```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import nltk
import re    # regular expression  (for removing special charachters)
```

```
# we use encoding here to encode the text, data like emoji
df=pd.read_csv('/content/drive/MyDrive/datasets/twitter_validation.csv',encoding='ISO-8859-1',header=None)
df
```

	0	1	2	3
0	3364	Facebook	Irrelevant	I mentioned on Facebook that I was struggling ...
1	352	Amazon	Neutral	BBC News - Amazon boss Jeff Bezos rejects clai...
2	8312	Microsoft	Negative	@Microsoft Why do I pay for WORD when it funct...
3	4371	CS-GO	Negative	CSGO matchmaking is so full of closet hacking,...
4	4433	Google	Neutral	Now the President is slapping Americans in the...
...	...	...	...	...
995	4891	GrandTheftAuto(GTA)	Irrelevant	â□ï¸□ Toronto is the arts and culture capital...
996	4359	CS-GO	Irrelevant	tHIS IS ACTUALLY A GOOD MOVE TOT BRING MORE VI...
997	2652	Borderlands	Positive	Today sucked so itâ□□s time to drink wine n pl...
998	8069	Microsoft	Positive	Bought a fraction of Microsoft today. Small wins.
999	6960	johnson&johnson	Neutral	Johnson & Johnson to stop selling talc baby po...

1000 rows × 4 columns

```
df.columns=['ID','location','target','text']
df
```

	ID	location	target	text
0	3364	Facebook	Irrelevant	I mentioned on Facebook that I was struggling ...
1	352	Amazon	Neutral	BBC News - Amazon boss Jeff Bezos rejects clai...
2	8312	Microsoft	Negative	@Microsoft Why do I pay for WORD when it funct...
3	4371	CS-GO	Negative	CSGO matchmaking is so full of closet hacking,...
4	4433	Google	Neutral	Now the President is slapping Americans in the...
...	...	...	...	...
995	4891	GrandTheftAuto(GTA)	Irrelevant	â□ï¸□ Toronto is the arts and culture capital...
996	4359	CS-GO	Irrelevant	tHIS IS ACTUALLY A GOOD MOVE TOT BRING MORE VI...
997	2652	Borderlands	Positive	Today sucked so itâ□□s time to drink wine n pl...
998	8069	Microsoft	Positive	Bought a fraction of Microsoft today. Small wins.
999	6960	johnson&johnson	Neutral	Johnson & Johnson to stop selling talc baby po...

1000 rows × 4 columns

```
df.shape
```

```
(1000, 4)
```

```
df.tail()
```

ID	location	target	text

```
df.head()
```

	ID	location	target	text
0	3364	Facebook	Irrelevant	I mentioned on Facebook that I was struggling ...
1	352	Amazon	Neutral	BBC News - Amazon boss Jeff Bezos rejects clai...
2	8312	Microsoft	Negative	@Microsoft Why do I pay for WORD when it funct...
3	4371	CS-GO	Negative	CSGO matchmaking is so full of closet hacking,...
4	4433	Google	Neutral	Now the President is slapping Americans in the...

```
df.isna().sum()
```

```
ID          0
location    0
target      0
text        0
dtype: int64
```

```
df.dtypes
```

