```python
import pandas as pd
import numpy as np
from nltk.tokenize import sent_tokenize, word_tokenize
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.model_selection import train_test_split
from sklearn.svm import SVC
from sklearn.datasets import fetch_20newsgroups
from nltk.corpus import stopwords
import string
from nltk import pos_tag
from nltk.stem import WordNetLemmatizer
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.naive_bayes import MultinomialNB
from sklearn.ensemble import RandomForestClassifier
from sklearn.svm import SVC
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn import preprocessing
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
```

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

```
[nltk_data] Downloading package stopwords to
[nltk_data]     C:\Users\jayaraman\AppData\Roaming\nltk_data...
[nltk_data]   Unzipping corpora\stopwords.zip.
```

```
True
```

```python
data = pd.read_csv("C:\\Users\\jayaraman\\OneDrive\\Pictures\\
Desktop\\Data science intership\\twitter_training.csv")
v_data = pd.read_csv("C:\\Users\\jayaraman\\OneDrive\\Pictures\\
Desktop\\Data science intership\\twitter_validation.csv")
```

```python
data
```

```
       2401  Borderlands  Positive  \
0      2401  Borderlands  Positive
1      2401  Borderlands  Positive
2      2401  Borderlands  Positive
3      2401  Borderlands  Positive
4      2401  Borderlands  Positive
...     ...          ...       ...
74676  9200       Nvidia  Positive
74677  9200       Nvidia  Positive
74678  9200       Nvidia  Positive
74679  9200       Nvidia  Positive
74680  9200       Nvidia  Positive
```

```
      im getting on borderlands and i will murder you all ,
0       I am coming to the borders and I will kill you...
1       im getting on borderlands and i will kill you ...
2       im coming on borderlands and i will murder you...
3       im getting on borderlands 2 and i will murder ...
4       im getting into borderlands and i can murder y...
...                                                  ...
74676   Just realized that the Windows partition of my...
74677   Just realized that my Mac window partition is ...
74678   Just realized the windows partition of my Mac ...
74679   Just realized between the windows partition of...
74680   Just like the windows partition of my Mac is l...

[74681 rows x 4 columns]
```

```
v_data
```

```
     3364             Facebook  Irrelevant  \
0     352               Amazon     Neutral
1    8312            Microsoft    Negative
2    4371                CS-GO    Negative
3    4433               Google     Neutral
4    6273                 FIFA    Negative
..    ...                  ...         ...
994  4891  GrandTheftAuto(GTA)  Irrelevant
995  4359                CS-GO  Irrelevant
996  2652          Borderlands    Positive
997  8069            Microsoft    Positive
998  6960      johnson&johnson     Neutral

    I mentioned on Facebook that I was struggling for motivation to go
for a run the other day, which has been translated by Tom’s great
auntie as ‘Hayley can’t get out of bed’ and told to his grandma, who
now thinks I’m a lazy, terrible person □
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 cel...

..                                                ...

994   Toronto is the arts and culture capital of ...

995  tHIS IS ACTUALLY A GOOD MOVE TOT BRING MORE VI...

996  Today sucked so it’s time to drink wine n play...
```

```
997  Bought a fraction of Microsoft today. Small wins.

998  Johnson & Johnson to stop selling talc baby po...


[999 rows x 4 columns]
```

```python
data.columns = ['id', 'game', 'sentiment', 'text']
v_data.columns = ['id', 'game', 'sentiment', 'text']
```

```python
data
```

```
         id         game sentiment  \
0      2401  Borderlands  Positive
1      2401  Borderlands  Positive
2      2401  Borderlands  Positive
3      2401  Borderlands  Positive
4      2401  Borderlands  Positive
...     ...          ...       ...
74676  9200       Nvidia  Positive
74677  9200       Nvidia  Positive
74678  9200       Nvidia  Positive
74679  9200       Nvidia  Positive
74680  9200       Nvidia  Positive

                                                    text
0      I am coming to the borders and I will kill you...
1      im getting on borderlands and i will kill you ...
2      im coming on borderlands and i will murder you...
3      im getting on borderlands 2 and i will murder ...
4      im getting into borderlands and i can murder y...
...                                                  ...
74676  Just realized that the Windows partition of my...
74677  Just realized that my Mac window partition is ...
74678  Just realized the windows partition of my Mac ...
74679  Just realized between the windows partition of...
74680  Just like the windows partition of my Mac is l...

[74681 rows x 4 columns]
```

```python
v_data
```

```
       id                 game   sentiment  \
0     352               Amazon     Neutral
1    8312            Microsoft    Negative
2    4371               CS-GO    Negative
3    4433               Google     Neutral
4    6273                 FIFA    Negative
..    ...                  ...         ...
