```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import nltk
import re

df_train=pd.read_csv('/content/drive/MyDrive/NLP/SMS_train_(1).csv',encoding='ISO-8859-1')
df_test=pd.read_csv('/content/drive/MyDrive/NLP/SMS_test_(2).csv',encoding='ISO-8859-1')
```

df_train

| | | S. No. | Message_body | Label | |
|--------|------------------------|---|---|-----------------------|--|
| | 0 | 1 | Rofl. Its true to its name | Non- Spam | |
| | 1 | 2 | The guy did some bitching but I acted like i'd | Non- Spam | |
| | 2 3 Pity, * was in mod | Pity, * was in mood for that. Soany other s | Non- Spam | | |
| | 3 | 4 | Will ü b going to esplanade fr home? | fr home? Non- Spam | |
| | 4 | 5 | This is the 2nd time we have tried 2 contact u | Spam | |
| | | | | | |
| | 952 | 953 | hows my favourite person today? r u workin har | Non- Spam | |
| | 953 | 954 | How much you got for cleaning | Non- Spam | |
| df_tes | st | | | | |

S. No. Message_body Label

df=pd.concat([df_train,df_test],axis=0,ignore_index=True)
df

| | S. No. | Message_body | Label | 7 | |
|-----------------------|--------|--|----------|---|--|
| 0 | 1 | Rofl. Its true to its name | Non-Spam | | |
| 1 | 2 | The guy did some bitching but I acted like i'd | Non-Spam | | |
| 2 | 3 | Pity, * was in mood for that. Soany other s | Non-Spam | | |
| 3 | 4 | Will ü b going to esplanade fr home? | Non-Spam | | |
| 4 | 5 | This is the 2nd time we have tried 2 contact u | Spam | | |
| | | | | | |
| 1077 | 121 | 7 wonders in My WORLD 7th You 6th Ur style 5th | Non-Spam | | |
| 1078 | 122 | Try to do something dear. You read something f | Non-Spam | | |
| 1079 | 123 | Sun ah Thk mayb can if dun have anythin on | Non-Spam | | |
| 1080 | 124 | SYMPTOMS when U are in love: "1.U like listeni | Non-Spam | | |
| 1081 | 125 | Great. Have a safe trip. Dont panic surrender | Non-Spam | | |
| 1082 rows × 3 columns | | | | | |

df.head()

| Label | Message_body | | S. No. | |
|----------|--|---|--------|--|
| Non-Spam | Rofl. Its true to its name | 1 | 0 | |
| Non-Spam | The guy did some bitching but I acted like i'd | 2 | 1 | |
| Non-Spam | Pity, * was in mood for that. Soany other s | 3 | 2 | |
| Non-Spam | Will ü b going to esplanade fr home? | 4 | 3 | |
| Spam | This is the 2nd time we have tried 2 contact u | 5 | 4 | |

df.tail()

| Label | Message_body | S. No. | |
|----------|--|--------|------|
| Non-Spam | 7 wonders in My WORLD 7th You 6th Ur style 5th | 121 | 1077 |
| Non-Spam | Try to do something dear. You read something f | 122 | 1078 |
| Non-Spam | Sun ah Thk mayb can if dun have anythin on | 123 | 1079 |
| Non-Spam | SYMPTOMS when U are in love: "1.U like listeni | 124 | 1080 |
| Non-Spam | Great. Have a safe trip. Dont panic surrender | 125 | 1081 |
| | | | |

```
(1082, 3)
df.isna().sum()
                        0
      S. No.
      Message_body
                        0
                        0
      Label
      dtype: int64
df=df.drop(['S. No.'],axis=1)
                                                                              1
                                                                     Label
                                                Message_body
        0
                                        Rofl. Its true to its name
                                                                Non-Spam
        1
                  The guy did some bitching but I acted like i'd...
                                                                Non-Spam
        2
                   Pity, * was in mood for that. So...any other s...
                                                                Non-Spam
        3
                           Will ü b going to esplanade fr home?
                                                                Non-Spam
        4
                  This is the 2nd time we have tried 2 contact u...
                                                                     Spam
        ...
             7 wonders in My WORLD 7th You 6th Ur style 5th...
       1077
                                                                Non-Spam
       1078
                Try to do something dear. You read something f...
                                                                Non-Spam
       1079
                Sun ah... Thk mayb can if dun have anythin on....
                                                                Non-Spam
       1080
               SYMPTOMS when U are in love: "1.U like listeni...
                                                                Non-Spam
       1081
                 Great. Have a safe trip. Dont panic surrender ...
                                                                Non-Spam
      1082 rows × 2 columns
```