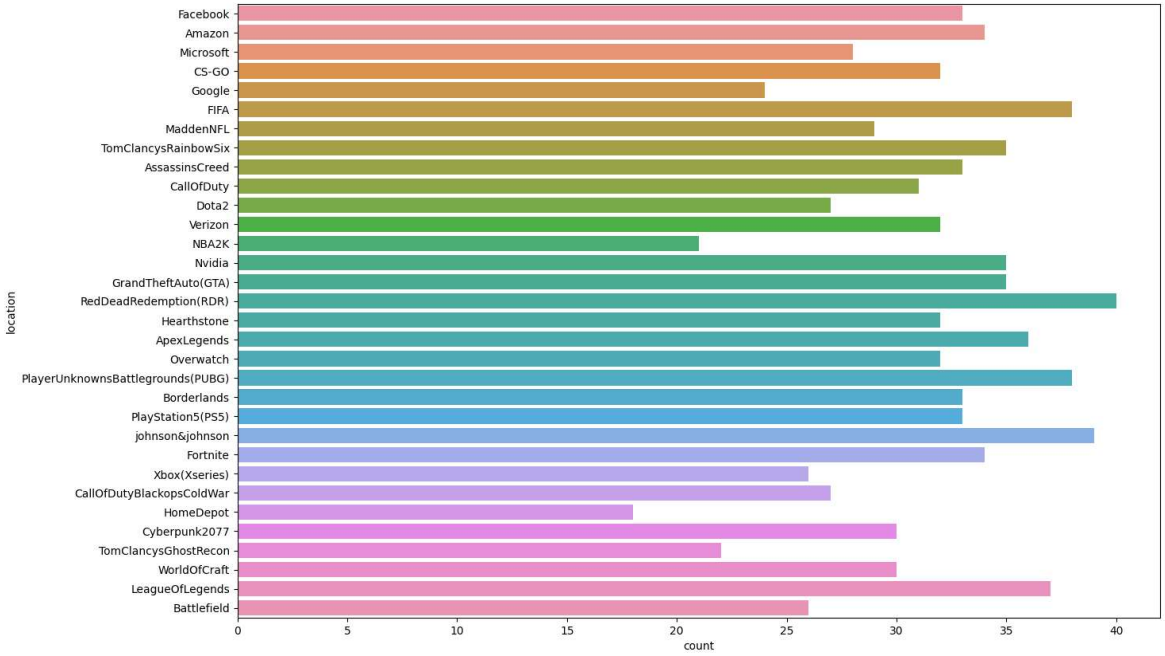
```
ID           int64
location    object
target      object
text        object
dtype: object
```

```
loc=df['location'].value_counts()
loc
```

```
RedDeadRedemption(RDR)              40
johnson&johnson                     39
FIFA                                38
PlayerUnknownsBattlegrounds(PUBG)   38
LeagueOfLegends                     37
ApexLegends                         36
TomClancysRainbowSix                35
Nvidia                              35
GrandTheftAuto(GTA)                 35
Amazon                              34
Fortnite                            34
Facebook                            33
PlayStation5(PS5)                   33
AssassinsCreed                      33
Borderlands                         33
Overwatch                           32
Hearthstone                         32
Verizon                             32
CS-GO                               32
CallOfDuty                          31
Cyberpunk2077                       30
WorldOfCraft                        30
MaddenNFL                           29
Microsoft                           28
Dota2                               27
CallOfDutyBlackopsColdWar           27
Xbox(Xseries)                       26
Battlefield                         26
Google                              24
TomClancysGhostRecon                22
NBA2K                               21
HomeDepot                           18
Name: location, dtype: int64
```

```
plt.figure(figsize=(15,10))
sns.countplot(y=df['location'])
```

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

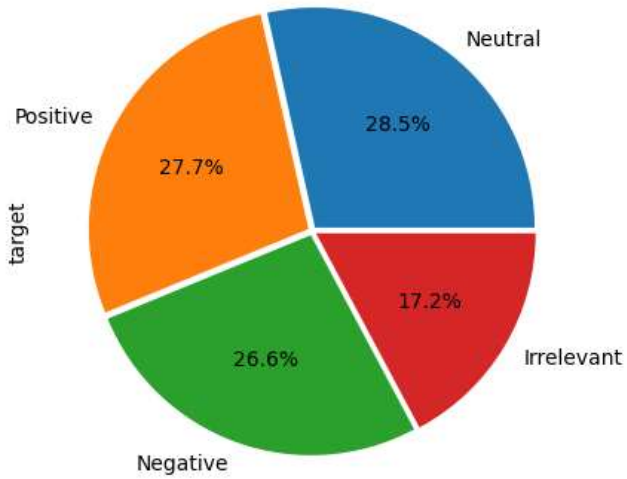



```
tar=df['target'].value_counts()
tar
```

```
Neutral       285
Positive      277
Negative      266
Irrelevant    172
Name: target, dtype: int64
```

