```python
In [36]:  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
In [37]:  import nltk
          nltk.download('stopwords')
```

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

Out[37]: True

In [43]:
```python
data=pd.read_csv('twitter_training.csv',encoding=('ISO-8859-1'),low_memory=F
data
```

Out[43]:

| | 2401 | Borderlands | Positive | im getting on borderlands and i will murder you all , |
|---|---|---|---|---|
| 0 | 2401 | Borderlands | Positive | I am coming to the borders and I will kill you... |
| 1 | 2401 | Borderlands | Positive | im getting on borderlands and i will kill you ... |
| 2 | 2401 | Borderlands | Positive | im coming on borderlands and i will murder you... |
| 3 | 2401 | Borderlands | Positive | im getting on borderlands 2 and i will murder ... |
| 4 | 2401 | Borderlands | Positive | im getting into borderlands and i can murder y... |
| 5 | 2402 | Borderlands | Positive | So I spent a few hours making something for fu... |
| 6 | 2402 | Borderlands | Positive | So I spent a couple of hours doing something f... |
| 7 | 2402 | Borderlands | Positive | So I spent a few hours doing something for fun... |
| 8 | 2402 | Borderlands | Positive | So I spent a few hours making something for fu... |
| 9 | 2402 | Borderlands | Positive | 2010 So I spent a few hours making something f... |
| 10 | 2402 | Borderlands | Positive | was |
| 11 | 2403 | Borderlands | Neutral | Rock-Hard La Varlope, RARE & POWERFUL, HANDSOM... |
| 12 | 2403 | Borderlands | Neutral | Rock-Hard La Varlope, RARE & POWERFUL, HANDSOM... |
| 13 | 2403 | Borderlands | Neutral | Rock-Hard La Varlope, RARE & POWERFUL, HANDSOM... |
| 14 | 2403 | Borderlands | Neutral | Rock-Hard La Vita, RARE BUT POWERFUL, HANDSOME... |
| 15 | 2403 | Borderlands | Neutral | Live Rock - Hard music La la Varlope, RARE & t... |
| 16 | 2403 | Borderlands | Neutral | I-Hard like me, RARE LONDON DE, HANDSOME 2011,... |
| 17 | 2404 | Borderlands | Positive | that was the first borderlands session in a lo... |
| 18 | 2404 | Borderlands | Positive | this was the first Borderlands session in a lo... |
| 19 | 2404 | Borderlands | Positive | that was the first borderlands session in a lo... |
| 20 | 2404 | Borderlands | Positive | that was the first borderlands session in a lo... |
| 21 | 2404 | Borderlands | Positive | that I was the first real borderlands session ... |
| 22 | 2404 | Borderlands | Positive | that was the first borderlands session in a ho... |
| 23 | 2405 | Borderlands | Negative | the biggest dissappoinment in my life came out... |
| 24 | 2405 | Borderlands | Negative | The biggest disappointment of my life came a y... |
| 25 | 2405 | Borderlands | Negative | The biggest disappointment of my life came a y... |
| 26 | 2405 | Borderlands | Negative | the biggest dissappoinment in my life coming o... |
| 27 | 2405 | Borderlands | Negative | For the biggest male dissappoinment in my life... |
| 28 | 2405 | Borderlands | Negative | the biggest dissappoinment in my life came bac... |
| 29 | 2406 | Borderlands | Positive | WE FINISHED BORDERLANDS 3 FINALLY YAS! Thank y... |
| ... | ... | ... | ... | ... |
| 74651 | 9196 | Nvidia | Negative | Cheap doesn't mean better btw! . . techsall.co... |
| 74652 | 9196 | Nvidia | Negative | Cheap does not mean better by the way!.. techs... |
| 74653 | 9196 | Nvidia | Negative | ?????????????????????????????????????????????... |
| 74654 | 9196 | Nvidia | Negative | Cheap will mean better<unk>!.. techsall.com/go... |
| 74655 | 9196 | Nvidia | Negative | ... Cheap doesn't t mean anyone better btw!.. ... |
| 74656 | 9196 | Nvidia | Negative | really doesn't look bad btw!.. net.com/google-... |
| 74657 | 9197 | Nvidia | Neutral | Nvidia doesnât want to give up its 2017 âc... |

| | 2401 | Borderlands | Positive | im getting on borderlands and i will murder you all , |
|---|---|---|---|---|
| **74658** | 9197 | Nvidia | Neutral | Nvidia plans to release its 2017 "Crypto Craze... |
| **74659** | 9197 | Nvidia | Neutral | Nvidia does not want to give up its "cryptoins... |
| **74660** | 9197 | Nvidia | Neutral | Nvidia doesn□□t intend to give away its 2017 ... |
| **74661** | 9197 | Nvidia | Neutral | Nvidia therefore doesn â□□ t want to give up i... |
| **74662** | 9197 | Nvidia | Neutral | is doesn□□t should I give up its password â□□... |
| **74663** | 9198 | Nvidia | Negative | Nvidia really delayed the 3070 2 weeks . |
| **74664** | 9198 | Nvidia | Negative | Nvidia really delayed the 3070 by 2 weeks. |
| **74665** | 9198 | Nvidia | Negative | Nvidia did delay by 3070 2 weeks. |
| **74666** | 9198 | Nvidia | Negative | Nvidia really delayed the 3070 several weeks. |
| **74667** | 9198 | Nvidia | Negative | Nvidia really only delayed the 3070 2 flight w... |
| **74668** | 9198 | Nvidia | Negative | Nvidia really delayed the next 2 weeks. |
| **74669** | 9199 | Nvidia | Positive | Let no elim go unnoticed. . . . NVIDIA Highlig... |
| **74670** | 9199 | Nvidia | Positive | t let Elim go unnoticed.... NVIDIA Highlights ... |
| **74671** | 9199 | Nvidia | Positive | Let no elite go unnoticed... NVIDIA Highlights... |
| **74672** | 9199 | Nvidia | Positive | Let no elim go unnoticed.... NVIDIA Highlights... |
| **74673** | 9199 | Nvidia | Positive | Let a no information elim that go unnoticed...... |
| **74674** | 9199 | Nvidia | Positive | <unk> my elim be no.... NVIDIA Highlights Pict... |
| **74675** | 9200 | Nvidia | Positive | Just realized the windows partition of my Mac ... |
| **74676** | 9200 | Nvidia | Positive | Just realized that the Windows partition of my... |
| **74677** | 9200 | Nvidia | Positive | Just realized that my Mac window partition is ... |
| **74678** | 9200 | Nvidia | Positive | Just realized the windows partition of my Mac ... |
| **74679** | 9200 | Nvidia | Positive | Just realized between the windows partition of... |
| **74680** | 9200 | Nvidia | Positive | Just like the windows partition of my Mac is l... |

74681 rows × 4 columns

```
In [44]: v_data=pd.read_csv('twitter_validation.csv')
         v_data
```

Out[44]:

| | 3364 | Facebook | Irrelevant | 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 | 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 I've had Madeleine McCann in my cel... |
| 5 | 7925 | MaddenNFL | Positive | Thank you @EAMaddenNFL!! \n\nNew TE Austin Hoo... |
| 6 | 11332 | TomClancysRainbowSix | Positive | Rocket League, Sea of Thieves or Rainbow Six: ... |
| 7 | 1107 | AssassinsCreed | Positive | my ass still knee-deep in Assassins Creed Odys... |
| 8 | 2069 | CallOfDuty | Negative | FIX IT JESUS ! Please FIX IT ! What In the wor... |
| 9 | 3185 | Dota2 | Positive | The professional dota 2 scene is fucking explo... |
| 10 | 1172 | AssassinsCreed | Positive | Itching to assassinate \n\n#TCCGif #AssassinsC... |
| 11 | 11783 | Verizon | Negative | @FredTJoseph hey fred, Comcast cut the cable a... |
| 12 | 4286 | CS-GO | Neutral | CSGO WIngman (Im Silver dont bully) twitch.tv/... |
| 13 | 8431 | NBA2K | Negative | @NBA2K game sucks... down by 2 with 38 seconds... |
| 14 | 9135 | Nvidia | Positive | Congrats to the NVIDIA NeMo team for the 1.0.0... |
| 15 | 4822 | GrandTheftAuto(GTA) | Positive | yeah and it's fun |
| 16 | 3068 | Dota2 | Negative | fuck my life 😣 |
| 17 | 10537 | RedDeadRedemption(RDR) | Positive | happy birthday red dead redemption that shit c... |
| 18 | 8056 | Microsoft | Negative | What does that say about Microsoft hardware & ... |
| 19 | 2131 | CallOfDuty | Negative | The new @CallofDuty for ps5 is 🔥🔥🔥🔥\nOh God 😭😁 |
| 20 | 5450 | Hearthstone | Neutral | Anyone that plays a bad luck albatross deck in... |
| 21 | 2286 | CallOfDuty | Irrelevant | Call of duty warzone (livestream) w/ subs #War... |
| 22 | 4038 | CS-GO | Negative | Finally played Rainbow Six Siege for the first... |