df.dtypes

Message_body object Label object

dtype: object

df.columns

Index(['Message_body', 'Label'], dtype='object')

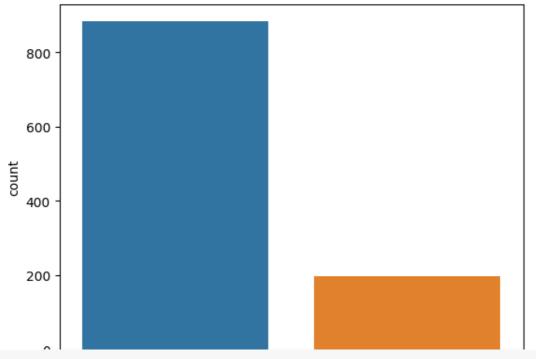
df['Label'].value_counts()

Non-Spam 884 Spam 198

Name: Label, dtype: int64

sns.countplot(x='Label',data=df)

<Axes: xlabel='Label', ylabel='count'>



df['Label'].replace({'Non-Spam':1,'Spam':-1},inplace=True)
df

| Label | Message_body | |
|-------|--|---------|
| 1 | Rofl. Its true to its name | 0 |
| 1 | The guy did some bitching but I acted like i'd | 1 |
| 1 | Pity, * was in mood for that. Soany other s | 2 |
| 1 | Will ü b going to esplanade fr home? | 3 |
| -1 | This is the 2nd time we have tried 2 contact u | 4 |
| | | |
| 1 | 7 wonders in My WORLD 7th You 6th Ur style 5th | 1077 |
| 1 | Try to do something dear. You read something f | 1078 |
| 1 | Sun ah Thk mayb can if dun have anythin on | 1079 |
| 1 | SYMPTOMS when U are in love: "1.U like listeni | 1080 |
| 1 | Great. Have a safe trip. Dont panic surrender | 1081 |
| | ows × 2 columns | 1082 rc |

nltk.download('wordnet')
nltk.download('stopwords')
nltk.download('punkt')
nltk.download('omw-1.4')