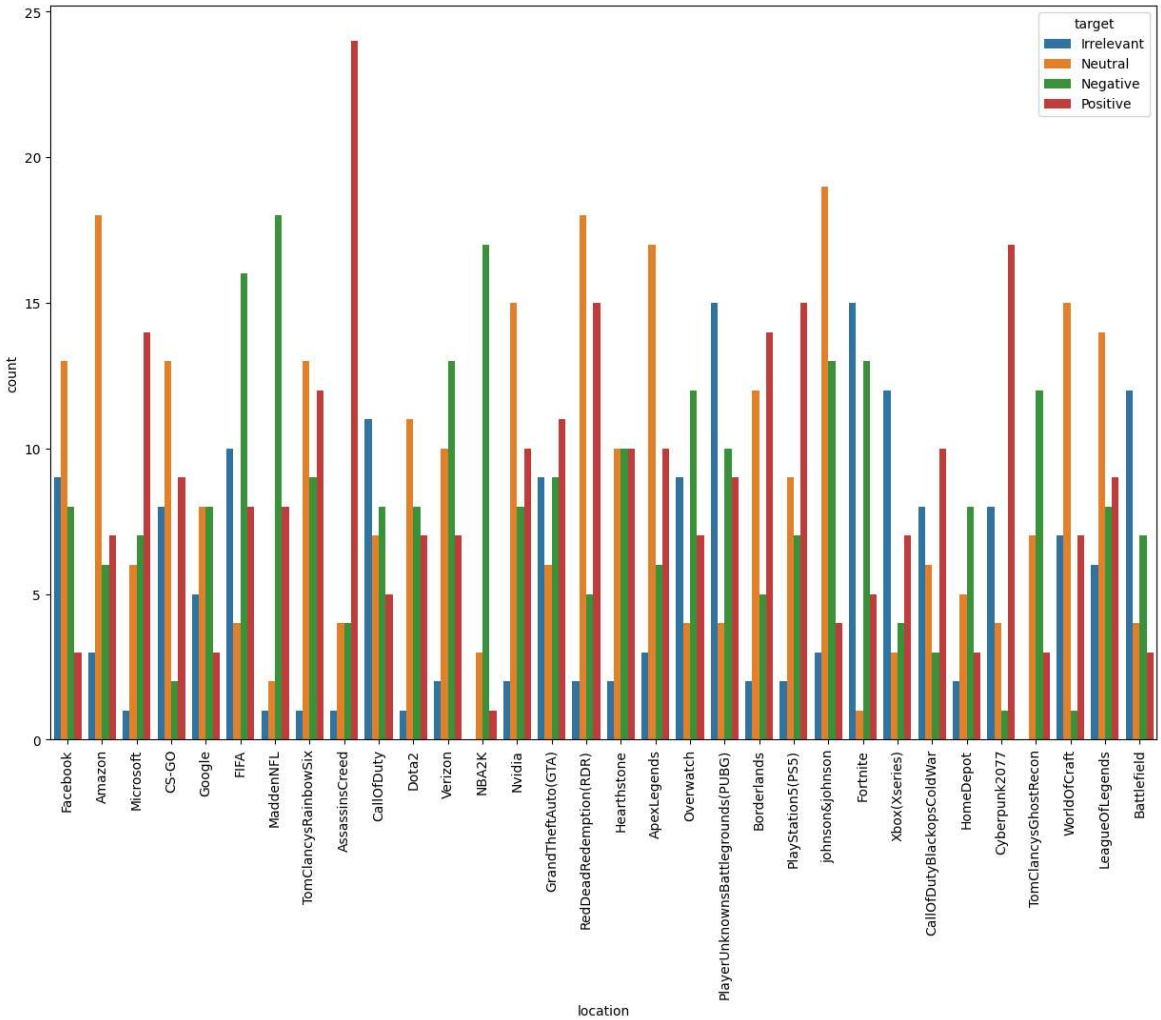
```
tar.plot(kind='pie',explode=(0.02,0.02,0.02,0.02),autopct='%1.1f%%')
```

```
<Axes: ylabel='target'>
```




```
plt.figure(figsize=(15,10))
sns.countplot(x='location',data=df,hue='target')
plt.xticks(rotation=90)
```

```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31]),
 [Text(0, 0, 'Facebook'),
  Text(1, 0, 'Amazon'),
  Text(2, 0, 'Microsoft'),
  Text(3, 0, 'CS-GO'),
  Text(4, 0, 'Google'),
  Text(5, 0, 'FIFA'),
  Text(6, 0, 'MaddenNFL'),
  Text(7, 0, 'TomClancysRainbowSix'),
  Text(8, 0, 'AssassinsCreed'),
  Text(9, 0, 'CallOfDuty'),
  Text(10, 0, 'Dota2'),
  Text(11, 0, 'Verizon'),
  Text(12, 0, 'NBA2K'),
  Text(13, 0, 'Nvidia'),
  Text(14, 0, 'GrandTheftAuto(GTA)'),
  Text(15, 0, 'RedDeadRedemption(RDR)'),
  Text(16, 0, 'Hearthstone'),
  Text(17, 0, 'ApexLegends'),
  Text(18, 0, 'Overwatch'),
  Text(19, 0, 'PlayerUnknownsBattlegrounds(PUBG)'),
  Text(20, 0, 'Borderlands'),
  Text(21, 0, 'PlayStation5(PS5)'),
  Text(22, 0, 'johnson&johnson'),
  Text(23, 0, 'Fortnite'),
  Text(24, 0, 'Xbox(Xseries)'),
  Text(25, 0, 'CallOfDutyBlackopsColdWar'),
  Text(26, 0, 'HomeDepot'),
  Text(27, 0, 'Cyberpunk2077'),
  Text(28, 0, 'TomClancysGhostRecon'),
  Text(29, 0, 'WorldOfCraft'),
  Text(30, 0, 'LeagueOfLegends'),
  Text(31, 0, 'Battlefield')])
```



```
text=df['text'].value_counts()
text
```

```
Wow
2
I mentioned on Facebook that I was struggling for motivation to go for a run the other day, which has been translated by Tomâs
great auntie as âHayley canât get out of bedâ and told to his grandma, who now thinks Iâm a lazy, terrible person ð¤£
1
Update: I actually finished Odyssey. I wish the three-ponged questline structure was communicated a bit more clearly but that game
is a lot of fun once it hits its stride. twitter.com/iv_javy/statusâ¦                                                        1
Know Your History...unless it involves China....because like....we have investors and shit...
1
Congratulations to @ninamanning78 on publication day. Hope you have a fabulous day and that your book flies ððð
1

..
eSports: Curiosities you probably didnât know about Red Dead RedemptionÂ 2 goalsn.com/2020/02/esportâ¦ https://t.co/JMLBSxAUou
1
Nvidia GeForce Now: Google Stadia rival suffers anotherÂ blow news89.net/nvidia-geforceâ¦ https://t.co/9ijNjV7L4C
1
I SAW A TWEET ABOUT HOW IT'S A STORY TOLD OVER AND OVER CUZ THEY'RE MAD MEN DIED IN THE WAR AND IT DIDN'T HAVE BATTLEFIELD 1
TREATMENT, I CAN'T EVEN THINK OF ANOTHER WW1 MOVIE PPL WOULD EVEN KNOW
1
Bro I had an abusive internet boyfriend that used to call me a stupid bitch whenever niggas used to like my pics on facebook and I
used to beg him to not be mad at me. I was such a stupid bitch FOR REAL                                                       1
Johnson & Johnson to stop selling talc baby powder in U.S. and Canada j.mp/3e1YtDV (Reuters) https://t.co/dsaUTgb5p9
1
Name: text, Length: 999, dtype: int64
```

```
df=df.drop(df.index[(df['target']=='Irrelevant')],axis=0)
df
```

