=0)

# train the model using the training sets
FinalLSV.fit(temp1,out_test)
```

```
Out[52]: LinearSVC(C=1.0, class_weight=None, dual=True, fit_intercept=True,
intercept_scaling=1, loss='squared_hinge', max_iter=1000,
multi_class='ovr', penalty='l2', random_state=0, tol=1e-05, verbose=0)
```

Make Prediction on UnSeen/New Data

```
In [53]: msg =input("Please Enter your Email here:\n")
```

Please Enter your Email here:
500 new mobiles 2004 must go txt nokia 89545

```
In [54]: value=[{'Message': msg}]
         attri =['Message']
         userinput=pd.DataFrame(value, columns=attri)
         print('User Input in Actual DataFrame Form:\n')
         userinput['Message']=userinput['Message'].apply(clean_text)
         print(userinput)
```

User Input in Actual DataFrame Form:

Message
0 500 new mobiles 2004 must go txt nokia 89545

```
In [55]: final_transform=X.transform(userinput['Message'])
print(final_transform.toarray())
```

```
[ [0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0  
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0  
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 ]]
```

```
In [56]: result=pd.DataFrame(final_transform.toarray(),columns=vectorizer.get_feature_names())
print(result)
```

0	1000	already	always	anything	back	bit	call	callertune	cant	car	\
0	0	0	0	0	0	0	0	0	0	0	
0	...	tonight	txt	ur	want	way	well	work	yeah	yes	yet
0	...	0	1	0	0	0	0	0	0	0	

```
[1 rows x 100 columns]
```

```
In [57]: final_predLinearLSV = FinalLSV.predict(result)
         decodefinal=encodetest.inverse_transform(final_predLinearLSV)
         print("Prediction:",decodefinal)
```

Prediction: ['Spam']

JAZAKALLAH