| | 3364 | Facebook | Irrelevant | 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 🤣 |
|---|---|---|---|---|
| 23 | 526 | ApexLegends | Neutral | Umm @PlayApex when I died it said Bug This pi... |
| 24 | 8977 | Nvidia | Neutral | #gtc20 - nice, motivational, and very accessi... |
| 25 | 11995 | Verizon | Negative | Yo! @Verizon just added a $120 'fee' to my acc... |
| 26 | 9449 | Overwatch | Irrelevant | They might not be the last team that has to ma... |
| 27 | 10193 | PlayerUnknownsBattlegrounds(PUBG) | Irrelevant | Best squad yet#pubg #pubgmobile #pubgkenya ins... |
| 28 | 2419 | Borderlands | Negative | @Borderlands how do I submit a complaint? Your... |
| 29 | 8857 | Nvidia | Positive | Watching NVIDIA position itself as not just a ... |
| ... | ... | ... | ... | ... |
| 969 | 11957 | Verizon | Negative | Old lady threatened me and said she was going ... |
| 970 | 8318 | Microsoft | Negative | Why didn't anyone think of this acronym for BL... |
| 971 | 3080 | Dota2 | Positive | FUCKING FINALLY |
| 972 | 2734 | Borderlands | Positive | surprise i still love #borderlands ' jack pic.... |
| 973 | 397 | Amazon | Positive | #Amazon Best Seller!\n\nScreen Cleaner Kit - B... |
| 974 | 12949 | Xbox(Xseries) | Irrelevant | Microsoft Apparently Has 16 First-Party Xbox S... |
| 975 | 2219 | CallOfDuty | Positive | this quarantine got me bored af playing call o... |
| 976 | 4444 | Google | Neutral | This is....odd. @Google suggests the most dead... |
| 977 | 10128 | PlayerUnknownsBattlegrounds(PUBG) | Irrelevant | How Abhijeet Bhayya ur efforts are incredible ... |
| 978 | 11431 | TomClancysRainbowSix | Negative | @Rainbow6Game when will you ban mnk/cronos pla... |
| 979 | 5495 | Hearthstone | Positive | Team 5 what a great media/announcement day. Yo... |
| 980 | 12689 | WorldOfCraft | Positive | @WarcraftDevs this would be incredible! |
| 981 | 9446 | Overwatch | Negative | Removing mcree's noose because ur pussies enit... |
| 982 | 3108 | Dota2 | Negative | wtf |
| 983 | 1373 | Battlefield | Negative | I have noticed streamers I watch who are now p... |
| 984 | 10588 | RedDeadRedemption(RDR) | Neutral | @6th__man playing red dead redemption-\n\n"Oh ... |

| 3364 | | Facebook | Irrelevant | 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 🤣 |
|---|---|---|---|---|
| 985 | 3980 | Cyberpunk2077 | Positive | This looks like a poster for a 90s action movi... |
| 986 | 4905 | GrandTheftAuto(GTA) | Irrelevant | The ultimate pruning machine! @stihlusa GTA 26... |
| 987 | 7516 | LeagueOfLegends | Neutral | ♥ Suikoden 2\n 1 Alex Kidd in Miracle World\... |
| 988 | 5708 | HomeDepot | Positive | Thank you to Matching funds Home Depot RW paym... |
| 989 | 11504 | TomClancysRainbowSix | Positive | Tom Clancy's Rainbow Six Siege is a great game... |
| 990 | 2165 | CallOfDuty | Neutral | Late night stream with the boys! Come watch so... |
| 991 | 2962 | Dota2 | Positive | guess i'll broke. |
| 992 | 314 | Amazon | Negative | Please explain how this is possible! How can t... |
| 993 | 9701 | PlayStation5(PS5) | Positive | Good on Sony. As much as I want to see the new... |
| 994 | 4891 | GrandTheftAuto(GTA) | Irrelevant | ⭐ Toronto is the arts and culture capital of ... |
| 995 | 4359 | CS-GO | Irrelevant | tHIS IS ACTUALLY A GOOD MOVE TOT BRING MORE VI... |
| 996 | 2652 | Borderlands | Positive | Today sucked so it's time to drink wine n play... |
| 997 | 8069 | Microsoft | Positive | Bought a fraction of Microsoft today. Small wins. |
| 998 | 6960 | johnson&johnson | Neutral | Johnson & Johnson to stop selling talc baby po... |

999 rows × 4 columns

```
In [45]:   data.columns = ['id', 'game', 'sentiment', 'text']
           v_data.columns = ['id', 'game', 'sentiment', 'text']
```

In [46]:  `data`

Out[46]:

| | id | game | sentiment | text |
|---|---|---|---|---|
| 0 | 2401 | Borderlands | Positive | I am coming to the borders and I will kill you... |
| 1 | 2401 | Borderlands | Positive | im getting on borderlands and i will kill you ... |
| 2 | 2401 | Borderlands | Positive | im coming on borderlands and i will murder you... |
| 3 | 2401 | Borderlands | Positive | im getting on borderlands 2 and i will murder ... |
| 4 | 2401 | Borderlands | Positive | im getting into borderlands and i can murder y... |
| 5 | 2402 | Borderlands | Positive | So I spent a few hours making something for fu... |
| 6 | 2402 | Borderlands | Positive | So I spent a couple of hours doing something f... |
| 7 | 2402 | Borderlands | Positive | So I spent a few hours doing something for fun... |
| 8 | 2402 | Borderlands | Positive | So I spent a few hours making something for fu... |
| 9 | 2402 | Borderlands | Positive | 2010 So I spent a few hours making something f... |
| 10 | 2402 | Borderlands | Positive | was |
| 11 | 2403 | Borderlands | Neutral | Rock-Hard La Varlope, RARE & POWERFUL, HANDSOM... |
| 12 | 2403 | Borderlands | Neutral | Rock-Hard La Varlope, RARE & POWERFUL, HANDSOM... |
| 13 | 2403 | Borderlands | Neutral | Rock-Hard La Varlope, RARE & POWERFUL, HANDSOM... |
| 14 | 2403 | Borderlands | Neutral | Rock-Hard La Vita, RARE BUT POWERFUL, HANDSOME... |
| 15 | 2403 | Borderlands | Neutral | Live Rock - Hard music La la Varlope, RARE & t... |
| 16 | 2403 | Borderlands | Neutral | I-Hard like me, RARE LONDON DE, HANDSOME 2011,... |
| 17 | 2404 | Borderlands | Positive | that was the first borderlands session in a lo... |
| 18 | 2404 | Borderlands | Positive | this was the first Borderlands session in a lo... |
| 19 | 2404 | Borderlands | Positive | that was the first borderlands session in a lo... |
| 20 | 2404 | Borderlands | Positive | that was the first borderlands session in a lo... |
| 21 | 2404 | Borderlands | Positive | that I was the first real borderlands session ... |
| 22 | 2404 | Borderlands | Positive | that was the first borderlands session in a ho... |
| 23 | 2405 | Borderlands | Negative | the biggest dissappoinment in my life came out... |
| 24 | 2405 | Borderlands | Negative | The biggest disappointment of my life came a y... |
| 25 | 2405 | Borderlands | Negative | The biggest disappointment of my life came a y... |
| 26 | 2405 | Borderlands | Negative | the biggest dissappoinment in my life coming o... |
| 27 | 2405 | Borderlands | Negative | For the biggest male dissappoinment in my life... |
| 28 | 2405 | Borderlands | Negative | the biggest dissappoinment in my life came bac... |
| 29 | 2406 | Borderlands | Positive | WE FINISHED BORDERLANDS 3 FINALLY YAS! Thank y... |
| ... | ... | ... | ... | ... |
| 74651 | 9196 | Nvidia | Negative | Cheap doesn't mean better btw! . . techsall.co... |
| 74652 | 9196 | Nvidia | Negative | Cheap does not mean better by the way!.. techs... |
| 74653 | 9196 | Nvidia | Negative | ??????????????????????????????????????????????... |
| 74654 | 9196 | Nvidia | Negative | Cheap will mean better<unk>!.. techsall.com/go... |
| 74655 | 9196 | Nvidia | Negative | ... Cheap doesn't t mean anyone better btw!.. ... |
| 74656 | 9196 | Nvidia | Negative | really doesn't look bad btw!.. net.com/google-... |
| 74657 | 9197 | Nvidia | Neutral | Nvidia doesn□□t want to give up its 2017 □□c... |

| | id | game | sentiment | text |
|---|---|---|---|---|
| **74658** | 9197 | Nvidia | Neutral | Nvidia plans to release its 2017 "Crypto Craze... |
| **74659** | 9197 | Nvidia | Neutral | Nvidia does not want to give up its "cryptoins... |
| **74660** | 9197 | Nvidia | Neutral | Nvidia doesn□□t intend to give away its 2017 ... |
| **74661** | 9197 | Nvidia | Neutral | Nvidia therefore doesn â□□ t want to give up i... |
| **74662** | 9197 | Nvidia | Neutral | is doesnâ□□t should I give up its password â□□... |
| **74663** | 9198 | Nvidia | Negative | Nvidia really delayed the 3070 2 weeks . |
| **74664** | 9198 | Nvidia | Negative | Nvidia really delayed the 3070 by 2 weeks. |
| **74665** | 9198 | Nvidia | Negative | Nvidia did delay by 3070 2 weeks. |
| **74666** | 9198 | Nvidia | Negative | Nvidia really delayed the 3070 several weeks. |
| **74667** | 9198 | Nvidia | Negative | Nvidia really only delayed the 3070 2 flight w... |
| **74668** | 9198 | Nvidia | Negative | Nvidia really delayed the next 2 weeks. |
| **74669** | 9199 | Nvidia | Positive | Let no elim go unnoticed. . . . NVIDIA Highlig... |
| **74670** | 9199 | Nvidia | Positive | t let Elim go unnoticed.... NVIDIA Highlights ... |
| **74671** | 9199 | Nvidia | Positive | Let no elite go unnoticed... NVIDIA Highlights... |
| **74672** | 9199 | Nvidia | Positive | Let no elim go unnoticed.... NVIDIA Highlights... |
| **74673** | 9199 | Nvidia | Positive | Let a no information elim that go unnoticed...... |
| **74674** | 9199 | Nvidia | Positive | <unk> my elim be no.... NVIDIA Highlights Pict... |
| **74675** | 9200 | Nvidia | Positive | Just realized the windows partition of my Mac ... |
| **74676** | 9200 | Nvidia | Positive | Just realized that the Windows partition of my... |
| **74677** | 9200 | Nvidia | Positive | Just realized that my Mac window partition is ... |
| **74678** | 9200 | Nvidia | Positive | Just realized the windows partition of my Mac ... |
| **74679** | 9200 | Nvidia | Positive | Just realized between the windows partition of... |
| **74680** | 9200 | Nvidia | Positive | Just like the windows partition of my Mac is l... |

74681 rows × 4 columns

```
In [47]:  v_data
```

Out[47]:

| | id | game | sentiment | 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 I've had Madeleine McCann in my cel... |
| 5 | 7925 | MaddenNFL | Positive | Thank you @EAMaddenNFL!! \n\nNew TE Austin Hoo... |
| 6 | 11332 | TomClancysRainbowSix | Positive | Rocket League, Sea of Thieves or Rainbow Six: ... |
| 7 | 1107 | AssassinsCreed | Positive | my ass still knee-deep in Assassins Creed Odys... |
| 8 | 2069 | CallOfDuty | Negative | FIX IT JESUS ! Please FIX IT ! What In the wor... |
| 9 | 3185 | Dota2 | Positive | The professional dota 2 scene is fucking explo... |
| 10 | 1172 | AssassinsCreed | Positive | Itching to assassinate \n\n#TCCGif #AssassinsC... |
| 11 | 11783 | Verizon | Negative | @FredTJoseph hey fred, Comcast cut the cable a... |
| 12 | 4286 | CS-GO | Neutral | CSGO WIngman (Im Silver dont bully) twitch.tv/... |
| 13 | 8431 | NBA2K | Negative | @NBA2K game sucks... down by 2 with 38 seconds... |
| 14 | 9135 | Nvidia | Positive | Congrats to the NVIDIA NeMo team for the 1.0.0... |
| 15 | 4822 | GrandTheftAuto(GTA) | Positive | yeah and it's fun |
| 16 | 3068 | Dota2 | Negative | fuck my life 😣 |
| 17 | 10537 | RedDeadRedemption(RDR) | Positive | happy birthday red dead redemption that shit c... |
| 18 | 8056 | Microsoft | Negative | What does that say about Microsoft hardware & ... |
| 19 | 2131 | CallOfDuty | Negative | The new @CallofDuty for ps5 is 🔥🔥🔥🔥\nOh God 😭🥵 |
| 20 | 5450 | Hearthstone | Neutral | Anyone that plays a bad luck albatross deck in... |
| 21 | 2286 | CallOfDuty | Irrelevant | Call of duty warzone (livestream) w/ subs #War... |
| 22 | 4038 | CS-GO | Negative | Finally played Rainbow Six Siege for the first... |
| 23 | 526 | ApexLegends | Neutral | Umm @PlayApex when I died it said Bug This pi... |
| 24 | 8977 | Nvidia | Neutral | #gtc20 - nice, motivational, and very accessi... |

| | id | game | sentiment | text |
|---|---|---|---|---|
| **25** | 11995 | Verizon | Negative | Yo! @Verizon just added a $120 'fee' to my acc... |
| **26** | 9449 | Overwatch | Irrelevant | They might not be the last team that has to ma... |
| **27** | 10193 | PlayerUnknownsBattlegrounds(PUBG) | Irrelevant | Best squad yet#pubg #pubgmobile #pubgkenya ins... |
| **28** | 2419 | Borderlands | Negative | @Borderlands how do I submit a complaint? Your... |
| **29** | 8857 | Nvidia | Positive | Watching NVIDIA position itself as not just a ... |
| **...** | ... | ... | ... | ... |
| **969** | 11957 | Verizon | Negative | Old lady threatened me and said she was going ... |
| **970** | 8318 | Microsoft | Negative | Why didn't anyone think of this acronym for BL... |
| **971** | 3080 | Dota2 | Positive | FUCKING FINALLY |
| **972** | 2734 | Borderlands | Positive | surprise i still love #borderlands ' jack pic.... |
| **973** | 397 | Amazon | Positive | #Amazon Best Seller!\n\nScreen Cleaner Kit - B... |
| **974** | 12949 | Xbox(Xseries) | Irrelevant | Microsoft Apparently Has 16 First-Party Xbox S... |
| **975** | 2219 | CallOfDuty | Positive | this quarantine got me bored af playing call o... |
| **976** | 4444 | Google | Neutral | This is....odd. @Google suggests the most dead... |
| **977** | 10128 | PlayerUnknownsBattlegrounds(PUBG) | Irrelevant | How Abhijeet Bhayya ur efforts are incredible ... |
| **978** | 11431 | TomClancysRainbowSix | Negative | @Rainbow6Game when will you ban mnk/cronos pla... |
| **979** | 5495 | Hearthstone | Positive | Team 5 what a great media/announcement day. Yo... |
| **980** | 12689 | WorldOfCraft | Positive | @WarcraftDevs this would be incredible! |
| **981** | 9446 | Overwatch | Negative | Removing mcree's noose because ur pussies enit... |
| **982** | 3108 | Dota2 | Negative | wtf |
| **983** | 1373 | Battlefield | Negative | I have noticed streamers I watch who are now p... |
| **984** | 10588 | RedDeadRedemption(RDR) | Neutral | @6th__man playing red dead redemption-\n\n"Oh ... |
| **985** | 3980 | Cyberpunk2077 | Positive | This looks like a poster for a 90s action movi... |
| **986** | 4905 | GrandTheftAuto(GTA) | Irrelevant | The ultimate pruning machine! @stihlusa GTA 26... |
| **987** | 7516 | LeagueOfLegends | Neutral | ♥ Suikoden 2\n 1️⃣ Alex Kidd in Miracle World\... |
| **988** | 5708 | HomeDepot | Positive | Thank you to Matching funds Home Depot RW paym... |

| | id | game | sentiment | text |
|---|---|---|---|---|
| **989** | 11504 | TomClancysRainbowSix | Positive | Tom Clancy's Rainbow Six Siege is a great game... |
| **990** | 2165 | CallOfDuty | Neutral | Late night stream with the boys! Come watch so... |
| **991** | 2962 | Dota2 | Positive | guess i'll broke. |
| **992** | 314 | Amazon | Negative | Please explain how this is possible! How can t... |
| **993** | 9701 | PlayStation5(PS5) | Positive | Good on Sony. As much as I want to see the new... |
| **994** | 4891 | GrandTheftAuto(GTA) | Irrelevant | ⭐ Toronto is the arts and culture capital of ... |
| **995** | 4359 | CS-GO | Irrelevant | tHIS IS ACTUALLY A GOOD MOVE TOT BRING MORE VI... |
| **996** | 2652 | Borderlands | Positive | Today sucked so it's time to drink wine n play... |
| **997** | 8069 | Microsoft | Positive | Bought a fraction of Microsoft today. Small wins. |
| **998** | 6960 | johnson&johnson | Neutral | Johnson & Johnson to stop selling talc baby po... |

999 rows × 4 columns

In [48]: `data.shape`

Out[48]: (74681, 4)

In [49]: `data.columns`

Out[49]: Index(['id', 'game', 'sentiment', 'text'], dtype='object')

In [50]: `data.describe(include='all')`

Out[50]:

| | id | game | sentiment | text |
|---|---|---|---|---|
| **count** | 74681.000000 | 74681 | 74681 | 73995 |
| **unique** | NaN | 32 | 4 | 69488 |
| **top** | NaN | MaddenNFL | Negative | At the same time, despite the fact that there ... |
| **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 |

In [51]:
```python
id_types = data['id'].value_counts()
id_types
```

Out[51]:

| | |
|---|---|
| 2047 | 6 |
| 2452 | 6 |
| 4695 | 6 |
| 6742 | 6 |
| 597 | 6 |
| 2644 | 6 |
| 12883 | 6 |
| 8785 | 6 |
| 10832 | 6 |
| 4631 | 6 |
| 6678 | 6 |
| 533 | 6 |
| 2580 | 6 |
| 8721 | 6 |
| 10768 | 6 |
| 4567 | 6 |
| 6614 | 6 |
| 469 | 6 |
| 2516 | 6 |
| 12755 | 6 |
| 8657 | 6 |
| 10704 | 6 |
| 4503 | 6 |
| 10896 | 6 |
| 8849 | 6 |
| 12947 | 6 |
| 8977 | 6 |
| 2900 | 6 |
| 13139 | 6 |
| 9041 | 6 |
| .. | |
| 7081 | 6 |
| 5032 | 6 |
| 11119 | 6 |
| 9070 | 6 |
| 13164 | 6 |
| 5224 | 6 |
| 7273 | 6 |
| 1130 | 6 |
| 7401 | 6 |
| 9518 | 6 |
| 3371 | 6 |
| 1322 | 6 |
| 7465 | 6 |
| 5416 | 6 |
| 11503 | 6 |
| 9454 | 6 |
| 3307 | 6 |
| 1258 | 6 |
| 5352 | 6 |
| 3179 | 6 |
| 11439 | 6 |
| 9390 | 6 |
| 3243 | 6 |
| 1194 | 6 |
| 7337 | 6 |
| 5288 | 6 |
| 11375 | 6 |
| 9326 | 6 |
| 2049 | 6 |

```
         2401      5
         Name: id, Length: 12447, dtype: int64
```

In [52]:
```python
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()
```
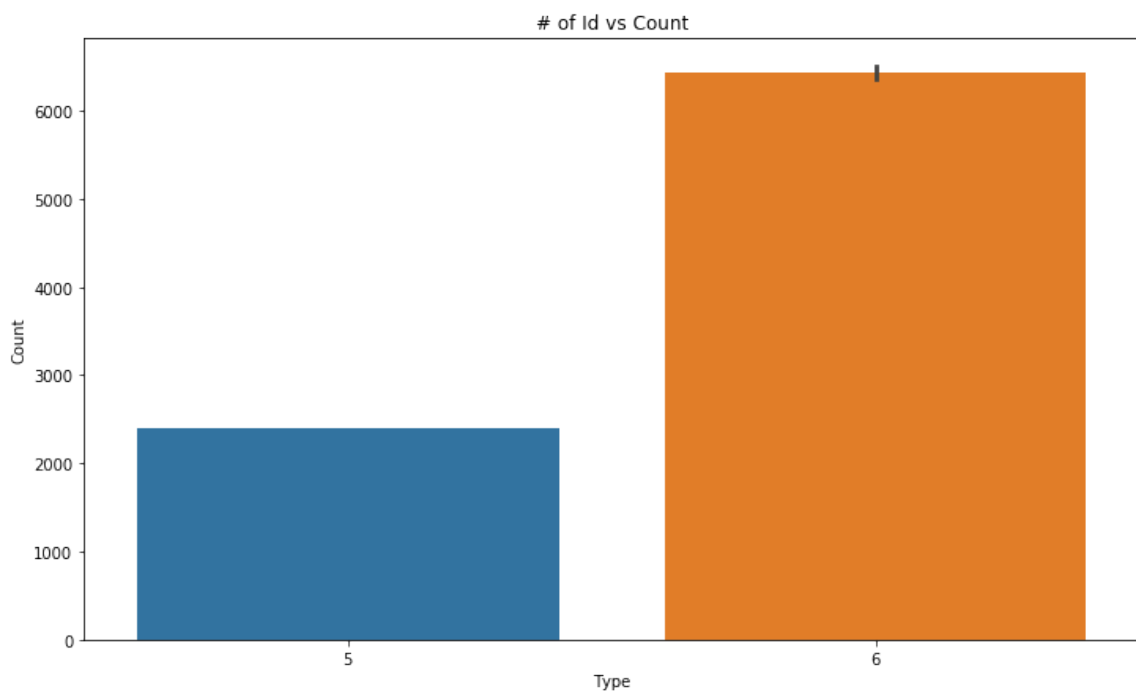
```
In [53]: game_types = data['game'].value_counts()
         game_types
```

```
Out[53]: MaddenNFL                            2400
         TomClancysRainbowSix                 2400
         Microsoft                            2400
         CallOfDuty                           2394
         LeagueOfLegends                      2394
         Verizon                              2382
         CallOfDutyBlackopsColdWar            2376
         ApexLegends                          2376
         Facebook                             2370
         Dota2                                2364
         WorldOfCraft                         2364
         NBA2K                                2352
         Battlefield                          2346
         TomClancysGhostRecon                 2346
         FIFA                                 2340
         Overwatch                            2334
         Xbox(Xseries)                        2334
         johnson&johnson                      2328
         Amazon                               2316
         PlayStation5(PS5)                    2310
         HomeDepot                            2310
         CS-GO                                2304
         GrandTheftAuto(GTA)                  2304
         Cyberpunk2077                        2304
         Nvidia                               2298
         Google                               2298
         Hearthstone                          2298
         Borderlands                          2285
         PlayerUnknownsBattlegrounds(PUBG)    2274
         Fortnite                             2274
         RedDeadRedemption(RDR)               2262
         AssassinsCreed                       2244
         Name: game, dtype: int64
```