	ID	location	target	text
1	352	Amazon	Neutral	BBC News - Amazon boss Jeff Bezos rejects clai...
2	8312	Microsoft	Negative	@Microsoft Why do I pay for WORD when it funct...
3	4371	CS-GO	Negative	CSGO matchmaking is so full of closet hacking,...
4	4433	Google	Neutral	Now the President is slapping Americans in the...
5	6273	FIFA	Negative	Hi @EAHelp Iâve had Madeleine McCann in my c...
...	...	...	...	...
993	314	Amazon	Negative	Please explain how this is possible! How can t...
994	9701	PlayStation5(PS5)	Positive	Good on Sony. As much as I want to see the new...
997	2652	Borderlands	Positive	Today sucked so itâs time to drink wine n pl...
998	8069	Microsoft	Positive	Bought a fraction of Microsoft today. Small wins.
999	6960	johnson&johnson	Neutral	Johnson & Johnson to stop selling talc baby po...

828 rows × 4 columns

```
# reset index values
df.reset_index(drop=True,inplace=True)
df
```

	ID	location	target	text
0	352	Amazon	Neutral	BBC News - Amazon boss Jeff Bezos rejects clai...
1	8312	Microsoft	Negative	@Microsoft Why do I pay for WORD when it funct...
2	4371	CS-GO	Negative	CSGO matchmaking is so full of closet hacking,...
3	4433	Google	Neutral	Now the President is slapping Americans in the...
4	6273	FIFA	Negative	Hi @EAHelp Iâ□□ve had Madeleine McCann in my c...
...	...	...	...	...
823	314	Amazon	Negative	Please explain how this is possible! How can t...
824	9701	PlayStation5(PS5)	Positive	Good on Sony. As much as I want to see the new...

```
df=df.drop(['ID','location'],axis=1)
df
```

	target	text
0	Neutral	BBC News - Amazon boss Jeff Bezos rejects clai...
1	Negative	@Microsoft Why do I pay for WORD when it funct...
2	Negative	CSGO matchmaking is so full of closet hacking,...
3	Neutral	Now the President is slapping Americans in the...
4	Negative	Hi @EAHelp Iâ□□ve had Madeleine McCann in my c...
...	...	...
823	Negative	Please explain how this is possible! How can t...
824	Positive	Good on Sony. As much as I want to see the new...
825	Positive	Today sucked so itâ□□s time to drink wine n pl...
826	Positive	Bought a fraction of Microsoft today. Small wins.
827	Neutral	Johnson & Johnson to stop selling talc baby po...