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

```
Package omw-1.4 is already up-to-date!
     True
smess=df.Message_body
smess
     a
                                     Rofl. Its true to its name
     1
             The guy did some bitching but I acted like i'd...
     2
             Pity, * was in mood for that. So...any other s...
     3
                          Will ü b going to esplanade fr home?
     4
             This is the 2nd time we have tried 2 contact u...
     1077
             7 wonders in My WORLD 7th You 6th Ur style 5th...
     1078
             Try to do something dear. You read something f...
     1079
             Sun ah... Thk mayb can if dun have anythin on....
     1080
             SYMPTOMS when U are in love: "1.U like listeni...
     1081
             Great. Have a safe trip. Dont panic surrender ...
     Name: Message_body, Length: 1082, dtype: object
f=lambda x,y:x+y
from nltk.tokenize import TweetTokenizer
tk=TweetTokenizer()
smess=smess.apply(lambda x:tk.tokenize(x)).apply(lambda x:" ".join(x))
smess
                                   Rofl . Its true to its name
     a
     1
             The guy did some bitching but I acted like i'd...
     2
             Pity , * was in mood for that . So ... any oth...
     3
                         Will ü b going to esplanade fr home ?
     4
             This is the 2nd time we have tried 2 contact u...
     1077
             7 wonders in My WORLD 7th You 6th Ur style 5th...
     1078
             Try to do something dear . You read something ...
     1079
             Sun ah ... Thk mayb can if dun have anythin on...
             SYMPTOMS when U are in love : " 1 . U like lis...
     1080
     1081
             Great . Have a safe trip . Dont panic surrende...
     Name: Message_body, Length: 1082, dtype: object
smess=smess.str.replace('[^a-zA-Z0-9]+',' ')
print(smess)
     0
                                      Rofl Its true to its name
     1
             The guy did some bitching but I acted like i d...
     2
             Pity was in mood for that So any other suggest...
     3
                            Will b going to esplanade fr home
     4
             This is the 2nd time we have tried 2 contact u...
             7 wonders in My WORLD 7th You 6th Ur style 5th...
     1077
     1078
             Try to do something dear You read something fo...
     1079
             Sun ah Thk mayb can if dun have anythin on Thk...
     1080
             SYMPTOMS when U are in love 1 U like listening...
     1081
              Great Have a safe trip Dont panic surrender all
     Name: Message body, Length: 1082, dtype: object
     <ipython-input-67-6501e7521964>:1: FutureWarning: The default value of regex will change fr
       smess=smess.str.replace('[^a-zA-Z0-9]+',' ')
```