994  4891  GrandTheftAuto(GTA)  Irrelevant
```

```
995  4359                CS-GO  Irrelevant
996  2652          Borderlands    Positive
997  8069            Microsoft    Positive
998  6960      johnson&johnson     Neutral

                                                  text
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 cel...
..                                                 ...
994   Toronto is the arts and culture capital of ...
995  tHIS IS ACTUALLY A GOOD MOVE TOT BRING MORE VI...
996  Today sucked so it’s time to drink wine n play...
997  Bought a fraction of Microsoft today. Small wins.
998  Johnson & Johnson to stop selling talc baby po...

[999 rows x 4 columns]
```

```
data.shape
```

```
(74681, 4)
```

```
data.columns
```

```
Index(['id', 'game', 'sentiment', 'text'], dtype='object')
```

```
data.describe(include='all')
```

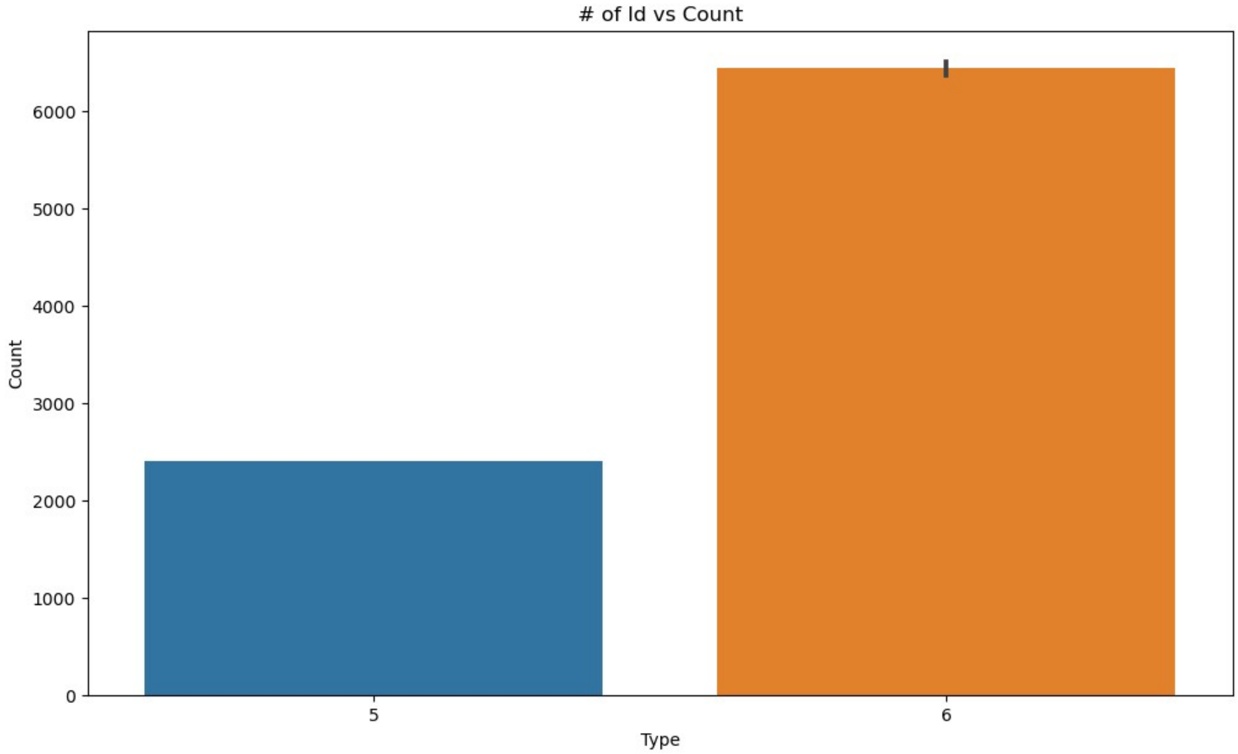
```
                  id                      game sentiment   text
count   74681.000000                     74681     74681  73995
unique           NaN                        32         4  69490
top              NaN  TomClancysRainbowSix  Negative
freq             NaN                      2400     22542    172
mean     6432.640149                       NaN       NaN    NaN
std      3740.423819                       NaN       NaN    NaN
min         1.000000                       NaN       NaN    NaN
25%      3195.000000                       NaN       NaN    NaN
50%      6422.000000                       NaN       NaN    NaN
75%      9601.000000                       NaN       NaN    NaN
max     13200.000000                       NaN       NaN    NaN
```

```
id_types = data['id'].value_counts()
id_types
```

```
id
5203    6
6164    6
6141    6
6142    6
```

```
6143    6
       ..