828 rows × 2 columns

```
# df['target']=df['target'].str.replace('Neutral','0')
# df['target']=df['target'].str.replace('Negative','-1')
# df['target']=df['target'].str.replace('Positive','1')
# df['target']=df['target'].astype(int)
# df

# using map function

df['target']=df['target'].map({'Positive':1,'Negative':-1,'Neutral':0})


df.dtypes
```

```
target     int64
text      object
dtype: object
```

```
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!
[nltk_data] Downloading package omw-1.4 to /root/nltk_data...
[nltk_data]   Package omw-1.4 is already up-to-date!
True
```

```
tweets=df.text
tweets
```

```
0      BBC News - Amazon boss Jeff Bezos rejects clai...
1      @Microsoft Why do I pay for WORD when it funct...
2      CSGO matchmaking is so full of closet hacking,...
3      Now the President is slapping Americans in the...
4      Hi @EAHelp Iâ□□ve had Madeleine McCann in my c...
                            ...
823    Please explain how this is possible! How can t...
824    Good on Sony. As much as I want to see the new...
825    Today sucked so itâ□□s time to drink wine n pl...
826    Bought a fraction of Microsoft today. Small wins.
827    Johnson & Johnson to stop selling talc baby po...
Name: text, Length: 828, dtype: object


# preprocessing

from nltk.tokenize import TweetTokenizer
tk=TweetTokenizer()
tweets=tweets.apply(lambda x:tk.tokenize(x)).apply(lambda x:" ".join(x))
tweets

0      BBC News - Amazon boss Jeff Bezos rejects clai...
1      @Microsoft Why do I pay for WORD when it funct...
2      CSGO matchmaking is so full of closet hacking ...
3      Now the President is slapping Americans in the...
4      Hi @EAHelp Iâ □ □ ve had Madeleine McCann in m...
                            ...
823    Please explain how this is possible ! How can ...
824    Good on Sony . As much as I want to see the ne...
825    Today sucked so itâ □ □ s time to drink wine n...
826    Bought a fraction of Microsoft today . Small w...
827    Johnson & Johnson to stop selling talc baby po...
Name: text, Length: 828, dtype: object


# special charachter remove
# re : regular expression we remove special charachters

tweets=tweets.str.replace('[^a-zA-Z-0-9]+',' ')
tweets

<ipython-input-124-d387f0562dfc>:4: FutureWarning: The default value of regex will change from True to False in a future version.
  tweets=tweets.str.replace('[^a-zA-Z-0-9]+',' ')
0      BBC News - Amazon boss Jeff Bezos rejects clai...
1       Microsoft Why do I pay for WORD when it funct...
2      CSGO matchmaking is so full of closet hacking ...
3      Now the President is slapping Americans in the...
4      Hi EAHelp I ve had Madeleine McCann in my cell...
                            ...
823    Please explain how this is possible How can th...
824    Good on Sony As much as I want to see the new ...
825    Today sucked so it s time to drink wine n play...
826     Bought a fraction of Microsoft today Small wins
827    Johnson Johnson to stop selling talc baby powd...
Name: text, Length: 828, dtype: object


# example for removal of special charachters

str1='wonderful @@@@peacock!12345#@!'
str2=re.sub('[^a-zA-Z-0-9]+',' ',str1)            # sub = replace
str2                                              #  '[^a-zA-Z-0-9]+'  here '^' denotes 'not in the string'
                                                  #                    here '+' denotes  'replace the combination of symbols

'wonderful peacock 12345 '


# stemming or lematization

from nltk.stem import SnowballStemmer
ss=SnowballStemmer('english')
tweets=tweets.apply(lambda x:[ss.stem(i.lower()) for i in tk.tokenize(x)]).apply(lambda x:" ".join(x))
tweets

0      bbc news - amazon boss jeff bezo reject claim ...
1      microsoft whi do i pay for word when it functi...
2      csgo matchmak is so full of closet hack it s a...
3      now the presid is slap american in the face th...
4      hi eahelp i ve had madelein mccann in my cella...
                            ...
823    pleas explain how this is possibl how can they...
824    good on soni as much as i want to see the new ...
```

```
825    today suck so it s time to drink wine n play b...
826       bought a fraction of microsoft today small win
827    johnson johnson to stop sell talc babi powder ...
Name: text, Length: 828, dtype: object
```

```
# stopwords

nltk.download('stopwords')
from nltk.corpus import stopwords
sw=stopwords.words('english')
tweets=tweets.apply(lambda x:[i for i in tk.tokenize(x) if i not in sw]).apply(lambda x:' '.join(x))
tweets
```

```
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
0      bbc news - amazon boss jeff bezo reject claim ...
1      microsoft whi pay word function poor samsungus...
2           csgo matchmak full closet hack truli aw game
3      presid slap american face realli commit unlaw ...
4      hi eahelp madelein mccann cellar past 13 year ...
                             ...
823    pleas explain possibl let compani overcharg sc...
824    good soni much want see new ps5 go right much ...
825    today suck time drink wine n play borderland s...
826             bought fraction microsoft today small win
827    johnson johnson stop sell talc babi powder u c...
Name: text, Length: 828, dtype: object
```

```
# vectorization

from sklearn.feature_extraction.text import TfidfVectorizer
vec=TfidfVectorizer()
train_data=vec.fit_transform(tweets)
print(train_data)         #x
```

```
  (0, 739)      0.2456282916977699
  (0, 524)      0.2456282916977699
  (0, 3629)     0.19717097284763976
  (0, 883)      0.11802111433875656
  (0, 1063)     0.2456282916977699
  (0, 1193)     0.22139963227270484
  (0, 2103)     0.12503547156807654
  (0, 342)      0.2135997461023189
  (0, 913)      0.16343698819954885
  (0, 857)      0.2018385048310212
  (0, 2902)     0.2456282916977699
  (0, 612)      0.2456282916977699
  (0, 1930)     0.23145543449136263
  (0, 679)      0.2135997461023189
  (0, 412)      0.14270670271218175
  (0, 2404)     0.365996231282465
  (0, 581)      0.46291086898272527
  (1, 847)      0.4055823664694651
  (1, 3039)     0.4055823664694651
  (1, 2693)     0.3821800909185634
  (1, 1479)     0.4055823664694651
  (1, 3849)     0.36557591217188057
  (1, 2595)     0.3126902562590763
  (1, 3808)     0.26216072802580975
  (1, 2266)     0.24555654927912696
  :     :
  (825, 677)    0.22981061112100945
  (825, 1056)   0.2315686698425631
  (825, 3532)   0.21750175079084832
  (825, 3380)   0.2904718522758868
  (825, 2661)   0.17148706662740873
  (826, 1453)   0.5079831062080814
  (826, 3222)   0.47867226429410115
  (826, 682)    0.4174215841659411
  (826, 3819)   0.353278941165688
  (826, 3542)   0.34523850330234374
  (826, 2266)   0.3075542453642147
  (827, 222)    0.3085327836746446
  (827, 1195)   0.3085327836746446
  (827, 2950)   0.3085327836746446
  (827, 166)    0.3085327836746446
  (827, 2341)   0.3085327836746446
  (827, 760)    0.2602967814546125
  (827, 3096)   0.24766572568673034
  (827, 3428)   0.24766572568673034
```

```
       (827, 3347)   0.21723219669277322
       (827, 1776)   0.14999073362910845
       (827, 2711)   0.23368360020019152
       (827, 547)    0.22309506625787626
       (827, 1952)   0.37089519596031884
       (827, 883)    0.14824588278342318


train_data.shape

     (828, 3961)


y=df['target'].values
y

     array([ 0, -1, -1,  0, -1,  1,  1,  1, -1,  1,  1, -1,  0, -1,  1,  1, -1,
             1, -1, -1,  0, -1,  0,  0, -1, -1,  1,  1, -1,  1, -1,  0,  0,  1,
             0,  1,  0,  0,  0,  1,  0, -1, -1, -1,  0,  1, -1, -1,  1,  1,  1,
             1,  1, -1, -1,  1,  1, -1,  0, -1,  0, -1,  1, -1, -1,  1,  1,  1,