[nltk_data] Downloading package omw-1.4 to /root/nltk_data...

```
from nltk.stem import SnowballStemmer
stemmer=SnowballStemmer('english')
smess=smess.apply(lambda x:[stemmer.stem(i.lower()) for i in tk.tokenize(x)]).apply(lambda x:' '
smess
     0
                                        rofl it true to it name
     1
             the guy did some bitch but i act like i d be i...
     2
                piti was in mood for that so ani other suggest
     3
                                 will b go to esplanad fr home
             this is the 2nd time we have tri 2 contact u u...
             7 wonder in my world 7th you 6th ur style 5th ...
     1077
                tri to do someth dear you read someth for exam
     1078
             sun ah thk mayb can if dun have anythin on thk...
     1079
     1080
             symptom when u are in love 1 u like listen son...
     1081
                 great have a safe trip dont panic surrend all
     Name: Message_body, Length: 1082, dtype: object
from nltk.corpus import stopwords
sw=stopwords.words('english')
smess=smess.apply(lambda x:[i for i in tk.tokenize(x) if i not in sw]).apply(lambda x:" ".join(x
smess
     0
                                                 rofl true name
             guy bitch act like interest buy someth els nex...
     1
     2
                                          piti mood ani suggest
     3
                                          b go esplanad fr home
     4
             2nd time tri 2 contact u u 750 pound prize 2 c...
     1077
             7 wonder world 7th 6th ur style 5th ur smile 4...
     1078
                              tri someth dear read someth exam
     1079
             sun ah thk mayb dun anythin thk book e lesson ...
     1080
             symptom u love 1 u like listen song 2 u get st...
     1081
                            great safe trip dont panic surrend
     Name: Message_body, Length: 1082, dtype: object
#Vectorization
from sklearn.feature_extraction.text import TfidfVectorizer
vec=TfidfVectorizer()
train data=vec.fit transform(smess)
train data
                       #x-variable
print(train_data)
       (0, 1849)
                     0.5086856793431559
       (0, 2727)
                     0.5352804139572925
       (0, 2257)
                     0.6743246681420617
       (1, 1189)
                     0.19084717659108363
       (1, 2787)
                     0.2620897628588603
       (1, 1234)
                     0.3166286972359124
       (1, 2873)
                     0.22002695063463382
       (1, 1878)
                     0.25587622919424974
       (1, 1034)
                     0.29329608266677626
       (1, 2448)
                     0.26551480891862445
       (1, 677)
                     0.26551480891862445
       (1, 1475)
                     0.307577621142851
       (1, 1623)
                     0.20980773882403927
       (1, 396)
                     0.3419878575694143
       (1, 607)
                     0.36211655551990307
       (1, 1307)
                     0.2588858462402129
       (2, 2548)
                     0.5165656915002457
       (2, 463)
                     0.36716239650585775
```

```
(2, 1802)
                      0.5469696796701571
       (2, 2038)
                      0.5469696796701571
       (3, 1384)
                      0.3883344606933877
       (3, 1185)
                      0.630740525885995
       (3, 1062)
                      0.5956800313099777
       (3, 1263)
                      0.3106896135077221
       (4, 2170)
                      0.24144740187001762
       (1079, 1819) 0.2633677871797729
       (1079, 2553)
                      0.2544650331411059
       (1079, 1611)
                      0.2410408066920934
       (1079, 628)
                      0.23101411970886698
       (1079, 2647)
                     0.4820816133841868
       (1079, 1734)
                      0.21063371947658105
       (1079, 1007)
                      0.21634301112384327
       (1079, 424)
                      0.23101411970886698
       (1080, 589)
                      0.37025990523411034
       (1080, 2581)
                      0.37025990523411034
       (1080, 1634)
                      0.3237491068715447
       (1080, 462)
                      0.3237491068715447
       (1080, 2452)
                      0.33507584451064965
       (1080, 2518)
                      0.2208005656522519
       (1080, 1673)
                      0.2249749608215637
       (1080, 2324)
                      0.21572034231434808
       (1080, 1251) 0.36602572795540395
       (1080, 1623)
                      0.21452593732655792
       (1080, 1849)
                      0.27931042764086844
       (1081, 2566)
                      0.4791624063199324
       (1081, 1983)
                      0.4791624063199324
       (1081, 982)
                      0.30819278764115643
       (1081, 2281)
                      0.4525275695553008
       (1081, 2724) 0.3734390895085233
       (1081, 1294) 0.31872563060534453
train_data.shape
     (1082, 2997)
y=df['Label'].values
     array([1, 1, 1, ..., 1, 1, 1])
#train_test_split
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(train_data,y,test_size=0.30,random_state=42)
y_train
     array([ 1, 1, -1,
                          1, -1,
                                   1,
                                       1,
                                           1,
                                               1,
                                                    1,
                                                        1,
                                                            1,
                                                                     1, -1,
             -1, 1, -1, -1,
                              1,
                                   1,
                                       1,
                                           1,
                                               1,
                                                    1, -1,
                                                            1,
                                                                1,
                                                                     1,
                                                                         1,
                                                                             1, -1,
                          1,
                                                   1,
                                                            1,
                                                                         1,
             1, -1, -1,
                              1,
                                   1,
                                       1,
                                           1,
                                               1,
                                                        1,
                                                                1,
                                                                             1,
                                                                     1,
                                                                                 1,
              1,
                 1,
                      1,
                          1,
                              1,
                                  1,
                                       1,
                                          -1,
                                              -1,
                                                   -1,
                                                        1,
                                                            1,
                                                               -1,
                                                                    1,
                                                                       -1,
                                                                             1,
                                                                                 1,
                      1,
                          1,
                              1,
                                       1,
                                           1,
                                               1,
                                                   1,
                                                           -1,
                                                                1,
                                                                         1,
              1,
                 1,
                                  1,
                                                        1,
                                                                    1,
                                                                             1,
                                                                                 1,
                              1,
                                               1,
                                                   1,
                                                           1,
                                          1,
                                                                        1,
                                                                                 1,
             -1.
                -1,
                     1,
                        -1,
                                  1,
                                      1,
                                                        1,
                                                                1,
                                                                    1,
                                                                             1,
                          1,
                                  1,
                                               1,
                                                   1,
                 1, -1,
                              1,
                                       1, -1,
                                                        1, -1,
                                                                     1,
                                                                           -1,
             1,
                                                                1,
                                                                         1,
                      1,
                                  1,
                                           1,
                                               1,
                                                   1,
                 1,
                          1,
                              1,
                                       1,
                                                        1,
                                                            1, -1,
                                                                     1,
                                                                         1,
                                                                             1,
              1,
                                               1,
                      1,
                                           1,
                                                   -1,
                                                               -1,
                                                                             1,
                          1, -1,
                                                                                 1,
             -1,
                 1,
                                   1, -1,
                                                      -1, -1,
                                                                     1, -1,
                 1, -1,
                              1,
                                                                         1,
              1,
                          1,
                                  1,
                                       1,
                                           1,
                                               1,
                                                   1,
                                                       -1,
                                                            1,
                                                                1,
                                                                    1,
                                                                             1,
                                                                                 1,
                                      1,
                                           1,
                                                       1,
                                                                                 1,
              1,
                 1,
                     1,
                          1,
                              1,
                                 -1,
                                              -1,
                                                   1,
                                                            1,
                                                                1,
                                                                    1,
                                                                         1,
                                                                             1,
```