4678    6
4679    6
4680    6
4681    6
2401    5
Name: count, Length: 12447, dtype: int64
```

```
plt.figure(figsize=(12,7))
sns.barplot(y=id_types.index, x=id_types.values)
plt.xlabel('Type')
plt.ylabel('Count')
plt.title('# of Id vs Count')
plt.show()
```

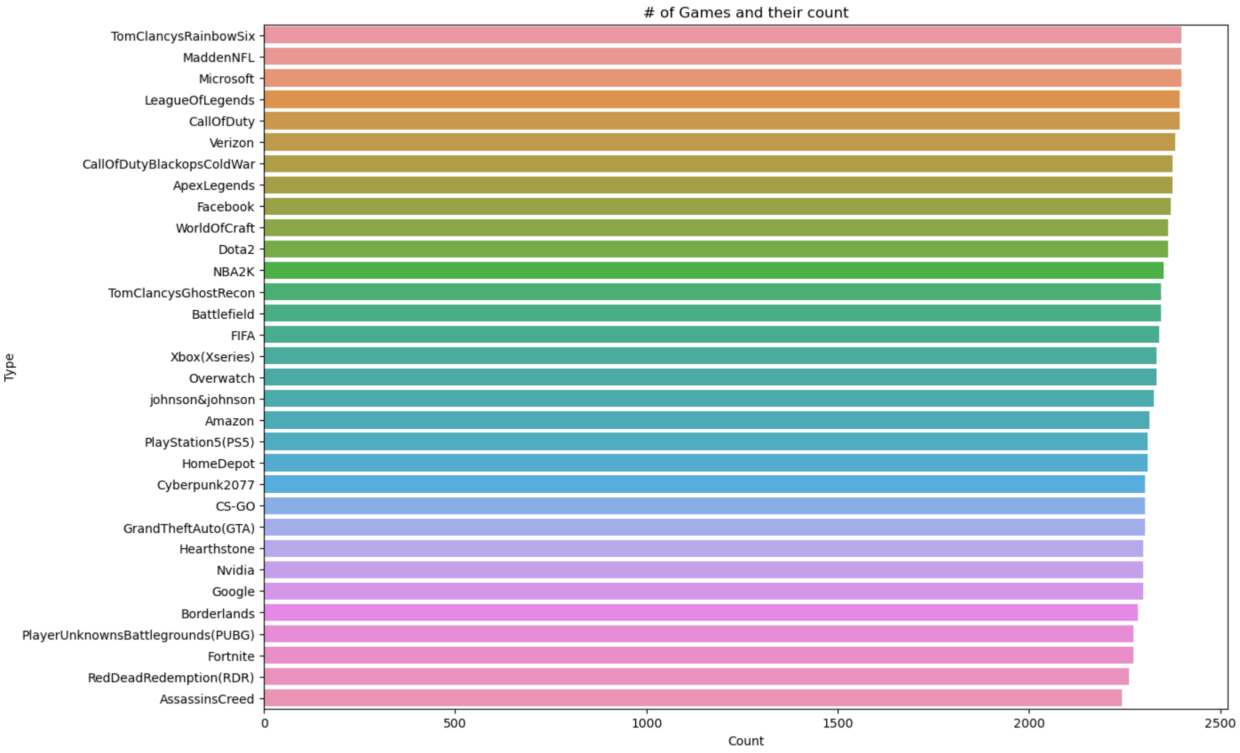


```
game_types = data['game'].value_counts()
game_types
```

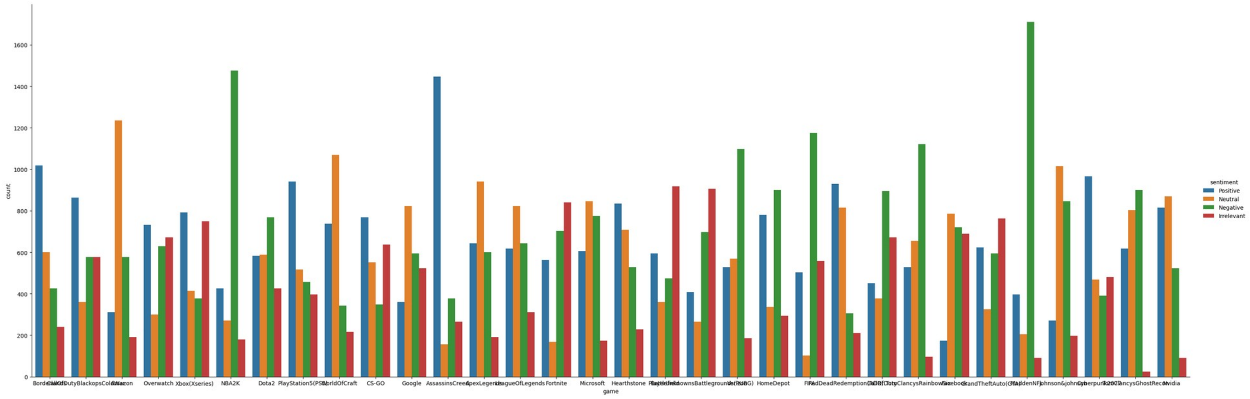
```
game
TomClancysRainbowSix                 2400
MaddenNFL                            2400
Microsoft                            2400
LeagueOfLegends                      2394
CallOfDuty                           2394
Verizon                              2382
```

```
CallOfDutyBlackopsColdWar            2376
ApexLegends                          2376
Facebook                             2370
WorldOfCraft                         2364
Dota2                                2364
NBA2K                                2352
TomClancysGhostRecon                 2346
Battlefield                          2346
FIFA                                 2340
Xbox(Xseries)                        2334
Overwatch                            2334
johnson&johnson                      2328
Amazon                               2316
PlayStation5(PS5)                    2310
HomeDepot                            2310
Cyberpunk2077                        2304
CS-GO                                2304
GrandTheftAuto(GTA)                  2304
