Netflix_Project

February 18, 2023

[258]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
```

[259]:
```
data = pd.read_csv("netflix.csv")
data.head(10)
```

[259]:

	show_id	type	title	director	cast
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban…
2	s3	TV Show	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi…
3	s4	TV Show	Jailbirds New Orleans	NaN	NaN
4	s5	TV Show	Kota Factory	NaN	Mayur More, Jitendra Kumar, Ranjan Raj, Alam K…
5	s6	TV Show	Midnight Mass	Mike Flanagan	
6	s7	Movie	My Little Pony: A New Generation	Robert Cullen, José Luis Ucha	
7	s8	Movie	Sankofa	Haile Gerima	
8	s9	TV Show	The Great British Baking Show	Andy Devonshire	
9	s10	Movie	The Starling	Theodore Melfi	

```
5  Kate Siegel, Zach Gilford, Hamish Linklater, H…
6  Vanessa Hudgens, Kimiko Glenn, James Marsden, …
7  Kofi Ghanaba, Oyafunmike Ogunlano, Alexandra D…
8  Mel Giedroyc, Sue Perkins, Mary Berry, Paul Ho…
9  Melissa McCarthy, Chris O'Dowd, Kevin Kline, T…

                                          country          date_added  \
0                                   United States  September 25, 2021
1                                    South Africa  September 24, 2021
2                                             NaN  September 24, 2021
3                                             NaN  September 24, 2021
4                                           India  September 24, 2021
5                                             NaN  September 24, 2021
6                                             NaN  September 24, 2021
7  United States, Ghana, Burkina Faso, United Kin…  September 24, 2021
8                                  United Kingdom  September 24, 2021
9                                   United States  September 24, 2021

   release_year rating   duration  \
0          2020  PG-13     90 min
1          2021  TV-MA  2 Seasons
2          2021  TV-MA   1 Season
3          2021  TV-MA   1 Season
4          2021  TV-MA  2 Seasons
5          2021  TV-MA   1 Season
6          2021     PG     91 min
7          1993  TV-MA    125 min
8          2021  TV-14  9 Seasons
9          2021  PG-13    104 min

                                       listed_in  \
0                                  Documentaries
1    International TV Shows, TV Dramas, TV Mysteries
2  Crime TV Shows, International TV Shows, TV Act…
3                            Docuseries, Reality TV
4  International TV Shows, Romantic TV Shows, TV …
5                 TV Dramas, TV Horror, TV Mysteries
6                          Children & Family Movies
7   Dramas, Independent Movies, International Movies
8                       British TV Shows, Reality TV
9                                Comedies, Dramas

                                         description
0  As her father nears the end of his life, filmm…
1  After crossing paths at a party, a Cape Town t…
2  To protect his family from a powerful drug lor…
3  Feuds, flirtations and toilet talk go down amo…
```

```
4  In a city of coaching centers known to train I…
5  The arrival of a charismatic young priest brin…
6  Equestria's divided. But a bright-eyed hero be…
7  On a photo shoot in Ghana, an American model s…
8  A talented batch of amateur bakers face off in…
9  A woman adjusting to life after a loss contend…
```

[260]:
```
data.info(),data.shape
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8807 entries, 0 to 8806
Data columns (total 12 columns):
 #   Column        Non-Null Count  Dtype 
---  ------        --------------  ----- 
 0   show_id       8807 non-null   object
 1   type          8807 non-null   object
 2   title         8807 non-null   object
 3   director      6173 non-null   object
 4   cast          7982 non-null   object
 5   country       7976 non-null   object
 6   date_added    8797 non-null   object
 7   release_year  8807 non-null   int64 
 8   rating        8803 non-null   object
 9   duration      8804 non-null   object
 10  listed_in     8807 non-null   object
 11  description   8807 non-null   object
dtypes: int64(1), object(11)
memory usage: 825.8+ KB
```

[260]:
```
(None, (8807, 12))
```

[261]:
```
data.isna().sum()
```

[261]:
```
show_id          0
type             0
title            0
director        2634
cast             825
country          831
date_added        10
release_year       0
rating             4
duration           3
listed_in          0
description        0
dtype: int64
```

[262]:
```
for i in data.columns:
    print(f"{i} : {data[i].nunique()}")
```

```
show_id : 8807
type : 2
title : 8807
director : 4528
cast : 7692
country : 748
date_added : 1767
release_year : 74
rating : 17
duration : 220
listed_in : 514
description : 8775
```

[263]:
```
data.describe(include="object").T
```

[263]:

	count	unique	top	freq
show_id	8807	8807	s1	1
type	8807	2	Movie	6131
title	8807	8807	Dick Johnson Is Dead	1
director	6173	4528	Rajiv Chilaka	19
cast	7982	7692	David Attenborough	19
country	7976	748	United States	2818
date_added	8797	1767	January 1, 2020	109
rating	8803	17	TV-MA	3207
duration	8804	220	1 Season	1793
listed_in	8807	514	Dramas, International Movies	362
description	8807	8775	Paranormal activity at a lush, abandoned prope…	4

[264]:
```
actor_df = pd.DataFrame(
    data["cast"].apply(lambda x: str(x).split(", ")).tolist(),index=data.title
    ).stack().reset_index().drop("level_1",axis=1)
actor_df.columns = ["title","cast"]
```

```
actor_df
```

[264]:
```
                      title                  cast
0      Dick Johnson Is Dead                   nan
1              Blood & Water            Ama Qamata
2              Blood & Water           Khosi Ngema
3              Blood & Water         Gail Mabalane
4              Blood & Water        Thabang Molaba
…                        …                     …
64946                Zubaan      Manish Chaudhary
64947                Zubaan          Meghna Malik
64948                Zubaan         Malkeet Rauni
64949                Zubaan        Anita Shabdish
64950                Zubaan  Chittaranjan Tripathy

[64951 rows x 2 columns]
```

[265]:
```
actor_df["cast"].value_counts().head(20)
```

[265]:
```
nan                  825
Anupam Kher           43
Shah Rukh Khan        35
Julie Tejwani         33
Naseeruddin Shah      32
Takahiro Sakurai      32
Rupa Bhimani          31
Akshay Kumar          30
Om Puri               30
Yuki Kaji             29
Amitabh Bachchan      28
Paresh Rawal          28
Boman Irani           27
Vincent Tong          26
Rajesh Kava           26
Kareena Kapoor        25
Andrea Libman         25
John Cleese           24
Samuel L. Jackson     24
Jigna Bhardwaj        23
Name: cast, dtype: int64
```

[266]:
```
actor_df[actor_df["cast"] == "Anupam Kher"]
```

[266]:
```
                                    title         cast
1606                          C Kkompany  Anupam Kher
1704                  Kyaa Kool Hai Hum   Anupam Kher
1718          Kyaa Super Kool Hain Hum    Anupam Kher
```