             0,  0,  0,  1,  1,  0,  1,  0, -1, -1,  0,  0, -1,  1, -1, -1, -1,
             0,  1,  0, -1,  1,  1,  0,  1,  0,  1, -1,  0,  0,  0, -1,  0, -1,
             0,  0,  1,  1,  0, -1, -1,  1, -1,  0, -1,  1,  0, -1,  0,  1,  0,
             1,  1,  0,  0,  0,  0,  1,  0,  1,  1, -1,  0,  0,  0,  0, -1,  0,
             1, -1,  0, -1,  0, -1, -1, -1,  1,  1,  1,  0,  0,  1,  0,  0,  0,
             1,  0, -1, -1,  0,  1,  1,  0,  1,  1,  0,  0, -1, -1, -1, -1,  1,
             0,  0,  1,  1,  1,  1, -1,  1,  1,  0, -1, -1, -1,  1,  1, -1, -1,
             1,  1, -1,  1,  1, -1,  1,  0, -1,  0,  0,  1, -1,  1,  1,  0,  1,
            -1, -1,  1,  1,  1,  1,  0,  0,  1, -1,  0,  1,  0, -1,  0,  0, -1,
             1,  1, -1,  0,  1,  0, -1,  0, -1,  1,  1, -1, -1, -1,  1, -1,  0,
             1,  0,  0, -1,  1, -1,  1, -1,  0,  0,  1, -1,  0, -1,  1, -1,  1,
             1,  1,  1,  1,  1, -1, -1,  1, -1,  0,  0,  0,  1,  0,  1, -1,  0,
             0,  0,  0, -1,  1, -1, -1,  1,  1,  0,  0, -1, -1, -1,  0,  1,  0,
            -1,  1,  0, -1, -1, -1,  1,  0,  0, -1,  1,  1,  0,  1,  0,  0,  1,
             1, -1,  0,  1, -1,  0, -1, -1,  1,  1,  1,  1,  0, -1,  0,  1,  0,
             1, -1, -1, -1,  1,  0,  1, -1,  0, -1,  1,  1,  1,  1,  0,  0,  0,
            -1,  1,  1,  0, -1,  1,  0, -1, -1, -1, -1, -1,  0,  0,  0,  1,  1,
            -1, -1,  0, -1,  0,  0, -1,  1, -1,  1,  1,  1,  0,  1,  0,  0, -1,
             1,  0,  0,  0,  0,  0,  0,  0,  0, -1, -1,  1,  1,  0, -1, -1,  1,
             1, -1,  1,  1,  1,  1,  1,  0, -1,  1,  0,  0,  1,  1,  1,  1,  0,
            -1, -1, -1, -1,  0,  1, -1, -1,  1,  1,  0,  0, -1, -1,  1,  0, -1,
            -1, -1,  0,  0,  1, -1, -1, -1,  0,  0,  0, -1, -1,  1, -1,  0, -1,
             0,  1, -1,  0,  1,  1, -1,  0,  0,  1, -1, -1,  0,  0, -1,  1, -1,
             0, -1, -1, -1,  1, -1,  1, -1,  1, -1, -1,  0, -1,  0, -1,  1, -1,
             0, -1, -1,  0,  0,  1, -1,  1,  0,  0,  0,  0, -1,  0,  0,  0, -1,
            -1,  0,  1,  0,  0, -1,  0,  1,  0,  0,  0,  0,  0,  1,  0,  1,  1,
             1,  0, -1,  1,  0,  0, -1,  1,  0,  0, -1,  0, -1,  0,  1, -1,  1,
            -1, -1,  0,  0,  0,  0,  1,  1,  1, -1, -1,  0,  1,  0,  0, -1,  1,
             1,  0,  1, -1, -1,  0,  1, -1,  1, -1,  0,  1,  1,  0,  0,  0,  1,
             0, -1,  0,  0, -1,  1, -1,  0,  1,  1,  1,  1,  0, -1,  0,  1,  1,
             1,  1,  1, -1,  0,  1,  0,  0, -1, -1, -1,  0,  1,  0, -1,  1,  1,
             1,  0,  1, -1,  0, -1,  0, -1,  0,  0,  1, -1,  1,  1,  0, -1,  0,
            -1, -1, -1, -1,  1,  1,  1,  1,  0, -1, -1,  1, -1, -1,  0,  0,  1,
             0, -1,  0,  1, -1,  0,  1, -1,  0,  0,  1, -1,  0, -1,  1,  1,  0,
             1,  0,  1, -1,  0,  0,  0,  1,  0,  0, -1,  1,  0, -1, -1,  0,  0,
             1, -1, -1, -1, -1,  1,  0,  0,  1,  0, -1,  1,  1, -1,  1,  1,  0,
            -1,  0,  1,  1, -1, -1, -1,  1, -1,  0, -1,  0,  0,  1,  1, -1,  0,
             1, -1, -1, -1, -1, -1, -1, -1, -1,  0, -1,  0,  0,  0,  1,  0,  0,
             0, -1,  0,  1,  0, -1, -1,  1,  0,  1,  0,  1,  0, -1,  1,  1,  1,
             1, -1, -1,  1,  0,  0,  0,  0,  0,  0, -1, -1, -1, -1,  1, -1,  0,
             1,  0, -1,  1,  1, -1,  1,  0,  0,  1, -1,  0, -1,  0,  1,  1,  0,
            -1,  1, -1, -1,  0, -1,  0, -1,  1,  0, -1, -1,  1,  1, -1,  0, -1,
             0,  0,  0,  0,  0,  0,  1,  0,  1,  1,  1, -1,  0,  1,  0,  1,  0,
             1,  0,  1,  0, -1, -1,  1,  1,  1,  1,  0, -1,  1,  1, -1, -1, -1,
             0,  1,  0,  1,  1,  0,  1, -1,  1,  1,  1,  0])


# 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)
print(x_train)

       (0, 2833)     0.22445333746210416
       (0, 721)      0.23819743082652528
       (0, 0)        0.23819743082652528
       (0, 1717)     0.22445333746210416
       (0, 3411)     0.23819743082652528
       (0, 3470)     0.23819743082652528
       (0, 1447)     0.22445333746210416
       (0, 2063)     0.23819743082652528
       (0, 335)      0.23819743082652528
       (0, 2582)     0.19573239287831176
       (0, 1715)     0.22445333746210416
       (0, 409)      0.1774619718703711
```

```
  (0, 3554)     0.1804114056568988
  (0, 1294)     0.14874102728657873
  (0, 2140)     0.284319400937232
  (0, 3777)     0.16565538326448254
  (0, 59)       0.16771038243892572
  (0, 3049)     0.15258254163782356
  (0, 1313)     0.14997378514152887
  (0, 3605)     0.15849261671802412
  (0, 2834)     0.16771038243892572
  (0, 3609)     0.15258254163782356
  (0, 3171)     0.19573239287831176
  (0, 3629)     0.19120606523479225
  (1, 307)      0.23042284485480724
  :     :
  (577, 742)    0.14968891974696927
  (577, 1947)   0.16302270346202263
  (577, 3767)   0.18158863086173657
  (577, 2317)   0.18717313645751385
  (577, 1165)   0.18717313645751385
  (577, 3396)   0.16302270346202263
  (577, 953)    0.20281971497818488
  (577, 1205)   0.15790584022871224
  (577, 1595)   0.24851073610897026
  (577, 2459)   0.2625744571143809
  (577, 752)    0.14043006275740014
  (577, 2401)   0.12126470370721307
  (577, 771)    0.16302270346202263
  (577, 1502)   0.08667889229898602
  (577, 3808)   0.2782529252576799
  (578, 2968)   0.2618429705732027
  (578, 3138)   0.37189303347534525
  (578, 1757)   0.37189303347534525
  (578, 1639)   0.2618429705732027
  (578, 3576)   0.37189303347534525
  (578, 2264)   0.37189303347534525
  (578, 1994)   0.28167283203049437
  (578, 2613)   0.23614849222634068
  (578, 2738)   0.2985263248739169
  (578, 1256)   0.2922929058414592
```

```
# model creation
from sklearn.metrics import confusion_matrix,classification_report
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
s_model=SVC()
n_model=MultinomialNB()
k_model=KNeighborsClassifier()
r_model=RandomForestClassifier()
d_model=DecisionTreeClassifier()
lst_model=[s_model,n_model,k_model,r_model,d_model]


for i in lst_model:
  i.fit(x_train,y_train)
  y_pred=i.predict(x_test)
  print(i)
  print('*'*100)
  print(confusion_matrix(y_test,y_pred))
  print(classification_report(y_test,y_pred))
```

```
 [45 17 29]]
              precision    recall  f1-score   support

          -1       0.41      0.81      0.55        79
           0       0.47      0.30      0.37        79
           1       0.67      0.32      0.43        91

    accuracy                           0.47       249
   macro avg       0.52      0.48      0.45       249
weighted avg       0.53      0.47      0.45       249

RandomForestClassifier()
**********************************************************************************************************
[[56 16  7]
 [28 41 10]
 [25 26 40]]
              precision    recall  f1-score   support

          -1       0.51      0.71      0.60        79
           0       0.49      0.52      0.51        79
           1       0.70      0.44      0.54        91

    accuracy                           0.55       249
   macro avg       0.57      0.56      0.55       249
weighted avg       0.58      0.55      0.55       249

DecisionTreeClassifier()
**********************************************************************************************************
[[49 22  8]
 [22 37 20]
 [31 28 32]]
              precision    recall  f1-score   support

          -1       0.48      0.62      0.54        79
           0       0.43      0.47      0.45        79
           1       0.53      0.35      0.42        91

    accuracy                           0.47       249
   macro avg       0.48      0.48      0.47       249
weighted avg       0.48      0.47      0.47       249
```