Hearthstone                          2298
Nvidia                               2298
Google                               2298
Borderlands                          2285
PlayerUnknownsBattlegrounds(PUBG)    2274
Fortnite                             2274
RedDeadRedemption(RDR)               2262
AssassinsCreed                       2244
Name: count, dtype: int64
```

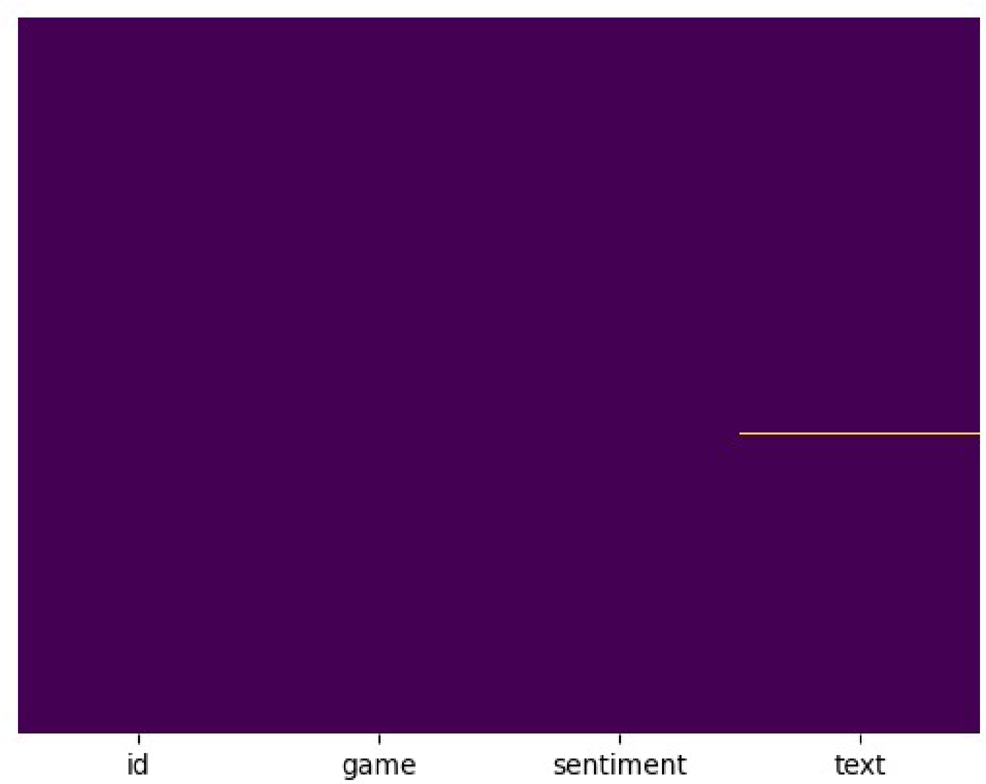
```
plt.figure(figsize=(14,10))

sns.barplot(x=game_types.values,y=game_types.index)
plt.title('# of Games and their count')
plt.ylabel('Type')
plt.xlabel('Count')

plt.show()
```



```
sns.catplot(x="game",hue="sentiment", kind="count",height=10,aspect=3,
data=data)

<seaborn.axisgrid.FacetGrid at 0x16fd19aa0d0>
```



```
sns.heatmap(data.isnull(),yticklabels=False,cbar=False,cmap='viridis')

<Axes: >
```



```
total_null=data.isnull().sum().sort_values(ascending=False)
percent =
((data.isnull().sum()/data.isnull().count())*100).sort_values(ascendin
g = False)
print("Total records = ", data.shape[0])
missing_data =
pd.concat([total_null,percent.round(2)],axis=1,keys=['Total
Missing','In Percent'])
missing_data.head(10)
```

```
Total records =  74681
```

```
           Total Missing  In Percent
text                 686        0.92
id                     0        0.00
game                   0        0.00
sentiment              0        0.00
```

```
data.dropna(subset=['text'],inplace=True)
```

```
total_null=data.isnull().sum().sort_values(ascending=False)
percent =
((data.isnull().sum()/data.isnull().count())*100).sort_values(ascendin
g = False)
print("Total records = ", data.shape[0])
missing_data =
pd.concat([total_null,percent.round(2)],axis=1,keys=['Total
Missing','In Percent'])
missing_data.head(10)
```

```
Total records =  73995
```

```
           Total Missing  In Percent
id                     0         0.0
game                   0         0.0
sentiment              0         0.0
text                   0         0.0
```

```
train0=data[data['sentiment']=="Negative"]
train1=data[data['sentiment']=="Positive"]
train2=data[data['sentiment']=="Irrelevant"]
train3=data[data['sentiment']=="Neutral"]
```

```
train0.shape, train1.shape, train2.shape, train3.shape
```

```
((22358, 4), (20654, 4), (12875, 4), (18108, 4))
```

```
train0=train0[:int(train0.shape[0]/12)]
train1=train1[:int(train1.shape[0]/12)]
train2=train2[:int(train2.shape[0]/12)]
train3=train3[:int(train3.shape[0]/12)]
```

```
train0.shape, train1.shape, train2.shape, train3.shape
```

```
((1863, 4), (1721, 4), (1072, 4), (1509, 4))
```

```
data=pd.concat([train0,train1,train2,train3],axis=0)
data
```

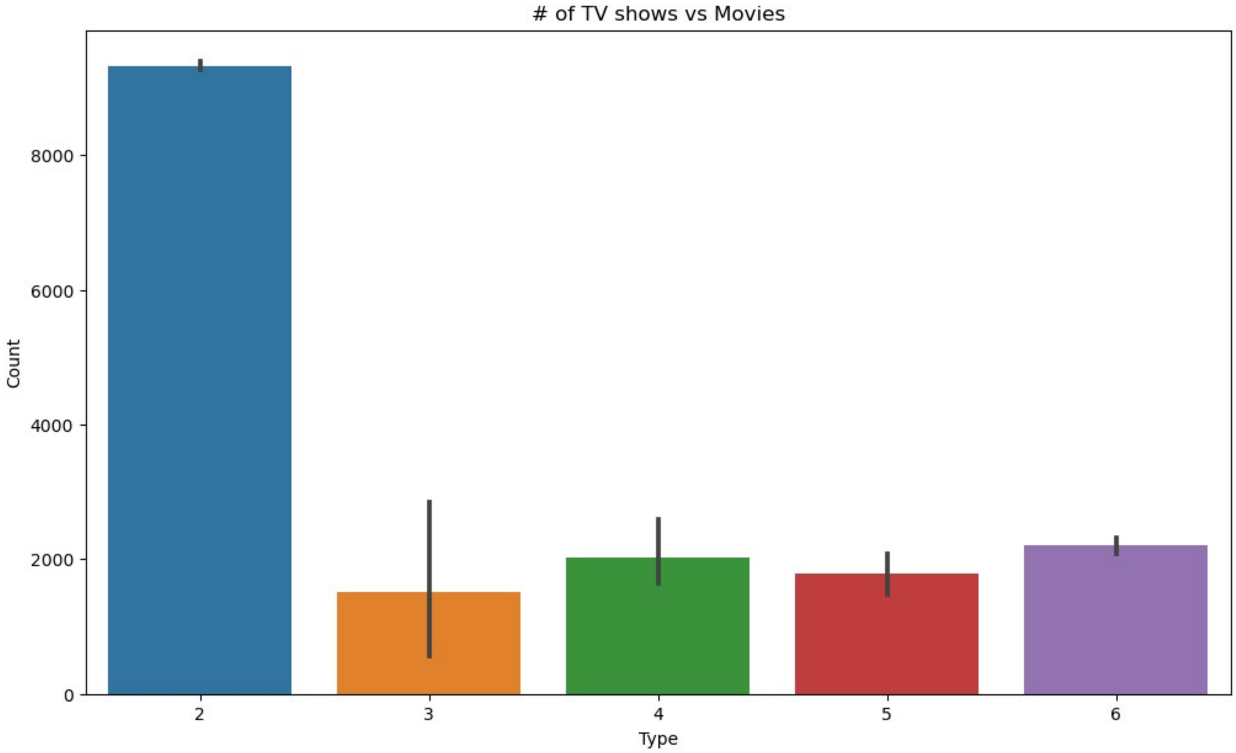
```
        id         game sentiment  \
23    2405  Borderlands  Negative
24    2405  Borderlands  Negative
25    2405  Borderlands  Negative
26    2405  Borderlands  Negative
27    2405  Borderlands  Negative
...    ...          ...       ...
5603   165       Amazon   Neutral
5604   165       Amazon   Neutral
5605   165       Amazon   Neutral
5606   165       Amazon   Neutral
5607   165       Amazon   Neutral

                                                   text
23    the biggest dissappoinment in my life came out...
24    The biggest disappointment of my life came a y...
25    The biggest disappointment of my life came a y...
26    the biggest dissappoinment in my life coming o...
27    For the biggest male dissappoinment in my life...
```

```
...                                                      ...
5603  An amazing read aloud book for you and your ch...
5604  An amazing reading book for you and your child...
5605  An amazing book to read aloud for you and your...
5606  An amazing read aloud book for you and your ch...
5607  and An amazing read aloud book for you and you...

[6165 rows x 4 columns]
```

```
id_types = data['id'].value_counts()
id_types
```

```
id
2405    6
1810    6
1748    6
1754    6
1760    6
       ..
1602    3
1880    3
333     3
9388    2
9267    2
Name: count, Length: 1040, dtype: int64
```

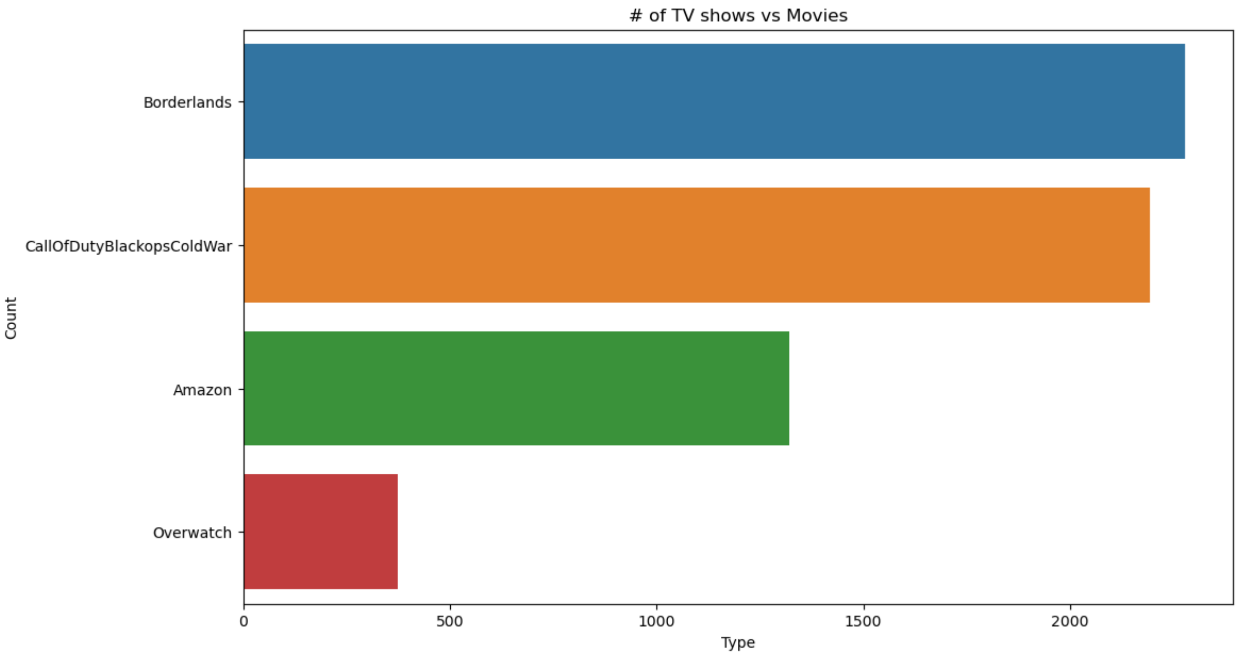
```
plt.figure(figsize=(12,7))
sns.barplot(x=id_types.values,y=id_types.index)

plt.xlabel('Type')
plt.ylabel('Count')
plt.title('# of TV shows vs Movies')
plt.show()
```



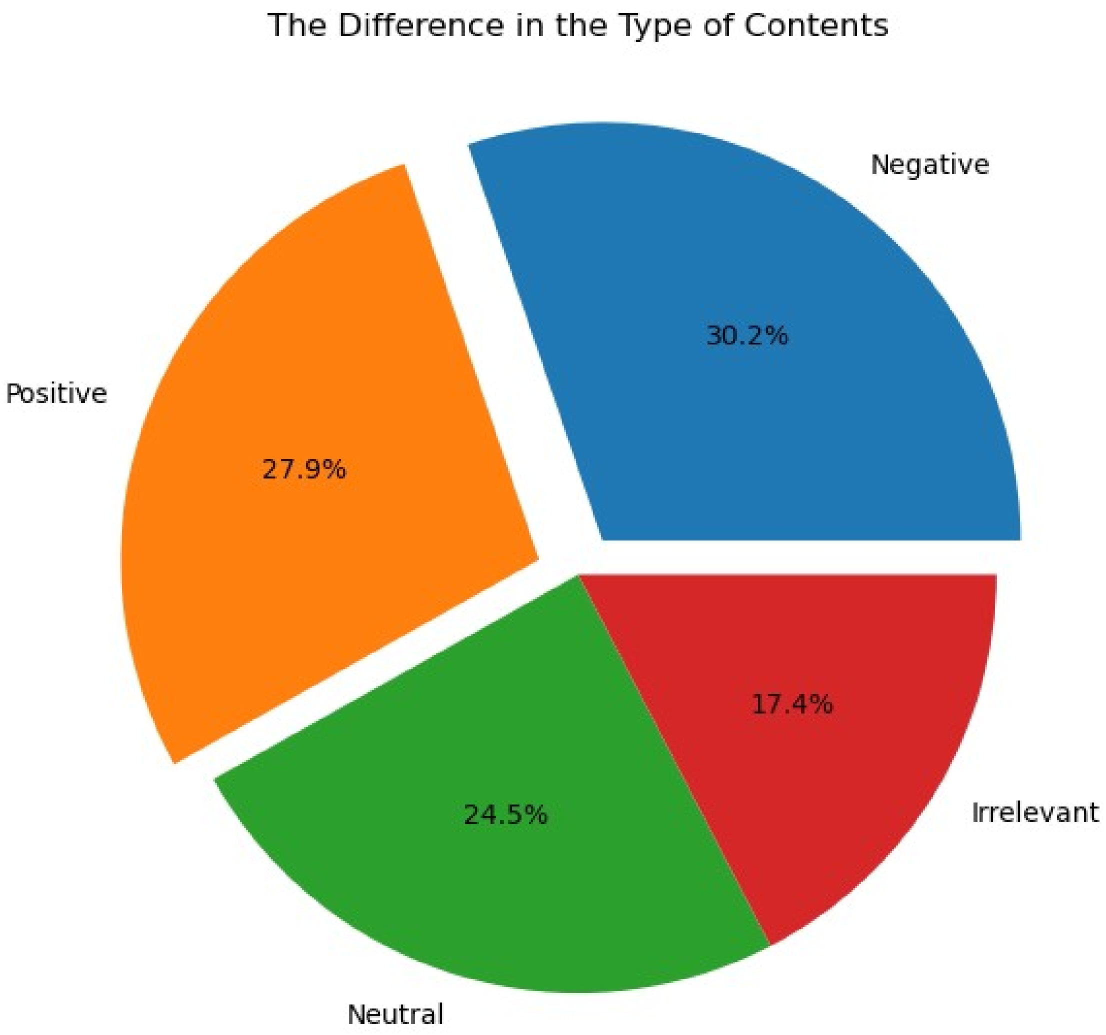
```
game_types = data['game'].value_counts()
game_types
```

```
game
Borderlands                    2279
CallOfDutyBlackopsColdWar      2192
Amazon                         1321
Overwatch                       373
Name: count, dtype: int64
```

```
plt.figure(figsize=(12,7))
sns.barplot(x=game_types.values,y=game_types.index)

plt.xlabel('Type')
plt.ylabel('Count')
plt.title('# of TV shows vs Movies')
plt.show()
```

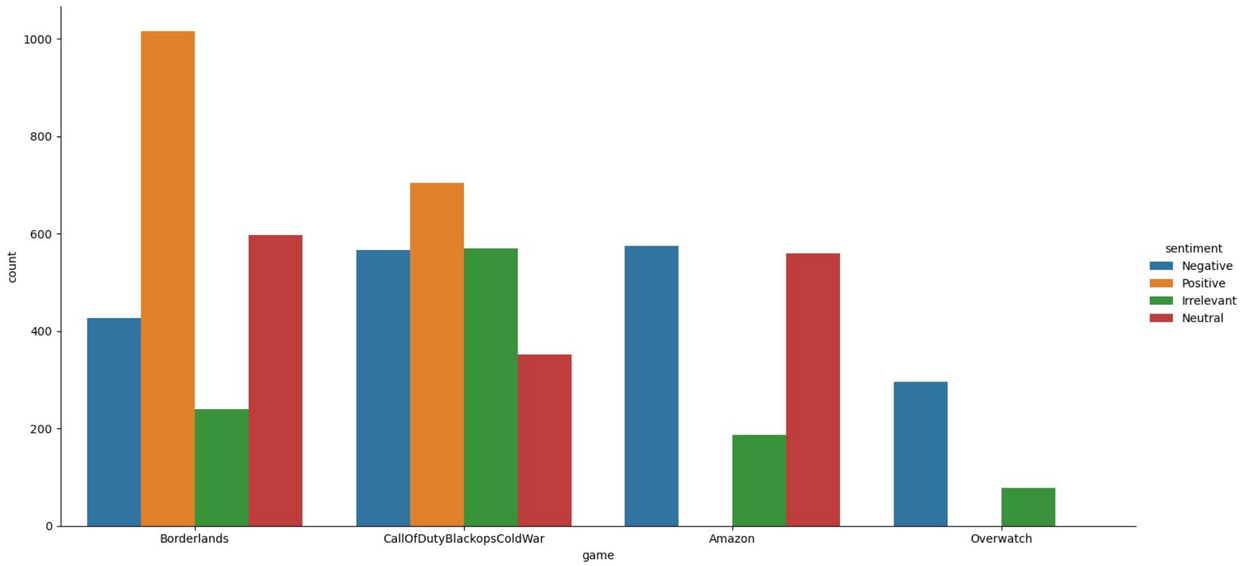


```
sentiment_types = data['sentiment'].value_counts()
sentiment_types

sentiment
Negative      1863
Positive      1721
Neutral       1509
Irrelevant    1072
Name: count, dtype: int64

plt.figure(figsize=(12,7))
plt.pie(x=sentiment_types.values, labels=sentiment_types.index,
autopct='%.1f%%', explode=[0.1, 0.1,0,0])
plt.title('The Difference in the Type of Contents')
plt.show()
```



The Difference in the Type of Contents

```
sns.catplot(x='game',hue='sentiment',kind='count',height=7,aspect=2,da
ta=data)

<seaborn.axisgrid.FacetGrid at 0x16fd385f810>
```



```
from sklearn import preprocessing
label_encoder = preprocessing.LabelEncoder()

data['sentiment']=label_encoder.fit_transform(data['sentiment'])
data['game']=label_encoder.fit_transform(data['game'])
v_data['sentiment']=label_encoder.fit_transform(v_data['sentiment'])
v_data['game']=label_encoder.fit_transform(v_data['game'])

data = data.drop(['id'],axis=1)
data

      game  sentiment
text
23       1          1  the biggest dissappoinment in my life came
out...
24       1          1  The biggest disappointment of my life came a
y...
25       1          1  The biggest disappointment of my life came a
y...
26       1          1  the biggest dissappoinment in my life coming
o...
27       1          1  For the biggest male dissappoinment in my
life...
...    ...        ...                                              .
..
5603     0          2  An amazing read aloud book for you and your
ch...
5604     0          2  An amazing reading book for you and your
child...
5605     0          2  An amazing book to read aloud for you and
your...
5606     0          2  An amazing read aloud book for you and your
ch...
```

```
5607     0          2  and An amazing read aloud book for you and
you...

[6165 rows x 3 columns]
```

```
data.nunique()
```

```
game            4
sentiment       4
text         5854
dtype: int64
```

```
v_data.nunique()
```

```
id           999
game          32
sentiment      4
text         998
dtype: int64
```