```
1728          Kyo Kii… Main Jhuth Nahin Bolta  Anupam Kher
5985                      Silver Linings Playbook  Anupam Kher
15063                                        Dil  Anupam Kher
18151                             Chashme Baddoor  Anupam Kher
18315                                  Special 26  Anupam Kher
18650                        Prem Ratan Dhan Payo  Anupam Kher
18662                                       Vivah  Anupam Kher
20434                  One Day: Justice Delivered  Anupam Kher
21603                        Gori Tere Pyaar Mein  Anupam Kher
21610                                     Gumrah  Anupam Kher
21685                          Kuch Kuch Hota Hai  Anupam Kher
23391                          Hum Aapke Hain Koun  Anupam Kher
24818                                        Game  Anupam Kher
34309                                    Zokkomon  Anupam Kher
35340                                  Wake Up Sid  Anupam Kher
35876                                 Naam Shabana  Anupam Kher
35967                        Toilet: Ek Prem Katha  Anupam Kher
36257                              Rang De Basanti  Anupam Kher
37011                                     Aiyaary  Anupam Kher
37592                                      Paheli  Anupam Kher
38002                                    Judwaa 2  Anupam Kher
38673                         The Indian Detective  Anupam Kher
41062                    Oh Darling Yeh Hai India  Anupam Kher
41297                                     Chaahat  Anupam Kher
44745                                A Family Man  Anupam Kher
44961                                A Wednesday  Anupam Kher
47815                             Chashme Buddoor  Anupam Kher
51126                   Hamara Dil Aapke Paas Hai  Anupam Kher
51292                        Haseena Maan Jaayegi  Anupam Kher
52503  Jaan-E-Mann: Let's Fall in Love… Again  Anupam Kher
52758                                      Judwaa  Anupam Kher
53060                                   Khalnayak  Anupam Kher
53074                           Khosla Ka Ghosla  Anupam Kher
53516                                   Kya Kehna  Anupam Kher
54440                                  Mahabharat  Anupam Kher
59857                                  Super Nani  Anupam Kher
59989                                      Tahaan  Anupam Kher
62696                                The Shaukeens  Anupam Kher
64642                      Y.M.I.: Yeh Mera India  Anupam Kher
64685                       Yamla Pagla Deewana 2  Anupam Kher
```

[267]:
```
df = data.merge(actor_df,on="title",how="inner").drop("cast_x",axis=1)
```

1 Actor based analysis

1. “Anupam Kher” is the one with most number of films in india
2. Director: David Dhawan was directed 6 movies with Anupam kher

3. Anupam kher acted 40 films in india 3 are international movies
4. Shah rukh khan is the 2 nd actor who acted most movies in netflix
5. Farah khan and karan johar directed 3 movies with shar rukh

[268]:
```
df.groupby("cast_y").agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False)
```

[268]:

cast_y	title
nan	825
Anupam Kher	43
Shah Rukh Khan	35
Julie Tejwani	33
Naseeruddin Shah	32
…	…
Jamie Lee	1
Jamie Kenna	1
Jamie Kaler	1
Jamie Johnston	1
Ṣọpẹ́ Dìrísù	1

[36440 rows x 1 columns]

[269]:
```
df[
   (df["cast_y"] == "Anupam Kher") &
   (df["country"] == "India")
    ].groupby("director").agg({"title":'count'}).
 ↪sort_values(by="title",ascending=False)
```

[269]:

director	title
David Dhawan	6
Sooraj R. Barjatya	3
Neeraj Pandey	3
Indra Kumar	2
Sangeeth Sivan	2
Mahesh Bhatt	2
Sachin Yardi	2
Abhinay Deo	1
Rakeysh Omprakash Mehra	1
Shree Narayan Singh	1
Shivam Nair	1
Shirish Kunder	1
Satyajit Bhatkal	1
Satish Kaushik	1
Santosh Sivan	1
N. Chandra	1
Punit Malhotra	1

```
Abhishek Sharma              1
Kundan Shah                  1
Ketan Mehta                  1
Karan Johar                  1
Dibakar Banerjee             1
Ayaan Mukherji               1
Ashok Nanda                  1
Amol Palekar                 1
Amaan Khan                   1
Subhash Ghai                 1
```

[270]:
```
df[
    (df["cast_y"] == "Shah Rukh Khan") &
    (df["country"] == "India")
    ].groupby("director").agg({"title":'count'}).
 ↪sort_values(by="title",ascending=False)
```

[270]:
```
                    title
director
Farah Khan              3
Karan Johar             3
Aziz Mirza              2
Rohit Shetty            2
Rajiv Mehra             2
Mahesh Bhatt            2
Amol Palekar            1
Nikkhil Advani          1
Shashilal K. Nair       1
Santosh Sivan           1
Rahul Rawail            1
Rahul Dholakia          1
Priyadarshan            1
Praveen Nischol         1
Mani Ratnam             1
Mukul Anand             1
Ashutosh Gowariker      1
Kundan Shah             1
Krishna Vamshi          1
Ketan Mehta             1
Imtiaz Ali              1
Gauri Shinde            1
Farhan Akhtar           1
Subhash Ghai            1
```

2 Actors outside india

1. Takahiro Sakurai, Yuki Kaji are the top actors with 25+Movies

2. Most of their genre are Animation shows.
3. Those movies all are from japan country
4. We can identify most popular shows in japan was Animation series.

[271]:
```
df[(df["country"] != "India")].groupby("cast_y").agg({"title":'nunique'}).
↪sort_values(by="title",ascending=False).head(10)
```

[271]:

cast_y	title
nan	793
Takahiro Sakurai	32
Yuki Kaji	29
Julie Tejwani	26
Vincent Tong	26
Andrea Libman	25
Rupa Bhimani	25
Samuel L. Jackson	24
John Cleese	24
Fred Tatasciore	23

[272]:
```
df[
    (df["cast_y"] == "Takahiro Sakurai")
    ].groupby("director").agg({"title":'nunique'}).
↪sort_values(by="title",ascending=False)
```

[272]:

director	title
Kobun Shizuno, Hiroyuki Seshita	3
Toshiyuki Kubooka	3
Akiyuki Shinbo, Nobuyuki Takeuchi	1
Hiroyuki Seshita	1

[273]:
```
df[
    (df["cast_y"] == "Takahiro Sakurai")
    ].groupby("listed_in").agg({"title":'nunique'}).
↪sort_values(by="title",ascending=False)
```

[273]:

listed_in	title
Anime Series, International TV Shows	16
Action & Adventure, Anime Features, Internation…	6
Anime Series, International TV Shows, Teen TV S…	4
Anime Features, Romantic Movies	1
Anime Series, Crime TV Shows, International TV …	1
Anime Series, International TV Shows, TV Thrillers	1
Anime Series, Kids' TV	1
Anime Series, Teen TV Shows	1
TV Shows	1

[274]:
```
df[
    (df["cast_y"] == "Takahiro Sakurai")
    ].groupby("country").agg({"title":'nunique'}).
 ↪sort_values(by="title",ascending=False)
```

[274]:

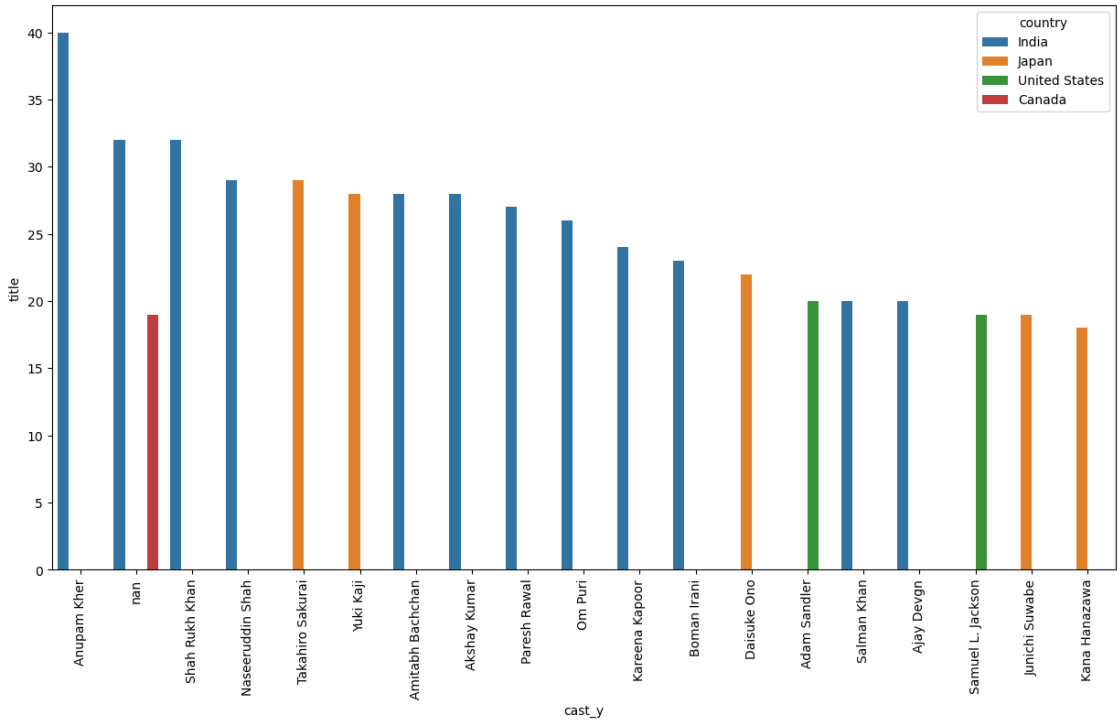
country	title
Japan	29

[275]:
```
df.groupby(
    ["cast_y","country"]
    ).agg({"title":'nunique'}).sort_values(by="title",ascending=False).head(20)
```

[275]:

cast_y	country	title
nan	United States	330
	United Kingdom	68
Anupam Kher	India	40
nan	India	32
Shah Rukh Khan	India	32
Naseeruddin Shah	India	29
Takahiro Sakurai	Japan	29
Yuki Kaji	Japan	28
Amitabh Bachchan	India	28
Akshay Kumar	India	28
Paresh Rawal	India	27
Om Puri	India	26
Kareena Kapoor	India	24
Boman Irani	India	23
Daisuke Ono	Japan	22
Adam Sandler	United States	20
Salman Khan	India	20
Ajay Devgn	India	20
Samuel L. Jackson	United States	19
Junichi Suwabe	Japan	19

[276]:
```
fig = plt.figure(figsize=(15,8))
sns.barplot(
    data=df.groupby(
        ["cast_y","country"]
        ).agg(
            {"title":'nunique'}
            ).sort_values(by="title",ascending=False).reset_index().iloc[2:
 ↪22],x="cast_y",y="title",hue="country")
plt.xticks(rotation=90)
plt.show()
```



3 Director based analysis

#Movies Director

1. Rajiv Chilaka was 1st popular director. He worked continuously with Julie Tejwani,gna Bhardwaj, Rajesh Kava, Rupa Bhimani, Vatsal Dubey in a 17 unique movies. All his movies was children movies
2. Raúl Campos, Jan Suter was the 2nd popular director, which he done all stand up comedy shows
3. Top comedy shows are directed by Raúl Campos, Jan Suter 18 shows.
4. Suhas Kadav was the 3rd popular director
5. He also famous for children comedy shows

[277]:
```
df[
    df["listed_in"].str.contains("Movies")
    ].groupby(["director","cast_y"]).agg({"title":'nunique'}).
 ↪sort_values(by="title",ascending=False).head(50)
```

[277]:

director	cast_y	title
Rajiv Chilaka	Julie Tejwani	17
	Jigna Bhardwaj	17
	Rajesh Kava	17
	Rupa Bhimani	16

	Vatsal Dubey	15
	Swapnil	12
	Mousam	12
Suhas Kadav	Saurav Chakraborty	8
Toshiya Shinohara	Kumiko Watanabe	7
S.S. Rajamouli	Ramya Krishnan	7
	Rana Daggubati	7
	Anushka Shetty	7
	Sathyaraj	7
Toshiya Shinohara	Houko Kuwashima	7
S.S. Rajamouli	Tamannaah Bhatia	7
Toshiya Shinohara	Satsuki Yukino	7
S.S. Rajamouli	Nassar	7
Toshiya Shinohara	Kappei Yamaguchi	7
S.S. Rajamouli	Prabhas	7
Toshiya Shinohara	Koji Tsujitani	7
Omoni Oboli	Omoni Oboli	6
Hakan Algül	Ata Demirer	6
Joey So	Joseph May	6
Cathy Garcia-Molina	Joross Gamboa	6
Yılmaz Erdoğan	Yılmaz Erdoğan	6
Wilson Yip	Donnie Yen	5
Toshiya Shinohara	Noriko Hidaka	5
Fernando Ayllón	Ricardo Quevedo	5
Hakan Algül	Salih Kalyon	5
Sooraj R. Barjatya	Salman Khan	5
	Alok Nath	5
Toshiya Shinohara	Ken Narita	5
Khaled Marei	Ahmed Helmy	5
David Dhawan	Anupam Kher	5
Joey So	Keith Wickham	5
Thierry Donard	Wille Lindberg	5
Cathy Garcia-Molina	John Lloyd Cruz	5
Hidenori Inoue	Taichi Saotome	4
Hakan Algül	Demet Akbağ	4
Hernán Zin	nan	4
Detlev Buck	Michael Maertens	4
Fernando Ayllón	Nelson Polanía	4
Steve Ball	Alessandro Juliani	4
	Vincent Tong	4
Robert Vince	David DeLuise	4
Masahiko Murata	Junko Takeuchi	4
Suhas Kadav	Mayur Vyas	4
Rathindran R Prasad	Vidhu	4
Prakash Satam	Sonal Kaushal	4
Masahiko Murata	Chie Nakamura	4

[278]:
```
df[
    df["director"] == "Rajiv Chilaka"
    ].groupby("listed_in").agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False)
```

[278]:

listed_in	title
Children & Family Movies	18
Children & Family Movies, Sports Movies	1

[279]:
```
df.groupby("director").agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False)
```

[279]:

director	title
Rajiv Chilaka	19
Raúl Campos, Jan Suter	18
Suhas Kadav	16
Marcus Raboy	16
Jay Karas	14
…	…
Jos Humphrey	1
Jose Gomez	1
Jose Javier Reyes	1
Joseduardo Giordano, Sergio Goyri Jr.	1
Khaled Youssef	1

[4528 rows x 1 columns]

[280]:
```
df[df["director"] == "Raúl Campos, Jan Suter"].groupby("listed_in").
 ↪agg({"title":"nunique"})
```

[280]:

listed_in	title
Stand-Up Comedy	18

[281]:
```
df[df["director"] == "Suhas Kadav"].groupby("listed_in").agg({"title":
 ↪"nunique"})
```

[281]:

listed_in	title
Children & Family Movies	5
Children & Family Movies, Comedies	6
Children & Family Movies, Comedies, Music & Mus…	2
Children & Family Movies, Music & Musicals	3

#Documentaries Director

1. Vlad Yudin is the director who directed 6 documentaries.

2. Thierry Donard and Wille Lindberg combined in 5 documentaries.

[282]:
```
df[
    df["listed_in"].str.contains("Documentaries")
    ].groupby("director").agg({"title":'nunique'}).
 ↪sort_values(by="title",ascending=False)
```

[282]:
```
                                                title
director
Vlad Yudin                                          6
Thierry Donard                                      5
Barry Avrich                                        4
Edward Cotterill                                    4
Hernán Zin                                          4
…                                                   …
Harvey Glazer, Stuart Stone                         1
Harvey Lilley                                       1
Heber Cannon                                        1
Heber Cannon, Mariah Moore, Marston Sawyers         1
Álvaro Longoria, Gerardo Olivares                   1