У

1,

1, 1,

-1,

1,

1,

1,

1, -1,

1, 1,

1,

1,

1,

1,

1,

1,

1,

1, 1,

1,

1,

1,

1,

1,

1,

1,

1,

1, -1,

1,

1,

```
1, -1,
                       1, -1,
                                                                    -1,
                                1, -1,
          1,
              1,
                   1,
                                          1,
                                             -1,
                                                   1,
                                                       1,
                                                            1,
                                                                 1,
                                                                         -1,
 1, -1,
          1,
              1,
                   1,
                      -1, -1,
                                1,
                                     1,
                                          1,
                                              1,
                                                   1,
                                                       1,
                                                            1,
                                                                 1, -1,
                                          1,
                                                       1,
                   1,
                       1,
                                1,
 1,
    1, -1, -1,
                            1,
                                     1,
                                              1,
                                                   1,
                                                            1,
                                                                 1,
                                                                     1,
                                                                          1,
     1, -1,
              1, -1, -1,
                                1,
                                     1, -1,
                                                   1,
                                                       1,
                                                            1, -1,
                                                                     1,
 1,
                            1,
                                              1,
                                                                          1,
                   1,
 1,
     1,
        -1,
              1,
                       1,
                            1,
                                1,
                                     1,
                                        -1,
                                              1,
                                                   1,
                                                       1,
                                                            1,
                                                                1,
                                                                     1,
                                                                          1,
                  1,
              1,
                       1,
 1.
     1,
         1,
                            1.
                                1,
                                    1,
                                          1,
                                             -1,
                                                  1,
                                                       1.
                                                           -1.
                                                                1.
                                                                     1,
                                                                         -1.
                                                   1,
 1,
    1,
          1,
              1,
                   1,
                       1,
                            1,
                               -1,
                                    1,
                                          1,
                                              1,
                                                      -1,
                                                            1,
                                                                1,
                                                                     1,
                                                                          1,
                                1,
-1,
   -1,
          1,
              1,
                   1,
                       1,
                            1,
                                    1,
                                          1, -1,
                                                   1,
                                                       1,
                                                            1,
                                                                     1,
                                                                 1,
              1,
                   1,
                                1,
                                          1,
                                              1,
                                                   1,
                                                               -1,
 1, -1,
          1,
                       1,
                            1,
                                     1,
                                                            1,
                                                      -1,
                                                                     1,
          1, -1,
 1,
     1,
                   1,
                       1,
                            1,
                                1,
                                     1,
                                          1,
                                              1,
                                                   1,
                                                       1, -1,
                                                                 1,
                                                                     1,
                                                                          1,
 1,
     1,
          1,
              1,
                   1,
                       1, -1,
                                1,
                                     1,
                                          1,
                                              1,
                                                   1,
                                                       1,
                                                            1,
                                                                 1,
                                                                     1,
                                                                         -1,
 1,
    -1,
         1,
              1,
                   1,
                       1,
                           1,
                                1,
                                     1,
                                         1,
                                              1,
                                                 -1,
                                                       1,
                                                           -1,
                                                                1,
                                                                    -1,
                                                                         -1.
         1,
                                1,
    1,
              1,
                   1,
                       1, -1,
                                    1, -1,
                                              1, -1,
                                                           1,
1,
                                                       1,
                                                                1,
                                                                     1,
-1, -1,
         1,
              1,
                   1,
                       1,
                           1,
                                1,
                                    1,
                                          1,
                                                   1,
                                                       1,
                                                            1, -1,
                                              1,
-1, 1,
                   1,
                                1,
                                              1,
              1,
                                                                     1,
         1,
                       1,
                            1,
                                    1, -1,
                                                   1,
                                                       1,
                                                            1,
                                                                1,
         1, -1,
1,
     1,
                   1,
                       1,
                            1,
                                1,
                                    1,
                                          1,
                                                   1,
                                                       1, -1,
                                                                 1, -1,
                                                                          1,
                                              1,
 1,
     1,
         1,
              1, -1,
                       1, -1,
                                1,
                                     1,
                                         1,
                                              1,
                                                  1,
                                                       1,
                                                            1,
                                                                 1,
                                                                     1,
         1,
                                1,
                                    1,
                                         -1,
                                              1,
                                                                1,
-1,
    1,
              1,
                  1,
                       1,
                           1,
                                                 -1,
                                                       1,
                                                            1,
                                                                     1,
                                    1,
1,
                       1,
                  1,
                                              1,
                                                       1,
    1,
         1,
              1,
                            1,
                               -1,
                                         1,
                                                  1,
                                                            1,
                                                                1,
                                                                     1,
 1,
    1,
         1,
              1, -1,
                       1, -1,
                                1,
                                     1,
                                          1, -1,
                                                   1,
                                                       1, -1,
                                                                 1,
              1,
                                1,
                                                                 1,
 1, -1,
          1,
                   1,
                      -1,
                            1,
                                     1,
                                          1,
                                              1,
                                                   1,
                                                       1,
                                                            1,
                                                                     1,
     1,
          1,
              1, -1,
                      -1, -1,
                                1,
                                     1, -1,
                                                   1,
                                                                 1,
 1,
                                              1,
                                                       1,
                                                            1,
                                                                     1,
                                                                          1,
-1,
     1,
        -1,
              1,
                  -1,
                       1,
                            1,
                               -1,
                                   -1,
                                         -1,
                                              1,
                                                 -1,
                                                       1,
                                                            1,
                                                               -1,
                                                                     1,
 1,
    1, -1,
              1,
                 -1,
                       1,
                            1,
                               -1,
                                    1,
                                         1,
                                              1,
                                                  1,
                                                       1,
                                                            1,
                                                               -1,
                                                                     1,
                                                                         -1.
                                                                1,
         1,
                   1,
                                1,
                                                                     1,
     1,
              1,
                       1,
                           1,
                                    1,
                                          1,
                                              1,
                                                  1,
                                                       1,
                                                            1,
 1.
 1,
     1,
         1, -1, -1,
                       1,
                            1, -1,
                                     1, -1,
                                              1, -1,
                                                       1,
                                                            1,
                                                                1,
                                                                     1,
                   1,
                                1,
                                     1,
                                                   1,
              1,
 1,
     1,
          1,
                       1,
                            1,
                                          1,
                                              1,
                                                       1,
                                                            1,
                                                                 1, -1, -1,
     1,
                                                   1,
                                                                 1, -1,
 1,
         1,
                   1,
                       1,
                            1,
                                1,
                                     1,
                                          1,
                                                       1, -1,
              1,
                                              1,
                                                                          1,
 1,
     1, -1,
              1, -1,
                       1,
                            1,
                                1,
                                     1,
                                          1,
                                              1, -1,
                                                       1,
                                                           -1,
                                                                 1,
                                                                     1,
                                                                         -1,
                  1,
                            1,
                                   -1,
                                                  1,
 1,
    1,
         1,
              1,
                       1,
                                1,
                                          1,
                                              1,
                                                       1,
                                                            1,
                                                                1,
                                                                     1,
                                                                          1,
 1, -1, -1, -1,
                  1,
                       1,
                           1,
                                1,
                                     1,
                                          1,
                                              1,
                                                  1,
                                                       1,
                                                            1,
-1,
     1, -1,
             1,
                   1, -1, -1,
                                1,
                                     1])
```

```
from sklearn.svm import SVC
from sklearn.naive_bayes import MultinomialNB
from sklearn.neighbors import KNeighborsClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.tree import DecisionTreeClassifier
svm_model=SVC()
nb_model=MultinomialNB()
knn_model=KNeighborsClassifier()
rf_model=RandomForestClassifier()
df_model=DecisionTreeClassifier()
lst_model=[svm_model,nb_model,knn_model,rf_model]
```

```
SVC()
************
precision recall f1-score support
```

| -1 | 1.00 | 0.61 | 0.76 | 56 | | |
|--|---|--------------------|---|----------|--|--|
| 1 | 0.92 | 1.00 | 0.96 | 269 | | |
| | | | | | | |
| accuracy | | | 0.93 | 325 | | |
| macro avg | 0.96 | 0.80 | 0.86 | 325 | | |
| weighted avg | 0.94 | 0.93 | 0.93 | 325 | | |
| | | | | | | |
| ******* | | | | | | |
| ******* | ****** | ****** | ***** | | | |
| [[34 22] | | | | | | |
| [0 269]] | | | | | | |
| MultinomialNB ******** | * * | ********* * | ******* | | | |
| ale | | | | | | |
| | precision | recall | f1-score | support | | |
| -1 | 1.00 | 0.64 | 0.78 | 56 | | |
| 1 | 0.93 | 1.00 | 0.96 | 269 | | |
| _ | 0.55 | 1.00 | 0.50 | 203 | | |
| accuracy | | | 0.94 | 325 | | |
| macro avg | 0.97 | 0.82 | 0.87 | 325 | | |
| weighted avg | 0.94 | 0.94 | 0.93 | 325 | | |
| wer8eea av8 | 0.51 | 0.5. | 0.55 | 323 | | |
| ******* | ****** | ****** | ****** | | | |
| ******* | ***** | ****** | ****** | | | |
| [[36 20] | | | | | | |
| [0 269]] | | | | | | |
| KNeighborsCla | ssifier() | | | | | |
| ******* | | ****** | ****** | | | |
| | precision | recall | f1-score | support | | |
| | | | | | | |
| -1 | 1.00 | 0.07 | 0.13 | 56 | | |
| 1 | 0.84 | 1.00 | 0.91 | 269 | | |
| | | | | | | |
| accuracy | | | 0.84 | 325 | | |
| macro avg | 0.92 | 0.54 | 0.52 | 325 | | |
| weighted avg | 0.87 | 0.84 | 0.78 | 325 | | |
| | ale | | ale | | | |
| ********* | | | | | | |
| | **** | **** | **** | | | |
| [[4 52] | | | | | | |
| [0 269]] | | | | | | |
| RandomForestClassifier() ************************************ | | | | | | |
| | | | f1-score | support | | |
| | precision | recarr | 11-30016 | зиррог с | | |
| -1 | 1.00 | 0.71 | 0.83 | 56 | | |
| 1 | 0.94 | 1.00 | 0.83 | 269 | | |
| 1 | 0.54 | 1.00 | 0.37 | 209 | | |
| accuracy | | | 0.95 | 325 | | |
| macro avg | 0.97 | 0.86 | 0.90 | 325 | | |
| weighted avg | 0.95 | 0.95 | 0.95 | 325 | | |
| | 0.55 | 0.00 | 0.55 | 525 | | |
| ******* | ****** | ****** | ****** | | | |
| and an area of the state of the | | | | | | |

_