In [54]:
```python
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()
```
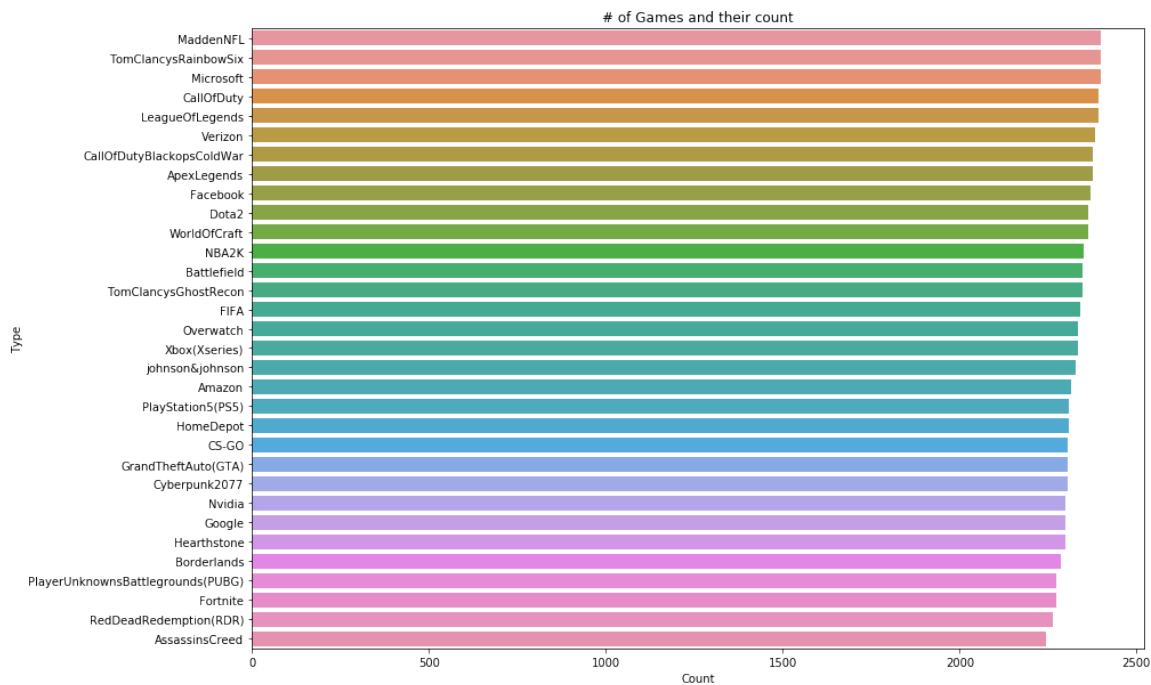
```
In [61]: grouped_data = data.groupby(['game', 'sentiment']).size().unstack()
         fig, ax = plt.subplots(figsize=(15, 10))
         grouped_data.plot(kind='bar', stacked=True, ax=ax)
         plt.xlabel('Game')
         plt.ylabel('Count')
         plt.title('Counts of Sentiments by Game')
         plt.xticks(rotation=90)
         plt.legend(title='Sentiment')
         plt.show()
```
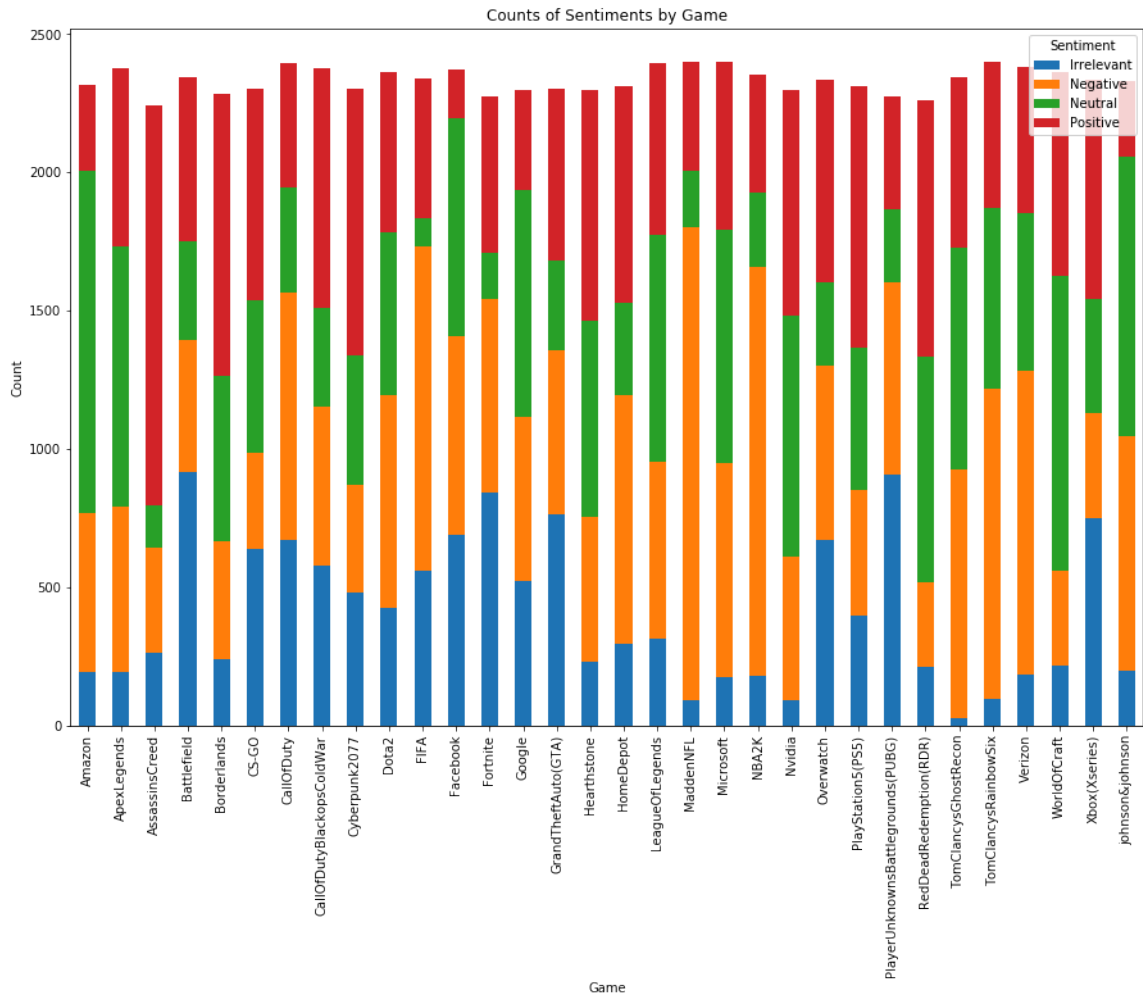
In [62]:
```python
missing_values_matrix = data.isnull().values.astype(int)
plt.figure(figsize=(10, 6))
plt.imshow(missing_values_matrix, cmap='viridis', aspect='auto')
plt.xlabel('Columns')
plt.title('Missing Values Heatmap')
plt.xticks(range(len(data.columns)), data.columns, rotation=90)
plt.yticks([])  # Disable y-axis ticks
plt.colorbar(label='Missing Values')
plt.show()
```
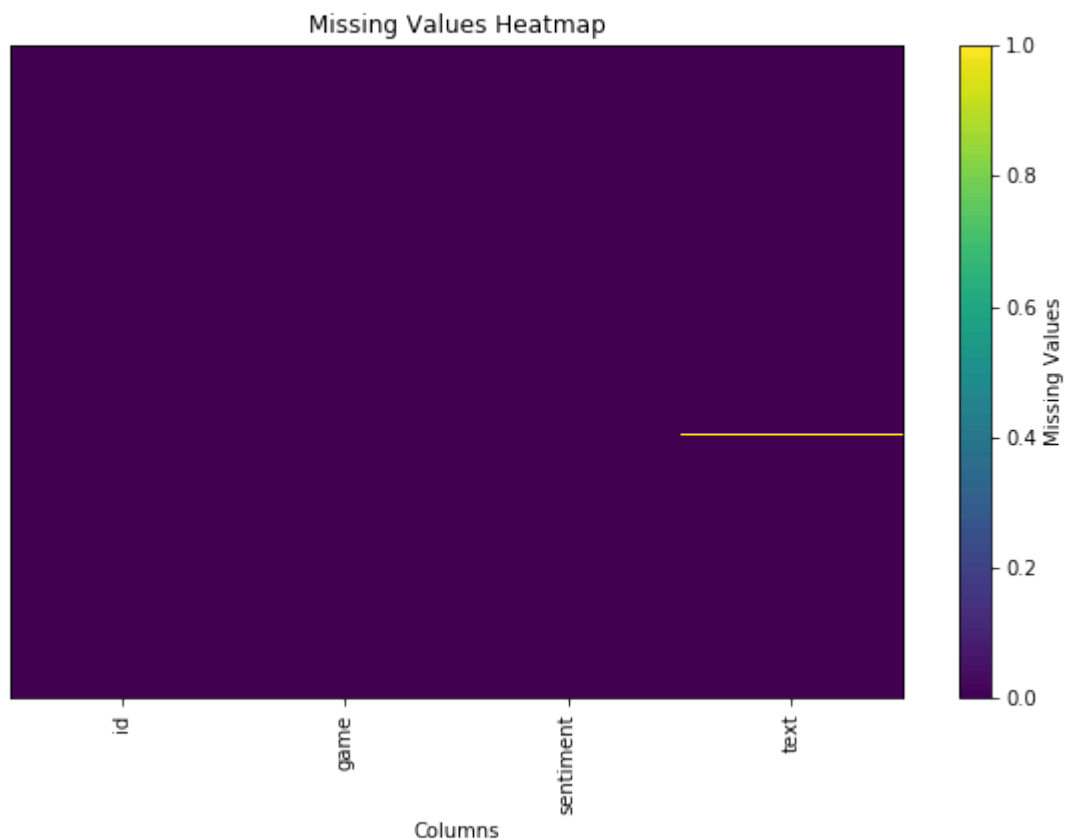


In [63]:
```python
total_null=data.isnull().sum().sort_values(ascending=False)
percent = ((data.isnull().sum()/data.isnull().count())*100).sort_values(asce
print("Total records = ", data.shape[0])
missing_data = pd.concat([total_null,percent.round(2)],axis=1,keys=['Total M
missing_data.head(10)
```

Total records =  74681

Out[63]:

|          | Total Missing | In Percent |
|----------|--------------|------------|
| **text** | 686 | 0.92 |
| **sentiment** | 0 | 0.00 |
| **game** | 0 | 0.00 |
| **id** | 0 | 0.00 |

In [64]:
```python
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(asce
print("Total records = ", data.shape[0])
missing_data = pd.concat([total_null,percent.round(2)],axis=1,keys=['Total M
missing_data.head(10)
```

```
Total records =  73995
```

Out[64]:

|          | Total Missing | In Percent |
|----------|:-------------:|:----------:|
| text     | 0             | 0.0        |
| sentiment| 0             | 0.0        |
| game     | 0             | 0.0        |
| id       | 0             | 0.0        |

In [66]:
```python
train0=data[data['sentiment']=="Negative"]
train1=data[data['sentiment']=="Positive"]
train2=data[data['sentiment']=="Irrelevant"]
train3=data[data['sentiment']=="Neutral"]
```

In [67]:
```python
train0.shape, train1.shape, train2.shape, train3.shape
```

Out[67]: `((22358, 4), (20654, 4), (12875, 4), (18108, 4))`

In [68]:
```python
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)]
```

In [69]:
```python
train0.shape, train1.shape, train2.shape, train3.shape
```

Out[69]: `((1863, 4), (1721, 4), (1072, 4), (1509, 4))`

```
In [70]: data=pd.concat([train0,train1,train2,train3],axis=0)
         data
```

Out[70]:

| | id | game | sentiment | text |
|---|---|---|---|---|
| 23 | 2405 | Borderlands | Negative | the biggest dissappoinment in my life came out... |
| 24 | 2405 | Borderlands | Negative | The biggest disappoinment of my life came a y... |
| 25 | 2405 | Borderlands | Negative | The biggest disappoinment of my life came a y... |
| 26 | 2405 | Borderlands | Negative | the biggest dissappoinment in my life coming o... |
| 27 | 2405 | Borderlands | Negative | For the biggest male dissappoinment in my life... |
| 28 | 2405 | Borderlands | Negative | the biggest dissappoinment in my life came bac... |
| 35 | 2407 | Borderlands | Negative | Man Gearbox really needs to fix this dissapoin... |
| 36 | 2407 | Borderlands | Negative | Man Gearbox really needs to fix these disappoi... |
| 37 | 2407 | Borderlands | Negative | Man Gearbox really needs to fix this disssapoi... |
| 38 | 2407 | Borderlands | Negative | Man Bethesda really needs to fix this dissapoi... |
| 39 | 2407 | Borderlands | Negative | Man Gearbox really needs to fix this dissapoin... |
| 40 | 2407 | Borderlands | Negative | <unk> Gearbox really time to fix this 10 drops... |
| 53 | 2410 | Borderlands | Negative | why does like every man in borderlands have sl... |
| 54 | 2410 | Borderlands | Negative | Why, like every man in border countries, have ... |
| 55 | 2410 | Borderlands | Negative | Why, like everyone else in the border countrie... |
| 56 | 2410 | Borderlands | Negative | why does like<unk> man in borderlands have sli... |
| 57 | 2410 | Borderlands | Negative | why Beth does like every man in borderlands ha... |
| 58 | 2410 | Borderlands | Negative | why does practically every man in France have ... |
| 95 | 2417 | Borderlands | Negative | Grounded almost looked pretty cool even despit... |
| 96 | 2417 | Borderlands | Negative | Grounded looked cool despite the borderline un... |
| 97 | 2417 | Borderlands | Negative | Grosskreutz looked pretty cool, even despite t... |
| 98 | 2417 | Borderlands | Negative | Grounded almost looked pretty cool here despit... |
| 99 | 2417 | Borderlands | Negative | Deep Grounded almost looked pretty cool even d... |
| 100 | 2417 | Borderlands | Negative | Grounded almost was pretty cool even despite t... |
| 107 | 2419 | Borderlands | Negative | @Borderlands how do I submit a complaint? Your... |
| 108 | 2419 | Borderlands | Negative | @ Borderlands, how can I file a complaint? You... |
| 109 | 2419 | Borderlands | Negative | @ Borderlands how to file a complaint? Your CE... |
| 110 | 2419 | Borderlands | Negative | @Borderlands how did I submit a complaint? You... |
| 111 | 2419 | Borderlands | Negative | @Borderlands how do suppose I submit a complai... |
| 112 | 2419 | Borderlands | Negative | Now how do I submit any complaint? Your CEO is... |
| ... | ... | ... | ... | ... |
| 5572 | 159 | Amazon | Neutral | Plain Janie. Smart girl. And the good sister t... |
| 5573 | 160 | Amazon | Neutral | Starting season 4 of Bosch on Amazon Prime vid... |
| 5574 | 160 | Amazon | Neutral | Starts Season 4 of Bosch on Amazon Prime Video... |
| 5575 | 160 | Amazon | Neutral | The fourth season of the series starts on Amaz... |
| 5576 | 160 | Amazon | Neutral | Starting season 4 in Bosch on Amazon Prime vid... |
| 5577 | 160 | Amazon | Neutral | I Starting season 4 of Bosch on an Amazon Prim... |
| 5578 | 160 | Amazon | Neutral | Starting Part 4 of Bosch on Amazon Prime video... |

| | id | game | sentiment | text |
|---|---|---|---|---|
| **5579** | 161 | Amazon | Neutral | I played this interesting quiz on Amazon - Try... |
| **5580** | 161 | Amazon | Neutral | ve played this interesting quiz on Amazon - Tr... |
| **5581** | 161 | Amazon | Neutral | I played this interesting quiz on Amazon - Try... |
| **5582** | 161 | Amazon | Neutral | I played this interesting quiz on Amazon - Try... |
| **5583** | 161 | Amazon | Neutral | I played this interesting quiz on Amazon - Try... |
| **5584** | 161 | Amazon | Neutral | us take this interesting quiz on Amazon - Wish... |
| **5585** | 162 | Amazon | Neutral | Agents of Mayhem is now Just $8.56. . Get it h... |
| **5586** | 162 | Amazon | Neutral | Agents of Mayhem now costs just $8.56.. Get it... |
| **5587** | 162 | Amazon | Neutral | Mayhem's agent now costs only $8.56. You can g... |
| **5588** | 162 | Amazon | Neutral | Agents of Mayhem Out now Just $8.56.. Get it h... |
| **5589** | 162 | Amazon | Neutral | Agents of Infinite Mayhem there is and now cos... |
| **5590** | 162 | Amazon | Neutral | Agents Against Mayhem Are A Just a.56.. Found ... |
| **5591** | 163 | Amazon | Neutral | I played this interesting quiz on Amazon - Try... |
| **5592** | 163 | Amazon | Neutral | ve played this interesting quiz on Amazon - Tr... |
| **5593** | 163 | Amazon | Neutral | I played this interesting quiz on Amazon - Try... |
| **5594** | 163 | Amazon | Neutral | I played this interesting quiz on Amazon - Try... |
| **5595** | 163 | Amazon | Neutral | I played all this really interesting quiz on A... |
| **5596** | 163 | Amazon | Neutral | mind get this interesting chance on Amazon - T... |
| **5603** | 165 | Amazon | Neutral | An amazing read aloud book for you and your ch... |
| **5604** | 165 | Amazon | Neutral | An amazing reading book for you and your child... |
| **5605** | 165 | Amazon | Neutral | An amazing book to read aloud for you and your... |
| **5606** | 165 | Amazon | Neutral | An amazing read aloud book for you and your ch... |
| **5607** | 165 | Amazon | Neutral | and An amazing read aloud book for you and you... |

6165 rows × 4 columns

In [71]:
```python
id_types = data['id'].value_counts()
id_types
```

Out[71]:

| | |
|---|---|
| 1999 | 6 |
| 2584 | 6 |
| 2636 | 6 |
| 2632 | 6 |
| 2628 | 6 |
| 2624 | 6 |
| 2620 | 6 |
| 2616 | 6 |
| 2612 | 6 |
| 2608 | 6 |
| 2604 | 6 |
| 2600 | 6 |
| 2596 | 6 |
| 2592 | 6 |
| 2588 | 6 |
| 2580 | 6 |
| 2644 | 6 |
| 2576 | 6 |
| 2572 | 6 |
| 2564 | 6 |
| 2556 | 6 |
| 2552 | 6 |
| 2548 | 6 |
| 2544 | 6 |
| 2540 | 6 |
| 2536 | 6 |
| 2528 | 6 |
| 2524 | 6 |
| 2520 | 6 |
| 2516 | 6 |
| | .. |
| 2532 | 5 |
| 1737 | 5 |
| 1717 | 5 |
| 2503 | 5 |
| 1708 | 5 |
| 1613 | 5 |
| 1779 | 5 |
| 2411 | 5 |
| 2401 | 5 |
| 1731 | 5 |
| 1622 | 5 |
| 2595 | 4 |
| 1632 | 4 |
| 1863 | 4 |
| 333 | 3 |
| 1880 | 3 |
| 1929 | 3 |
| 16 | 3 |
| 1602 | 3 |
| 42 | 3 |
| 1959 | 3 |
| 9256 | 3 |
| 235 | 3 |
| 1763 | 3 |
| 1719 | 3 |
| 134 | 3 |
| 37 | 3 |
| 157 | 3 |
| 9267 | 2 |

```
9388      2
Name: id, Length: 1040, dtype: int64
```

In [72]:
```python
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()
```
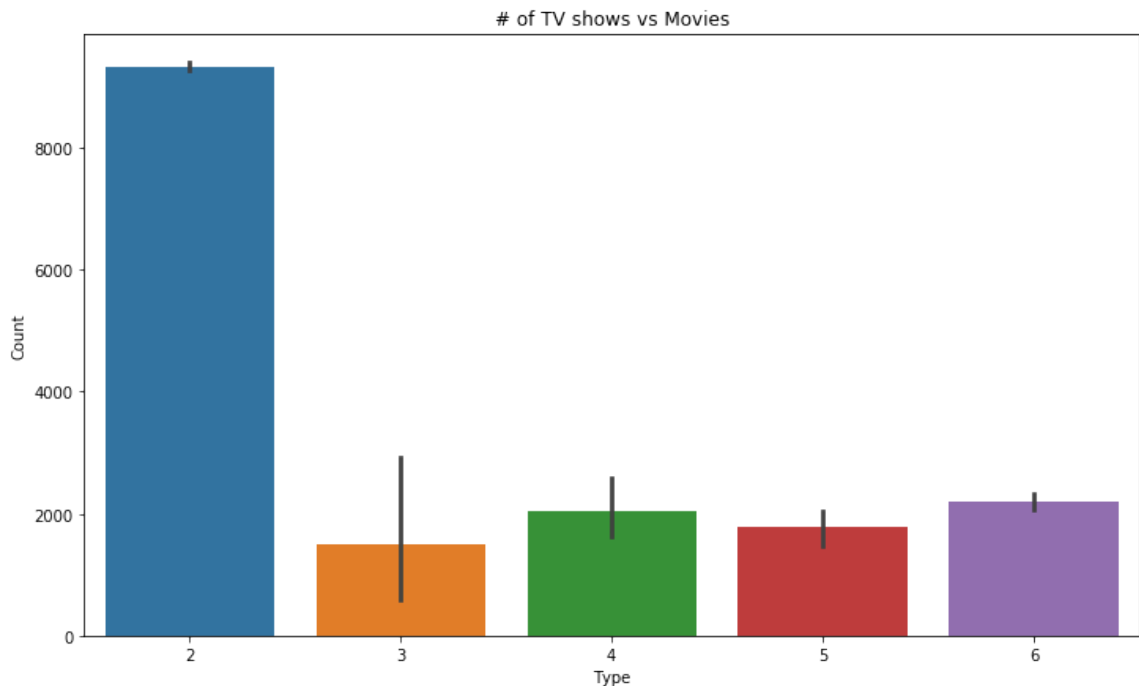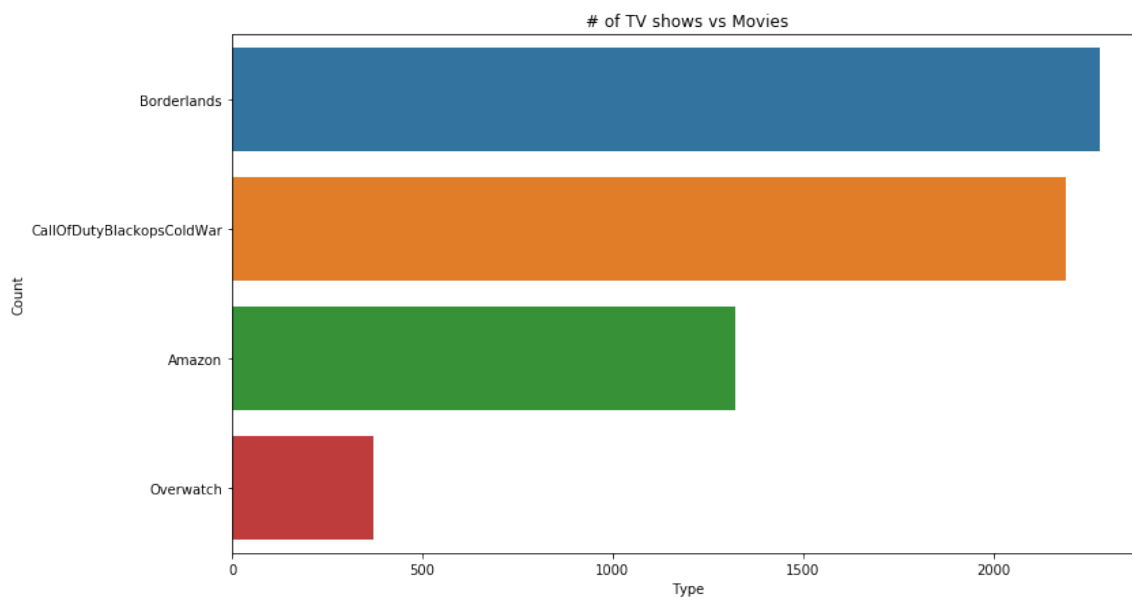


In [73]:
```python
game_types = data['game'].value_counts()
game_types
```

Out[73]:
```
Borderlands                2279
CallOfDutyBlackopsColdWar  2192
Amazon                     1321
Overwatch                   373
Name: game, dtype: int64
```

In [74]:
```python
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()
```



In [75]:
```python
sentiment_types = data['sentiment'].value_counts()
sentiment_types
```

Out[75]:
```
Negative      1863
Positive      1721
Neutral       1509
Irrelevant    1072
Name: sentiment, dtype: int64
```

In [78]:
```python
plt.figure(figsize=(12,7))
plt.pie(x=sentiment_types.values, labels=sentiment_types.index, autopct='%.1
plt.title('The Difference in the Type of Contents')
plt.gca().set_aspect('equal')
plt.show()
```

The Difference in the Type of Contents
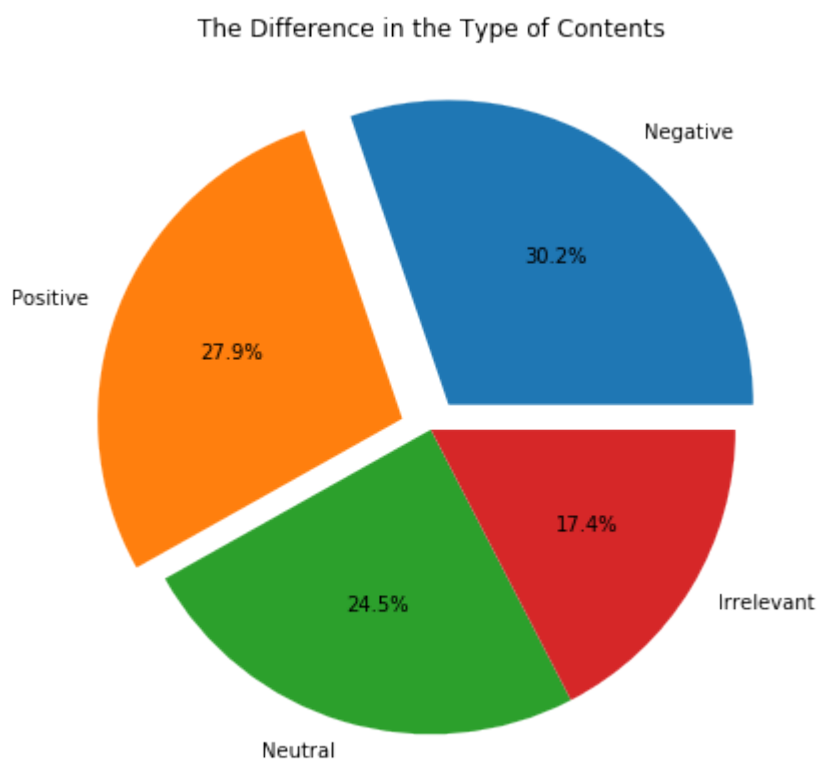
In [79]:
```python
grouped_data = data.groupby(['game', 'sentiment']).size().unstack()
games = grouped_data.index
sentiments = grouped_data.columns
fig, ax = plt.subplots(figsize=(14, 7))
bar_width = 0.2
index = np.arange(len(games))
for i, sentiment in enumerate(sentiments):
    ax.bar(index + (i * bar_width), grouped_data[sentiment], width=bar_width
ax.set_xlabel('Game')
ax.set_ylabel('Count')
ax.set_title('Counts of Sentiments by Game')
ax.set_xticks(index + (bar_width * len(sentiments)) / 2)
ax.set_xticklabels(games)
ax.legend(title='Sentiment')
plt.show()
```
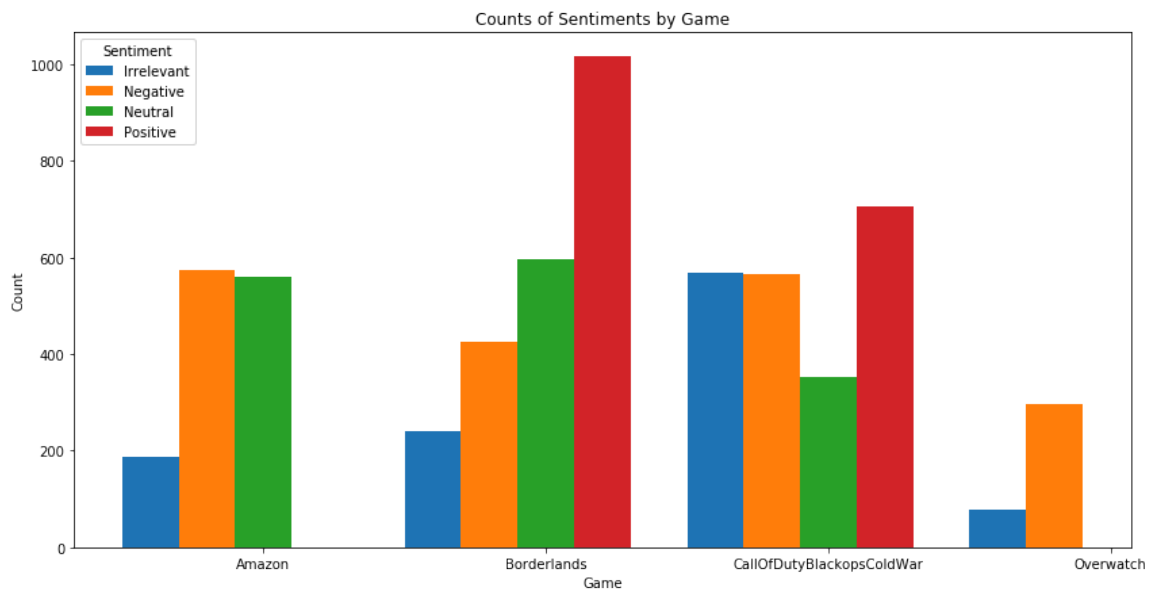


In [80]:
```python
from sklearn import preprocessing
label_encoder = preprocessing.LabelEncoder()
```

In [81]:
```python
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'])
```

In [82]:
```python
data = data.drop(['id'],axis=1)
data
```

Out[82]:

| | 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... |
| 28 | 1 | 1 | the biggest dissappoinment in my life came bac... |
| 35 | 1 | 1 | Man Gearbox really needs to fix this dissapoin... |
| 36 | 1 | 1 | Man Gearbox really needs to fix these disappoi... |
| 37 | 1 | 1 | Man Gearbox really needs to fix this disssapoi... |
| 38 | 1 | 1 | Man Bethesda really needs to fix this dissapoi... |
| 39 | 1 | 1 | Man Gearbox really needs to fix this dissapoin... |
| 40 | 1 | 1 | <unk> Gearbox really time to fix this 10 drops... |
| 53 | 1 | 1 | why does like every man in borderlands have sl... |
| 54 | 1 | 1 | Why, like every man in border countries, have ... |
| 55 | 1 | 1 | Why, like everyone else in the border countrie... |
| 56 | 1 | 1 | why does like<unk> man in borderlands have sli... |
| 57 | 1 | 1 | why Beth does like every man in borderlands ha... |
| 58 | 1 | 1 | why does practically every man in France have ... |
| 95 | 1 | 1 | Grounded almost looked pretty cool even despit... |
| 96 | 1 | 1 | Grounded looked cool despite the borderline un... |
| 97 | 1 | 1 | Grosskreutz looked pretty cool, even despite t... |
| 98 | 1 | 1 | Grounded almost looked pretty cool here despit... |
| 99 | 1 | 1 | Deep Grounded almost looked pretty cool even d... |
| 100 | 1 | 1 | Grounded almost was pretty cool even despite t... |
| 107 | 1 | 1 | @Borderlands how do I submit a complaint? Your... |
| 108 | 1 | 1 | @ Borderlands, how can I file a complaint? You... |
| 109 | 1 | 1 | @ Borderlands how to file a complaint? Your CE... |
| 110 | 1 | 1 | @Borderlands how did I submit a complaint? You... |
| 111 | 1 | 1 | @Borderlands how do suppose I submit a complai... |
| 112 | 1 | 1 | Now how do I submit any complaint? Your CEO is... |
| ... | ... | ... | ... |
| 5572 | 0 | 2 | Plain Janie. Smart girl. And the good sister t... |
| 5573 | 0 | 2 | Starting season 4 of Bosch on Amazon Prime vid... |
| 5574 | 0 | 2 | Starts Season 4 of Bosch on Amazon Prime Video... |
| 5575 | 0 | 2 | The fourth season of the series starts on Amaz... |
| 5576 | 0 | 2 | Starting season 4 in Bosch on Amazon Prime vid... |
| 5577 | 0 | 2 | I Starting season 4 of Bosch on an Amazon Prim... |
| 5578 | 0 | 2 | Starting Part 4 of Bosch on Amazon Prime video... |

| | game | sentiment | text |
|---|---|---|---|
| **5579** | 0 | 2 | I played this interesting quiz on Amazon - Try... |
| **5580** | 0 | 2 | ve played this interesting quiz on Amazon - Tr... |
| **5581** | 0 | 2 | I played this interesting quiz on Amazon - Try... |
| **5582** | 0 | 2 | I played this interesting quiz on Amazon - Try... |
| **5583** | 0 | 2 | I played this interesting quiz on Amazon - Try... |
| **5584** | 0 | 2 | us take this interesting quiz on Amazon - Wish... |
| **5585** | 0 | 2 | Agents of Mayhem is now Just $8.56. . Get it h... |
| **5586** | 0 | 2 | Agents of Mayhem now costs just $8.56.. Get it... |
| **5587** | 0 | 2 | Mayhem's agent now costs only $8.56. You can g... |
| **5588** | 0 | 2 | Agents of Mayhem Out now Just $8.56.. Get it h... |
| **5589** | 0 | 2 | Agents of Infinite Mayhem there is and now cos... |
| **5590** | 0 | 2 | Agents Against Mayhem Are A Just a.56.. Found ... |
| **5591** | 0 | 2 | I played this interesting quiz on Amazon - Try... |
| **5592** | 0 | 2 | ve played this interesting quiz on Amazon - Tr... |
| **5593** | 0 | 2 | I played this interesting quiz on Amazon - Try... |
| **5594** | 0 | 2 | I played this interesting quiz on Amazon - Try... |
| **5595** | 0 | 2 | I played all this really interesting quiz on A... |
| **5596** | 0 | 2 | mind get this interesting chance on Amazon - T... |
| **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 × 3 columns

In [83]:
```python
data.nunique()
```

Out[83]:
```
game          4
sentiment     4
text       5854
dtype: int64
```

In [84]:
```python
v_data.nunique()
```

Out[84]:
```
id         999
game        32
sentiment    4
text       998
dtype: int64
```