[711 rows x 1 columns]
```

[283]:
```
df[
    df["listed_in"].str.contains("Documentaries")
    ].groupby(["director","cast_y"]).agg({"title":'nunique'}).
 ↪sort_values(by="title",ascending=False)
```

[283]:
```
                                                      title
director                          cast_y
Thierry Donard                    Wille Lindberg          5
                                  Matt Annetts            4
                                  Jesse Richman           4
Hernán Zin                        nan                     4
Edward Cotterill                  Rachael Stirling        3
…                                                         …
Heber Cannon                      Rich Froning            1
Harvey Lilley                     Eric Meyers             1
Harvey Glazer, Stuart Stone       nan                     1
Hardik Mehta                      nan                     1
Álvaro Longoria, Gerardo Olivares nan                     1

[1468 rows x 1 columns]
```

4 What type of content is available in different countries?

1. United stated having 3689 movies in netflix, most of the users in netflix are from USA
2. India is in 2nd place of having 1046 movies in netflix

3. Americans most likely to watch movies than series, even in movies also most of them are documentaries
4. They used to watch highly in musical documentaries and second highest was stand-up comedy shows

[284]:
```
country_df = pd.DataFrame(
    df["country"].apply(lambda x : str(x).split(", ")
                        ).tolist(),index=df.title).stack().reset_index().
 ↪drop("level_1",axis=1)
country_df.columns = ["title","country"]
```

[285]:
```
country_df.groupby(["country"]).agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False)
```

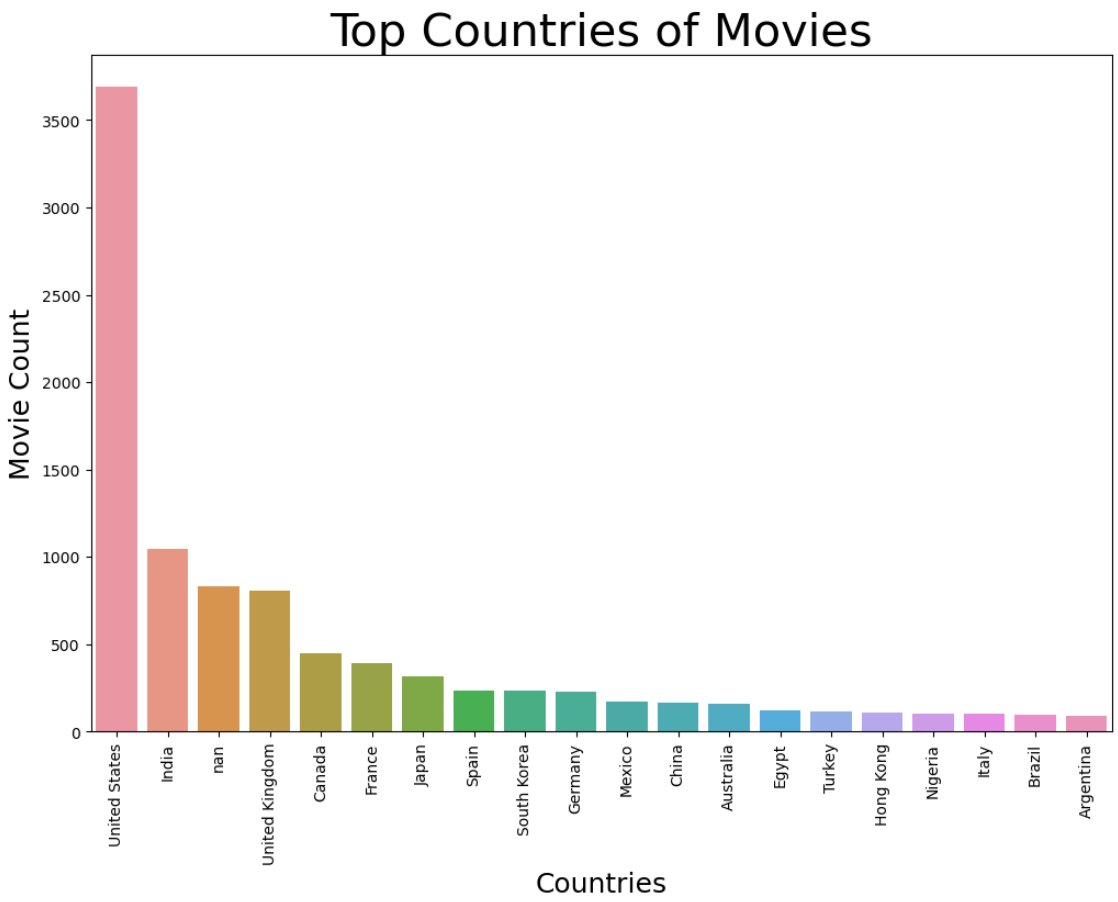
[285]:
```
                title
country
United States    3689
India            1046
nan               831
United Kingdom    804
Canada            445
…                 …
Mongolia            1
Somalia             1
Ethiopia            1
Botswana            1
Poland,             1

[128 rows x 1 columns]
```

5 Top Countries count

1. First place we have USA of about 3500+ movies and tv shows
2. Second place we have india of about 1000+movies and tv shows
3. Third place we have international movies and kids movies that all are watching
4. Uk is in fourth place have 500+ movies

[286]:
```
fig = plt.figure(figsize=(12, 8))
sns.barplot(
    data=country_df.groupby(
                        ["country"]).agg({"title":"nunique"}
                        ).sort_values(by="title",ascending=False).reset_index().
 ↪head(20),x="country",y="title")
plt.xlabel("Countries",fontsize=18)
plt.xticks(rotation=90)
plt.ylabel("Movie Count",fontsize=18)
plt.title("Top Countries of Movies",fontsize=30)
```

```
plt.show()
```



[287]:
```
df = df.merge(country_df,on="title",how="inner").drop("country_x",axis=1)
```

[288]:
```
df[
    df["country_y"] == "United States"
    ].groupby(["listed_in"]).agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False).reset_index()
```

[288]:

	listed_in	title
0	Documentaries	288
1	Stand-Up Comedy	210
2	Children & Family Movies, Comedies	146
3	Kids' TV	119
4	Dramas	115
..	…	…
369	Crime TV Shows, Spanish-Language TV Shows, TV …	1
370	Crime TV Shows, TV Action & Adventure, TV Sci-…	1
371	Crime TV Shows, TV Comedies, Teen TV Shows	1

```
372            Crime TV Shows, TV Horror, TV Mysteries      1
373               Crime TV Shows, TV Dramas, TV Horror      1

[374 rows x 2 columns]
```

[289]:
```
df[
    (df["country_y"] == "United States")
    & (df["listed_in"].str.contains("Documentaries"))
    ].groupby(["listed_in"]).agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False)
```

[289]:
```
                                                    title
listed_in
Documentaries                                         288
Documentaries, Music & Musicals                        67
Documentaries, Sports Movies                           47
Documentaries, International Movies                    39
Documentaries, LGBTQ Movies                            20
Classic Movies, Documentaries                          11
Documentaries, Faith & Spirituality                     7
Children & Family Movies, Documentaries                 7
Documentaries, International Movies, Sports Movies      7
Documentaries, International Movies, Music & Mu…      3
Documentaries, Stand-Up Comedy                          2
Children & Family Movies, Documentaries, Sports…      2
Documentaries, LGBTQ Movies, Music & Musicals           2
Documentaries, Horror Movies                            2
Action & Adventure, Documentaries, Sports Movies        1
Documentaries, International Movies, LGBTQ Movies       1
Documentaries, Dramas                                   1
Comedies, Documentaries                                 1
Classic Movies, Cult Movies, Documentaries              1
Children & Family Movies, Documentaries, Intern…      1
Documentaries, Faith & Spirituality, Music & Mu…      1
```

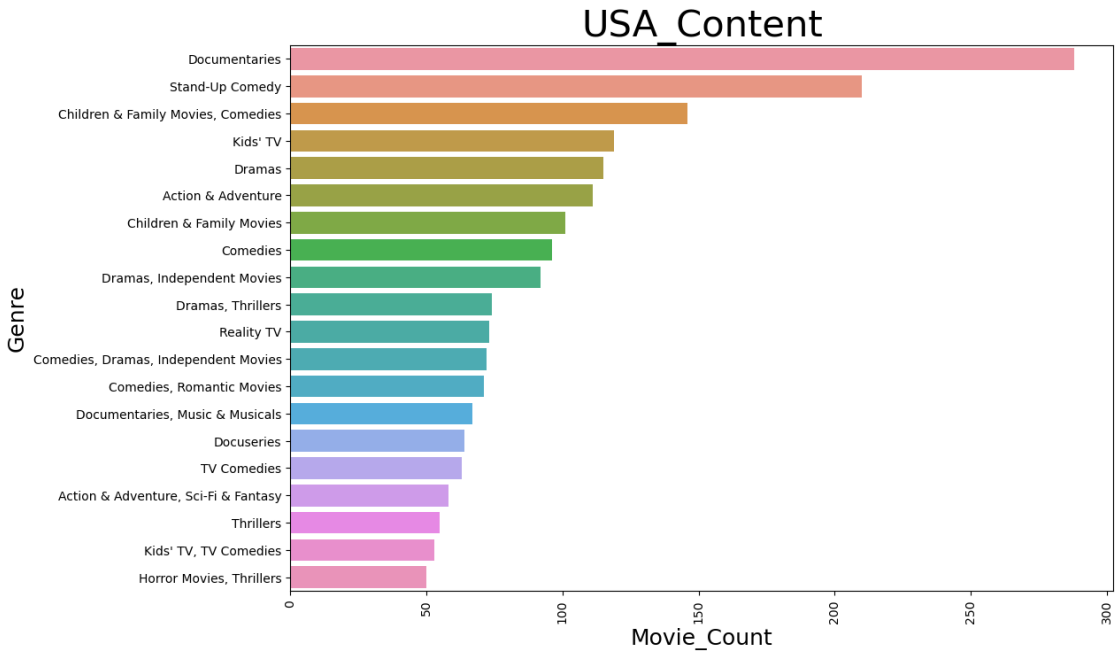
[290]:
```
df[
    (df["country_y"] == "United States") &
    (df["listed_in"].str.contains("Documentaries")) &
    (df["listed_in"].str.contains("Music"))
].groupby(["listed_in"]).agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False).reset_index()
```

[290]:
```
                                        listed_in  title
0                    Documentaries, Music & Musicals     67
1  Documentaries, International Movies, Music & M…      3
2      Documentaries, LGBTQ Movies, Music & Musicals      2
3  Documentaries, Faith & Spirituality, Music & M…      1
```

USA Content 1. top usa content variations was documentaries, stand-up comedy, comediy movies,kids tv and action movies 2. very least was thriller movies and sports movies

[291]:
```
Movie_content_usa = df[
    df["country_y"] == "United States"
    ].groupby(["listed_in"]).agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False).reset_index().head(20)
```

[292]:
```
fig = plt.figure(figsize=(12, 8))
sns.barplot(data=Movie_content_usa, x="title",y="listed_in")
plt.xlabel("Movie_Count",fontsize=18)
plt.ylabel("Genre",fontsize=18)
plt.xticks(rotation=90)
plt.title("USA_Content",fontsize=30)
plt.show()
```



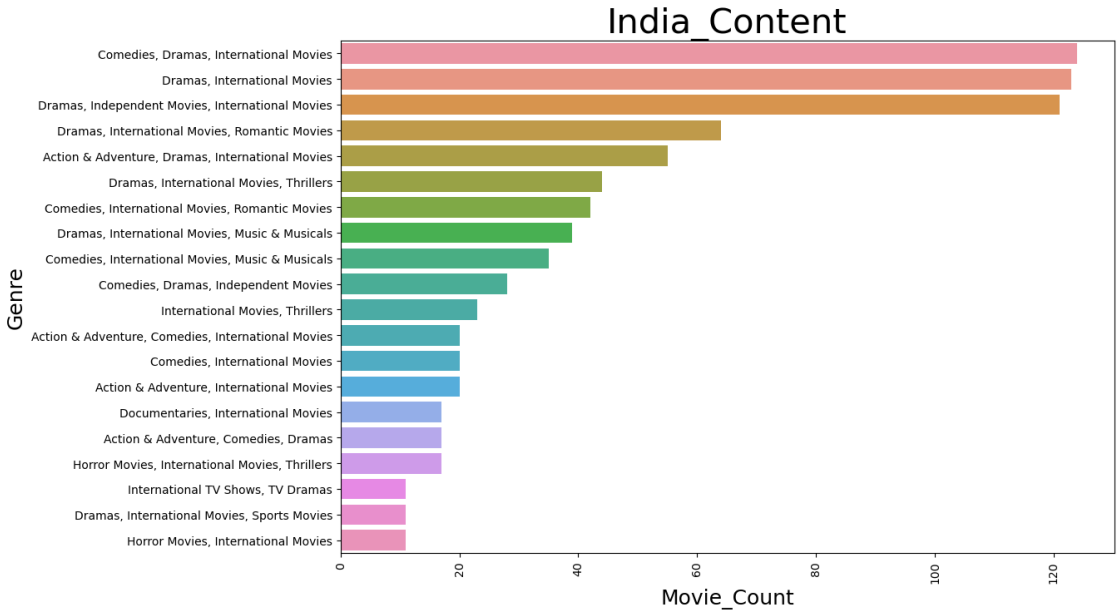
#India Content 1. Most popular content in india was Thrillers, dramas, comedies, Action & Adventure. 2. Least popular was sports, documentaries, kids and family movies

[293]:
```
Movie_content_india_most = df[
    df["country_y"] == "India"
    ].groupby(["listed_in"]).agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False).reset_index().head(20)
Movie_content_india_most
```

[293]:

	listed_in	title
0	Comedies, Dramas, International Movies	124
1	Dramas, International Movies	123
2	Dramas, Independent Movies, International Movies	121
3	Dramas, International Movies, Romantic Movies	64
4	Action & Adventure, Dramas, International Movies	55
5	Dramas, International Movies, Thrillers	44
6	Comedies, International Movies, Romantic Movies	42
7	Dramas, International Movies, Music & Musicals	39
8	Comedies, International Movies, Music & Musicals	35
9	Comedies, Dramas, Independent Movies	28
10	International Movies, Thrillers	23
11	Action & Adventure, Comedies, International Mo…	20
12	Comedies, International Movies	20
13	Action & Adventure, International Movies	20
14	Documentaries, International Movies	17
15	Action & Adventure, Comedies, Dramas	17
16	Horror Movies, International Movies, Thrillers	17
17	International TV Shows, TV Dramas	11
18	Dramas, International Movies, Sports Movies	11
19	Horror Movies, International Movies	11

[294]:
```
fig = plt.figure(figsize=(12, 8))
sns.barplot(data=Movie_content_india_most, x="title",y="listed_in")
plt.xlabel("Movie_Count",fontsize=18)
plt.ylabel("Genre",fontsize=18)
plt.xticks(rotation=90)
plt.title("India_Content",fontsize=30)
plt.show()
```



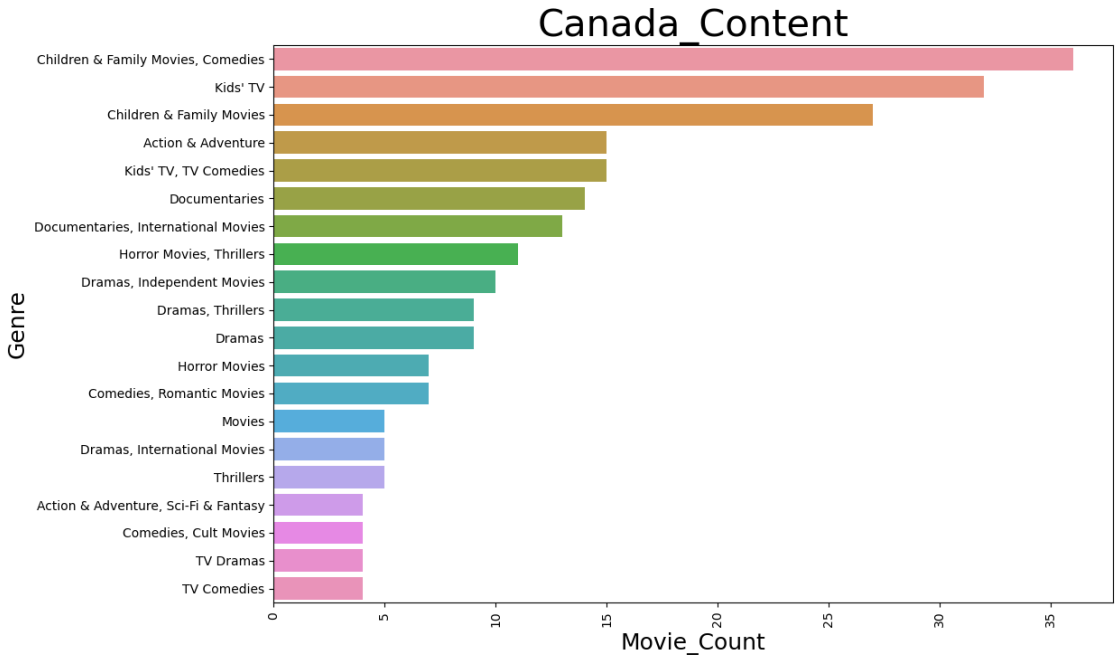
[295]:
```
Movie_content_india_least = df[
    df["country_y"] == "India"
    ].groupby(["listed_in"]).agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False).reset_index().head(20)
Movie_content_india_least
```

[295]:

	listed_in	title
0	Comedies, Dramas, International Movies	124
1	Dramas, International Movies	123
2	Dramas, Independent Movies, International Movies	121
3	Dramas, International Movies, Romantic Movies	64
4	Action & Adventure, Dramas, International Movies	55
5	Dramas, International Movies, Thrillers	44
6	Comedies, International Movies, Romantic Movies	42
7	Dramas, International Movies, Music & Musicals	39
8	Comedies, International Movies, Music & Musicals	35
9	Comedies, Dramas, Independent Movies	28
10	International Movies, Thrillers	23
11	Action & Adventure, Comedies, International Mo…	20
12	Comedies, International Movies	20
13	Action & Adventure, International Movies	20
14	Documentaries, International Movies	17
15	Action & Adventure, Comedies, Dramas	17
16	Horror Movies, International Movies, Thrillers	17
17	International TV Shows, TV Dramas	11
18	Dramas, International Movies, Sports Movies	11
19	Horror Movies, International Movies	11

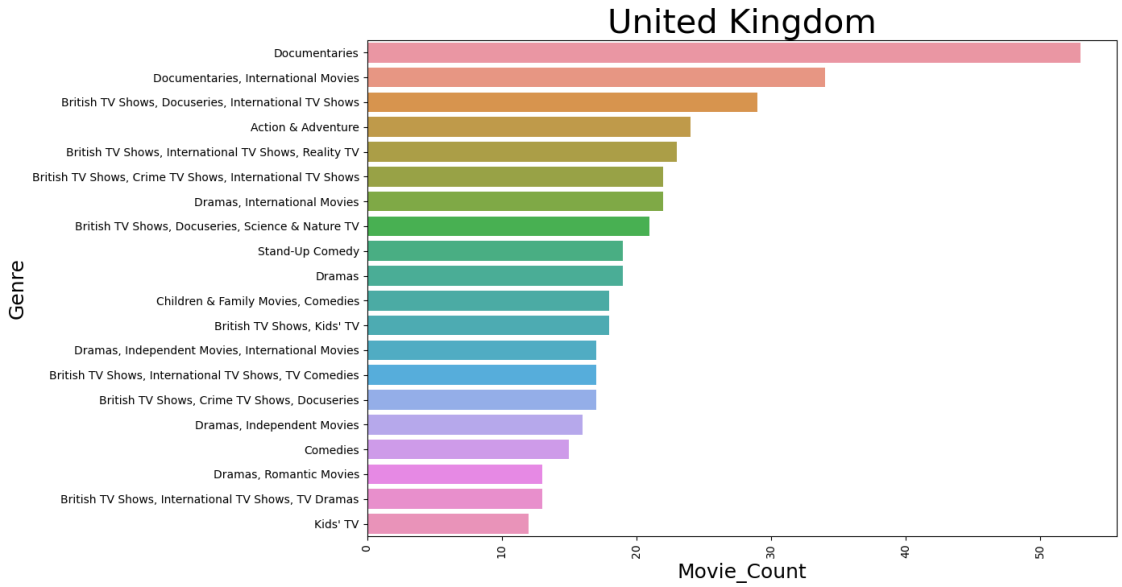
#Canada content 1. Kids Tv, family shows and documentaries are very popular in canada 2. Thrillers, Horror movies are very least popular in canada

[296]:
```
fig = plt.figure(figsize=(12, 8))
sns.barplot(data=df[
    df["country_y"] == "Canada"
    ].groupby(["listed_in"]).agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False).reset_index().head(20),␣
 ↪x="title",y="listed_in")
plt.xlabel("Movie_Count",fontsize=18)
plt.ylabel("Genre",fontsize=18)
plt.xticks(rotation=90)
plt.title("Canada_Content",fontsize=30)
plt.show()
```



#Uk Content 1. The same like Usa but here we have less amount of movies that too most popular are documentaries and British Tv Shows 2. Action and thriller kind of movies are very less in Uk

[297]:
```
fig = plt.figure(figsize=(12, 8))
sns.barplot(data=df[
    df["country_y"] == "United Kingdom"
    ].groupby(["listed_in"]).agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False).reset_index().head(20),␣
 ↪x="title",y="listed_in")
plt.xlabel("Movie_Count",fontsize=18)
plt.ylabel("Genre",fontsize=18)
plt.xticks(rotation=90)
plt.title("United Kingdom",fontsize=30)
plt.show()
```



6 Number of movies released per year changed over the last 20-30 years

1. Lots of movies released over netflix in 2017 and 2018
2. Each year there is a consistent increase in movies and shows released.
3. Before 20 years there is not much movie released but from the past 20 years there is 20% increase over the last 20 years
4. 2017 and 2018 is the peak years for movies,
5. 2020 is the peak year for tv show
6. we can see netflix focus is more on tv show than movies, because in 2020 the movie count is less compared to tv show.

[298]:
```
df["release_year"].max()-df["release_year"].min()
```

[298]: 96

[299]:
```
df.groupby(
    ["release_year","type"]
    )["title"].nunique().rename_axis(["Year_released","Movie/show"]).
 ↪reset_index().sort_values(by="title",ascending=False).head(3)
```

[299]:

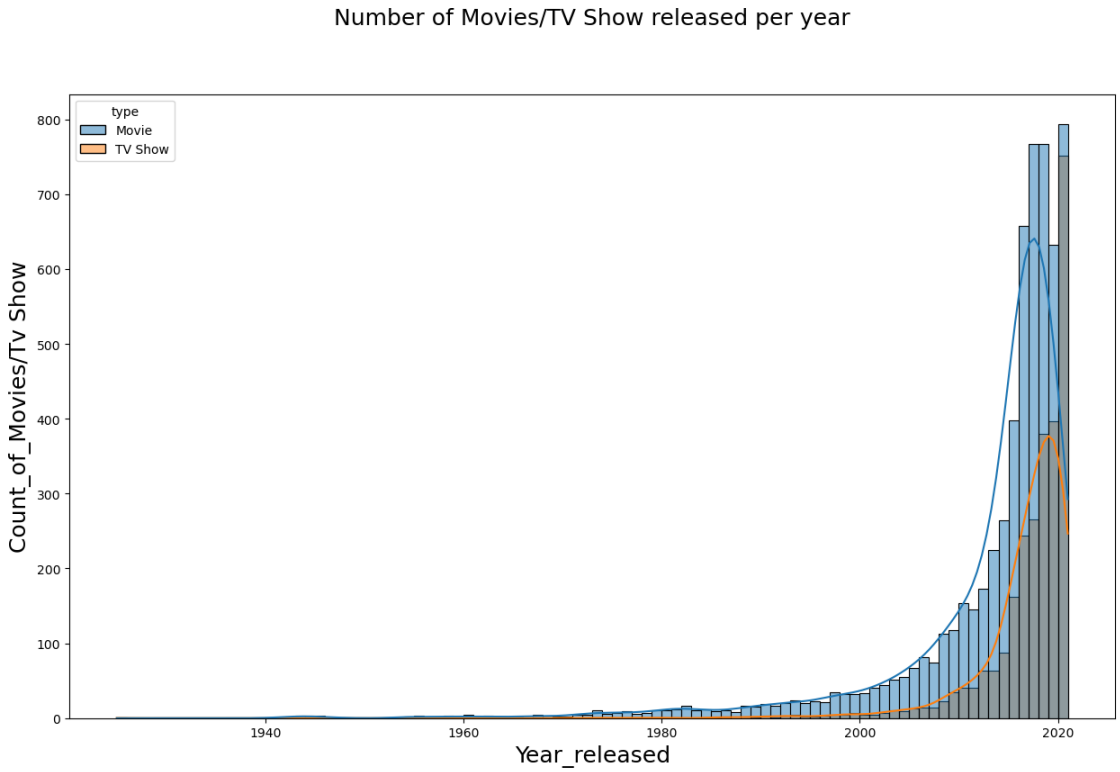
	Year_released	Movie/show	title
109	2017	Movie	767
111	2018	Movie	767
107	2016	Movie	658

[300]:
```
years_data = df[
    df["type"] == "Movie"
    ].groupby(
    ["release_year"]
    )["title"].nunique().rename_axis(["Year_released"]).reset_index().
 ↪sort_values(by="Year_released",ascending=False).head(5)
years_data
```

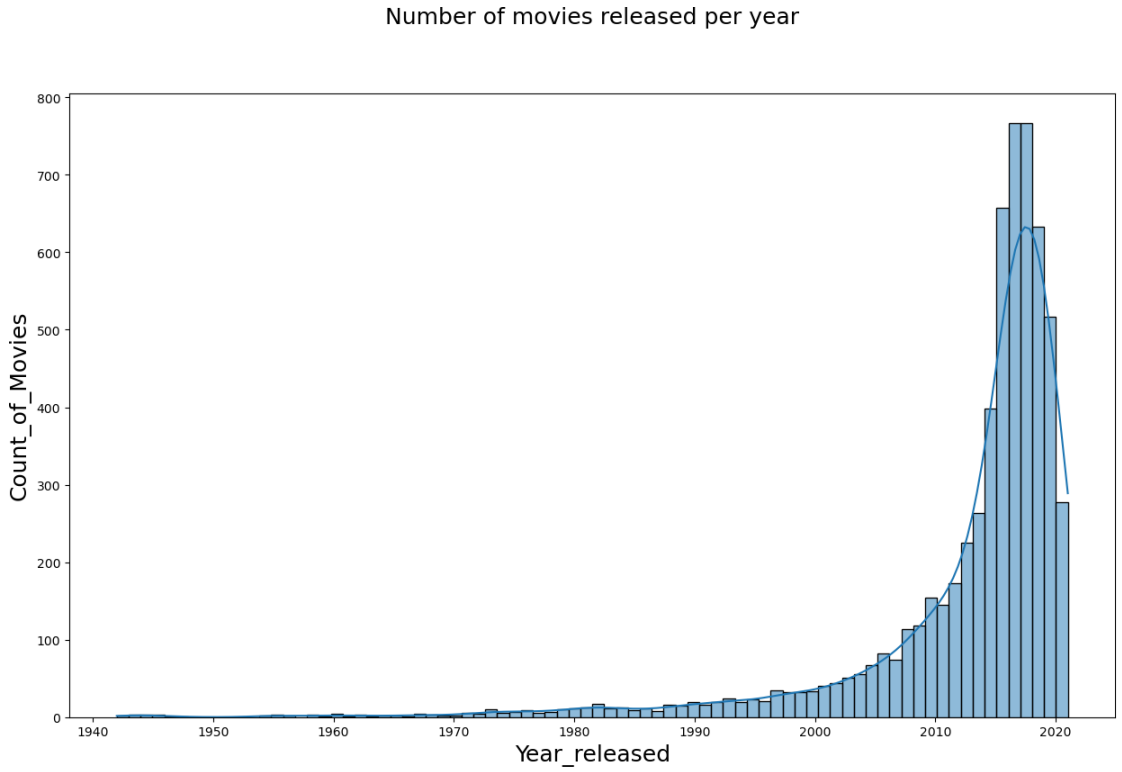
[300]:

	Year_released	title
72	2021	277
71	2020	517
70	2019	633
69	2018	767
68	2017	767

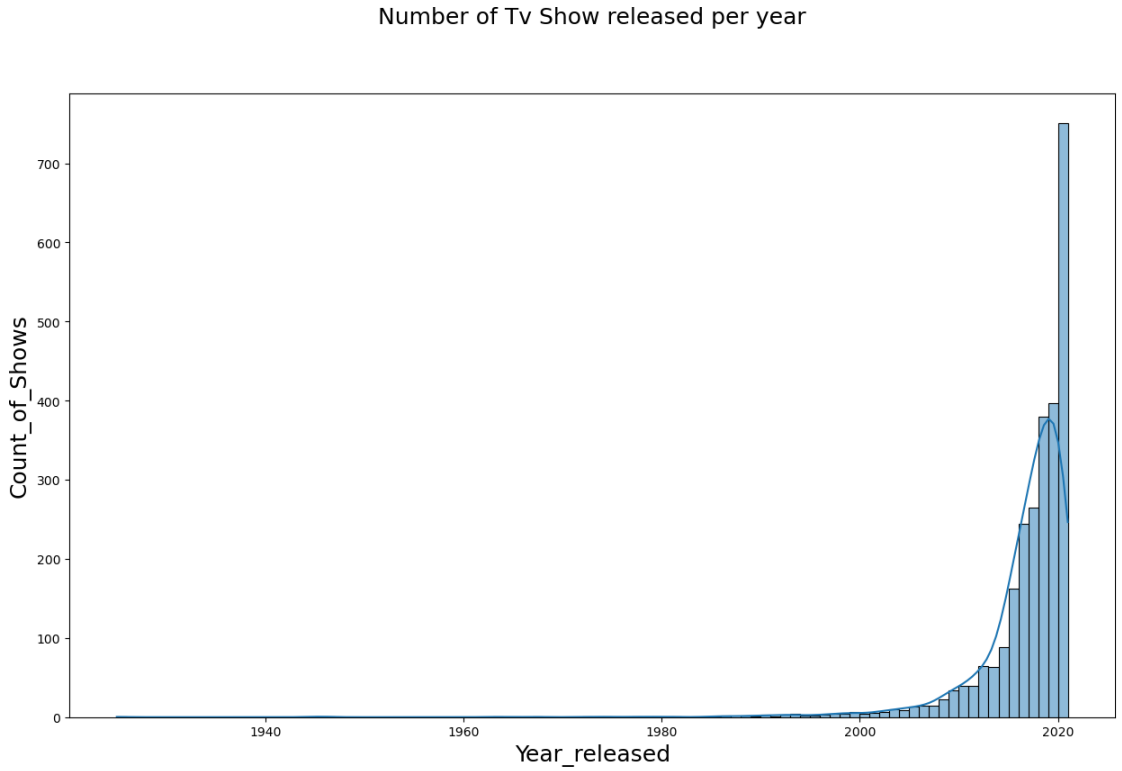
[301]:
```
fig = plt.figure(figsize=(15,9))
sns.histplot(data=data.
 ↪sort_values(by="release_year",ascending=False),x="release_year",hue="type",bins=96,kde=True
plt.title("Number of Movies/TV Show released per year",y=1.
 ↪1,fontsize=18,loc="center")
plt.xlabel("Year_released",fontsize=18)
plt.ylabel("Count_of_Movies/Tv Show",fontsize=18)
plt.show()
```



[302]:
```
fig = plt.figure(figsize=(15,9))
sns.histplot(data=data[data["type"] == "Movie"].
 ↪sort_values(by="release_year",ascending=False).
 ↪head(8500),x="release_year",bins=80,kde=True)
plt.title("Number of movies released per year",y=1.1,fontsize=18,loc="center")
plt.xlabel("Year_released",fontsize=18)
plt.ylabel("Count_of_Movies",fontsize=18)
plt.show()
```



[303]:
```
fig = plt.figure(figsize=(15,9))
sns.histplot(data=data[data["type"] == "TV Show"].
 ↪sort_values(by="release_year",ascending=False).
 ↪head(8500),x="release_year",bins=96,kde=True)
plt.title("Number of Tv Show released per year",y=1.1,fontsize=18,loc="center")
plt.xlabel("Year_released",fontsize=18)
plt.ylabel("Count_of_Shows",fontsize=18)
plt.show()
```



[304]:
```
df.groupby(["date_added","type"]).agg({"title":"nunique"}).
  ↪sort_values(by="title",ascending=False).head(30)
```

[304]:

date_added	type	title
January 1, 2020	Movie	97
November 1, 2019	Movie	75
March 1, 2018	Movie	72
December 31, 2019	Movie	67
October 1, 2018	Movie	64
November 1, 2018	Movie	55
July 1, 2021	Movie	53
October 1, 2019	Movie	51
September 1, 2021	Movie	48
January 1, 2018	Movie	47
July 1, 2019	Movie	43
June 2, 2021	Movie	42
January 1, 2021	Movie	41
July 1, 2018	Movie	38
April 1, 2018	Movie	38
October 1, 2017	Movie	34
April 1, 2020	Movie	34

```
January 1, 2019   Movie       33
August 1, 2021    Movie       33
August 1, 2018    Movie       33
May 1, 2018       Movie       32
July 6, 2021      TV Show     31
May 1, 2021       Movie       30
September 1, 2017 Movie       29
July 5, 2020      Movie       28
November 20, 2019 Movie       27
April 1, 2021     Movie       26
September 1, 2019 Movie       26
August 2, 2018    Movie       25
May 1, 2017       Movie       24
```

[305]:
```
def clean(x):
    y = str(x).split(", ")[0].split(" ")
    return y[1] if len(y) == 2 else np.nan
```

[306]:
```
data["date"] = data["date_added"].apply(clean)
```

[307]:
```
data["Month"] = data["date_added"].apply(lambda x: str(x).split(", ")[0].
 ↪split(" ")[0])
```

[308]:
```
data["Year"] = data["date_added"].apply(lambda x: str(x).split(", ")[1] if␣
 ↪len(str(x).split(", ")) == 2 else np.nan)
```

[309]:
```
data.head(3)
```

[309]:

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90 min	Documentaries
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban…	South Africa	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, TV Dramas, TV Mysteries
2	s3	TV Show	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi…	NaN	September 24, 2021	2021	TV-MA	1 Season	Crime TV Shows, International TV Shows, TV Act…

```
                                              description date      Month  Year
0  As her father nears the end of his life, filmm…   25  September  2021
1  After crossing paths at a party, a Cape Town t…   24  September  2021
2  To protect his family from a powerful drug lor…   24  September  2021
```

[310]:
```
data.groupby("Month").agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False)
```

[310]:
```
           title
Month
July         819
December     797
September    765
April        759
October      755
August       749
March        734
January      727
June         724
November     697
May          626
February     557
              88
nan           10
```

[311]:
```
data.groupby("date").agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False)
```

[311]:
```
      title
date
1      2179
15      681
2       324
16      286
31      268
20      245
19      242
5       230
22      228
10      214
6       210
30      209
18      205
26      204
8       198
14      196
```

```
25      196
27      195
7       193
21      192
28      187
23      183
12      179
17      178
13      173
4       171
24      158
3       149
11      148
9       147
29      141
```

[312]:
```
data.groupby("Year").agg({"title":"nunique"}).
↪sort_values(by="title",ascending=False)
```

[312]:
```
      title
Year
2019   2016
2020   1879
2018   1649
2021   1498
2017   1188
2016    429
2015     82
2014     24
2011     13
2013     11
2012      3
2008      2
2009      2
2010      1
```

7 Comparison of tv shows vs. movies

1. Total shows are 8087 in that we have 6131 Movie and 2676 Tv shows.
2. Rajiv Chilaka, Raúl Campos, Jan Suter and Suhas Kadav are the top Movie directors they directed 15+ movies.
3. Alastair Fothergill, Stan Lathan, Iginio Straffi are the top TV Show directors
4. First three countries in movies are USA, India, UK
5. First three countries in TV Shows are USA, UK, Japan.
6. Top 3 ratings are TV-MA,TV-14,R for movies, and TV-MA,TV-14,TV-7 are of TV Shows

[313]:
```
df.groupby(
    ["type"]
    )["title"].nunique().rename_axis(["Movie/show"]).reset_index().
 ↪sort_values(by="title",ascending=False)
```

[313]:

	Movie/show	title
0	Movie	6131
1	TV Show	2676

[314]:
```
df.groupby(
    ["type","director"]
    )["title"].nunique().rename_axis(["Movie/show","Directors"]).reset_index().
 ↪sort_values(by="title",ascending=False)
```

[314]:

	Movie/show	Directors	title
3252	Movie	Rajiv Chilaka	19
3303	Movie	Raúl Campos, Jan Suter	18
3885	Movie	Suhas Kadav	16
2492	Movie	Marcus Raboy	15
1716	Movie	Jay Karas	14
…	…	…	…
1687	Movie	Jasmine D'Souza	1
1688	Movie	Jason Bourque	1
1689	Movie	Jason Cohen	1
1690	Movie	Jason James	1
4575	TV Show	Ziad Doueiri	1

[4576 rows x 3 columns]

[315]:
```
df[df["type"] == "TV Show"].groupby(
    ["type","director"]
    )["title"].nunique().rename_axis(["Movie/show","Directors"]).reset_index().
 ↪sort_values(by="title",ascending=False)
```

[315]:

	Movie/show	Directors	title
5	TV Show	Alastair Fothergill	3
194	TV Show	Stan Lathan	2
74	TV Show	Iginio Straffi	2
177	TV Show	Rob Seidenglanz	2
108	TV Show	Ken Burns	2
..	…	…	…
79	TV Show	James Bamford	1
80	TV Show	James Hawes	1
81	TV Show	James Lee	1
82	TV Show	Jan Holoubek	1
221	TV Show	Ziad Doueiri	1

[222 rows x 3 columns]

[316]:
```
df.groupby(
    ["type","country_y"]
    )["title"].nunique().rename_axis(["Movie/show","country"]).reset_index().
 ↪sort_values(by="title",ascending=False).head(20)
```

[316]:

	Movie/show	country	title
114	Movie	United States	2751
43	Movie	India	962
186	TV Show	United States	938
112	Movie	United Kingdom	532
122	Movie	nan	440
189	TV Show	nan	391
20	Movie	Canada	319
34	Movie	France	303
185	TV Show	United Kingdom	272
153	TV Show	Japan	199
36	Movie	Germany	182
100	Movie	Spain	171
175	TV Show	South Korea	170
131	TV Show	Canada	126
51	Movie	Japan	119
23	Movie	China	114
65	Movie	Mexico	111
31	Movie	Egypt	102
40	Movie	Hong Kong	100
75	Movie	Nigeria	94

[317]:
```
df.groupby(
    ["type","rating"]
    )["title"].nunique().rename_axis(["Movie/show","Rating"]).reset_index().
 ↪sort_values(by="title",ascending=False)
```

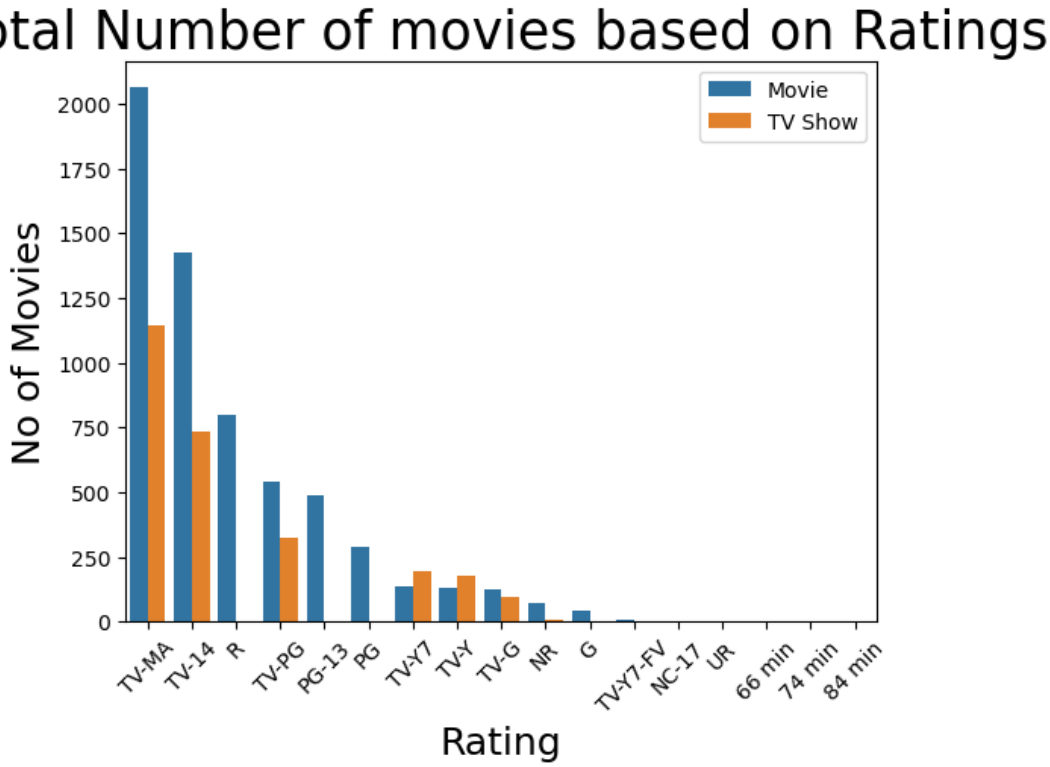
[317]:

	Movie/show	Rating	title
11	Movie	TV-MA	2062
9	Movie	TV-14	1427
21	TV Show	TV-MA	1145
8	Movie	R	797
19	TV Show	TV-14	733
12	Movie	TV-PG	540
7	Movie	PG-13	490
22	TV Show	TV-PG	323
6	Movie	PG	287
24	TV Show	TV-Y7	195
23	TV Show	TV-Y	176
14	Movie	TV-Y7	139

```
13      Movie      TV-Y    131
10      Movie      TV-G    126
20    TV Show      TV-G     94
5       Movie        NR     75
3       Movie         G     41
15      Movie  TV-Y7-FV      5
17    TV Show        NR      5
4       Movie     NC-17      3
16      Movie        UR      3
18    TV Show         R      2
0       Movie    66 min      1
1       Movie    74 min      1
2       Movie    84 min      1
25    TV Show  TV-Y7-FV      1
```

[318]:
```
sns.barplot(
    data = df.groupby(
    ["type","rating"]
    )["title"].nunique().rename_axis(["Movie/show","Rating"]).reset_index().
 ↪sort_values(by="title",ascending=False),
    x="Rating",
    y="title",
    hue="Movie/show"
    )
plt.xlabel("Rating",fontsize=18)
plt.xticks(rotation=45)
plt.ylabel("No of Movies",fontsize=18)
plt.legend(loc="upper right")
plt.title("Total Number of movies based on Ratings",fontsize=25)
```

[318]:
```
Text(0.5, 1.0, 'Total Number of movies based on Ratings')
```



TV-MA – Mature Audience
TV-14 – above 14
R – 18+
PG-13 – parental guidance
TV-PG – parental guidance
PG – parental guidance
TV-Y7 – Above 7
TV-Y – Between 2-6
TV-G – All ages
G – All ages not neccessary for children
NR – Not rated(Uncut version)
NC-17 – 18+
TV-Y7-FV – Fantasy violence
UR – Not rated

1. 83 Movies are uncut version having no rated

[319]:
```
df[(df["rating"]=="NR") | (df["rating"] == "UR")].nunique()
```

[319]:
```
show_id          83
type              2
title            83
director         78
```

```
date_added       69
release_year     20
rating            2
duration         48
listed_in        39
description      83
cast_y          478
country_y        26
dtype: int64
```

[320]:
```
Tv_show = df[
    df["type"] == "TV Show"
    ].groupby("listed_in").agg({"title":"nunique"}).
 ↪sort_values(by="title",ascending=False).reset_index()
```

#Tv Show genre

1. