Double-click (or enter) to edit

```python
import pandas as pd
import numpy as np
import seaborn as sns
a=pd.read_csv('/content/twitter_validation.csv',header=None,encoding="ISO-8859-1")
a.columns=['id','source','target','review']
a
```

	id	source	target	review
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

Next steps: Generate code with a | View recommended plots

```python
a.head()
```

	id	source	target	review
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...

Next steps: Generate code with a | View recommended plots

```python
a.tail()
```

	id	source	target	review
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...

```python
a.shape
```

```
(1000, 4)
```

```python
a.isna().sum()
```

```
id        0
source    0
target    0
review    0
dtype: int64
```

```python
a.dtypes
```

```
id        int64
source    object
target    object
review    object
dtype: object
```

```
a['source'].value_counts()
```

```
source
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: count, dtype: int64
```
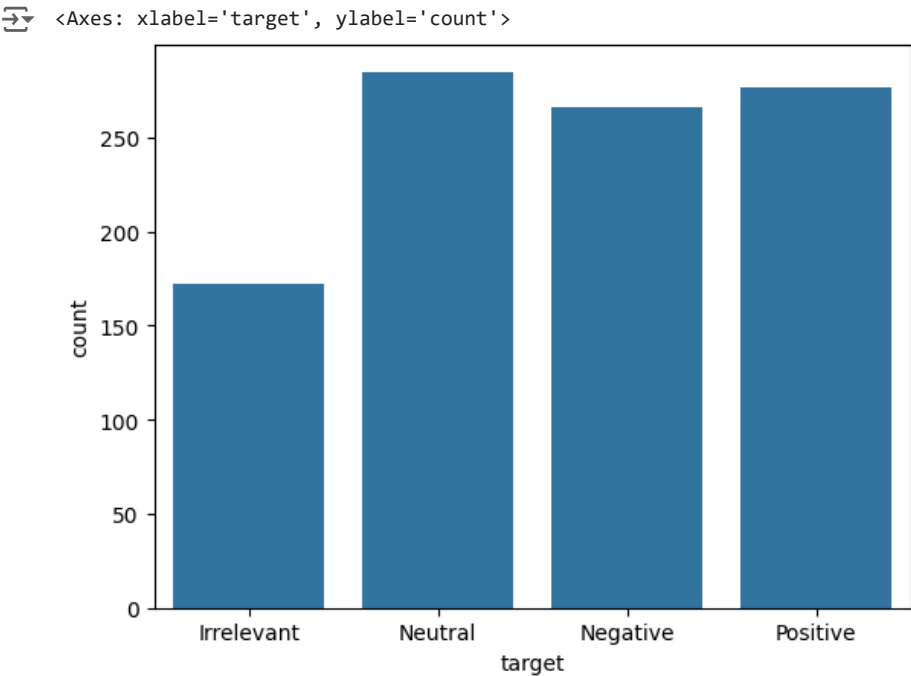
```
sns.countplot(y='source',data=a)
```

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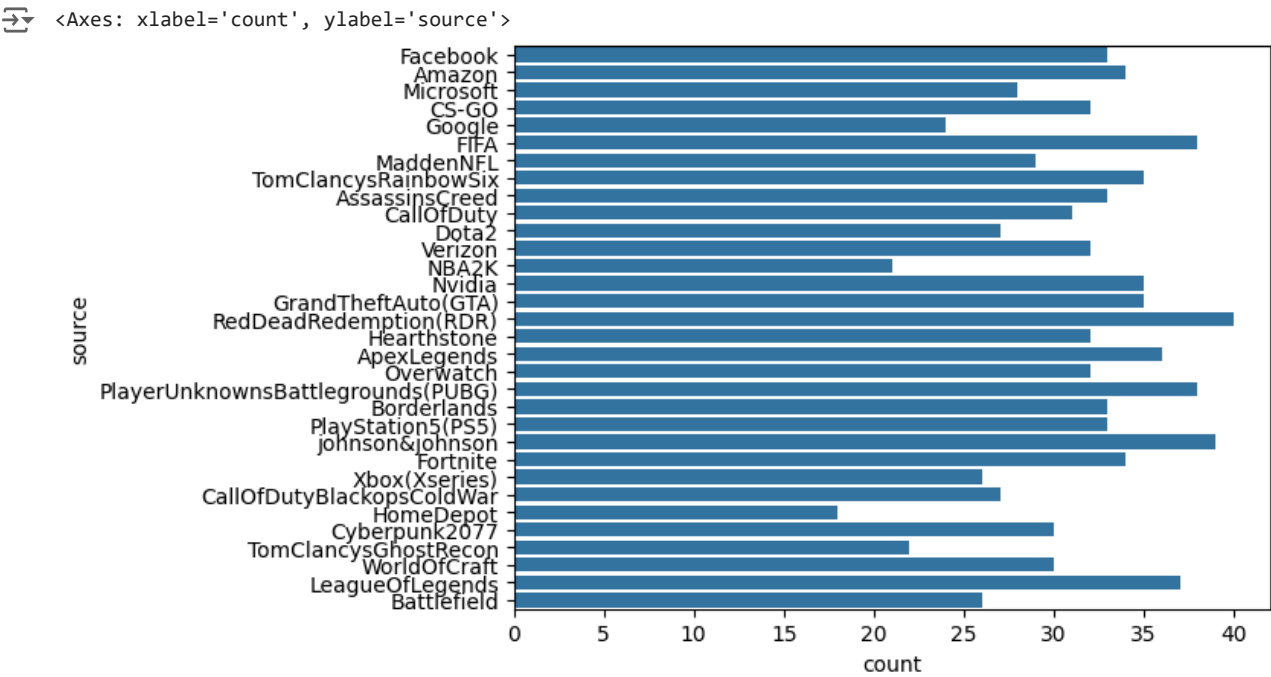


```
a['target'].value_counts()
```

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

```
sns.countplot(x='target',data=a)
```

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



```
a.drop(a.index[(a['target']=='Irrelevant')],axis=0,inplace=True)
a
```

	id	source	target	review
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 Iâ□□ve 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 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...

828 rows × 4 columns

Next steps: **Generate code with** a   ◯ **View recommended plots**

```
# we can two way to correct the index
a.reset_index(drop=True,inplace=True)
a
```

	id	source	target	review
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...
825	2652	Borderlands	Positive	Today sucked so itâ□□s time to drink wine n pl...
826	8069	Microsoft	Positive	Bought a fraction of Microsoft today. Small wins.
827	6960	johnson&johnson	Neutral	Johnson & Johnson to stop selling talc baby po...

828 rows × 4 columns

Next steps: **Generate code with** a   ◯ **View recommended plots**

```
a.drop(['id','source'],axis=1,inplace=True)
a
```

	target	review
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

Next steps: **Generate code with** a   ◯ **View recommended plots**

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

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

828 rows × 2 columns

Next steps: **Generate code with a**   ⬤ View recommended plots

```
a.dtypes
```

```
target      int64
review     object
dtype: object
```

```python
import nltk
nltk.download('stopwords')
nltk.download('wordnet')
nltk.download('punkt')
```

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

```python
tweets=a.review

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: review, Length: 828, dtype: object
```

```python
from nltk.tokenize import word_tokenize
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: review, Length: 828, dtype: object
```

```python
import re
tweets=tweets.str.replace('[^a-zA-Z0-9]+',' ')
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: review, Length: 828, dtype: object
```

```python
tweets=tweets.apply(lambda x:' '.join([w for w in word_tokenize(x) if len(w)>3]))
tweets
```

```
0      News Amazon boss Jeff Bezos rejects claims com...
1      Microsoft WORD when functions poorly SamsungUS...
2      CSGO matchmaking full closet hacking truly awf...
3      President slapping Americans face that really ...
4      EAHelp Madeleine McCann cellar past years litt...
                             ...
823    Please explain this possible they companies ov...
824    Good Sony much want what going right much more...
```

```
825    Today sucked time drink wine play borderlands ...
826          Bought fraction Microsoft today Small wins
827    Johnson Johnson stop selling talc baby powder ...
Name: review, Length: 828, dtype: object
```

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

```
⇥  0      news amazon boss jeff bezo reject claim compan...
   1      microsoft word when function poor samsungus ch...
   2          csgo matchmak full closet hack truli aw game
   3      presid slap american face that realli commit u...
   4      eahelp madelein mccann cellar past year littl ...
                            ...
   823    pleas explain this possibl they compani overch...
   824    good soni much want what go right much more im...
   825    today suck time drink wine play borderland unt...
   826          bought fraction microsoft today small win
   827    johnson johnson stop sell talc babi powder can...
Name: review, Length: 828, dtype: object
```

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

```
⇥  0      news amazon boss jeff bezo reject claim compan...
   1      microsoft word function poor samsungus chromebook
   2          csgo matchmak full closet hack truli aw game
   3      presid slap american face realli commit unlaw ...
   4      eahelp madelein mccann cellar past year littl ...
                            ...
   823    pleas explain possibl compani overcharg scam a...
   824              good soni much want go right much import
   825    today suck time drink wine play borderland com...
   826          bought fraction microsoft today small win
   827    johnson johnson stop sell talc babi powder can...
Name: review, Length: 828, dtype: object
```

```python
#snowball stem
from sklearn.feature_extraction.text import TfidfVectorizer
vec=TfidfVectorizer()
data=vec.fit_transform(tweets)
data
```

```
⇥  <828x3663 sparse matrix of type '<class 'numpy.float64'>'
        with 9730 stored elements in Compressed Sparse Row format>
```

```python
print(data.shape)
```

```
⇥  (828, 3663)
```

Start coding or generate with AI.

```python
y=a['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,  0, -1,  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,  1,  0,  1,  0, -1,  0,
          0,  0,  0, -1,  1, -1, -1,  1,  1,  0,  0, -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,  0, -1,  0,  0,  0,
          1, -1, -1, -1,  1,  0,  1, -1,  0, -1,  1,  1,  1,  1,  1,  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, -1,  1,  1,  1,  0, -1,  0, -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,  0,
          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,  0,  0,  0, -1,  0,  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,  0,  1,  0,  0, -1, -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,  0, -1,  0,  0,  1, -1,  1,  1,  0, -1,  0, -1,  1,  1,
         -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,  0, -1, -1,  0,  0,
          1, -1, -1, -1, -1,  1,  0,  0,  1,  0, -1,  1,  1, -1,  1,  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,  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])
```

```python
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(data,y,test_size=0.30,random_state=42)
x_train
```

```
<579x3663 sparse matrix of type '<class 'numpy.float64'>'
        with 6737 stored elements in Compressed Sparse Row format>
```

```python
y_train
```

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

```python
from sklearn.svm import SVC
from sklearn.neighbors import KNeighborsClassifier
from sklearn.naive_bayes import BernoulliNB
from sklearn.tree import DecisionTreeClassifier
model1=SVC()
model2=KNeighborsClassifier()
model3=BernoulliNB()
model4=DecisionTreeClassifier()
lst=[model1,model2,model3,model4]
for i in lst:
  i.fit(x_train,y_train)
  y_pred=i.predict(x_test)
```

Suggested code may be subject to a license | sayemimtiaz/kaggle-notebooks | tss-ai/ai-curriculum | morioh.com/p/e9a28361ebad
```python
from sklearn.metrics import accuracy_score,confusion_matrix,classification_report
for i in lst:
  print(i,accuracy_score(y_test,y_pred))
  print(confusion_matrix(y_test,y_pred))
  print(classification_report(y_test,y_pred))
```

```
SVC() 0.43775100401606426
[[45 15 19]
 [24 36 19]
 [41 22 28]]
              precision    recall  f1-score   support

          -1       0.41      0.57      0.48        79
           0       0.49      0.46      0.47        79
           1       0.42      0.31      0.36        91

    accuracy                           0.44       249
   macro avg       0.44      0.44      0.44       249
weighted avg       0.44      0.44      0.43       249

KNeighborsClassifier() 0.43775100401606426
[[45 15 19]
 [24 36 19]
 [41 22 28]]
              precision    recall  f1-score   support

          -1       0.41      0.57      0.48        79
           0       0.49      0.46      0.47        79
           1       0.42      0.31      0.36        91

    accuracy                           0.44       249
   macro avg       0.44      0.44      0.44       249
weighted avg       0.44      0.44      0.43       249

BernoulliNB() 0.43775100401606426
[[45 15 19]
 [24 36 19]
 [41 22 28]]
              precision    recall  f1-score   support

          -1       0.41      0.57      0.48        79
           0       0.49      0.46      0.47        79
           1       0.42      0.31      0.36        91

    accuracy                           0.44       249
   macro avg       0.44      0.44      0.44       249
weighted avg       0.44      0.44      0.43       249

DecisionTreeClassifier() 0.43775100401606426
[[45 15 19]
```

```
 [24 36 19]
 [41 22 28]]
               precision    recall  f1-score   support

         -1        0.41      0.57      0.48        79
          0        0.49      0.46      0.47        79
          1        0.42      0.31      0.36        91

   accuracy                            0.44       249
  macro avg        0.44      0.44      0.44       249
```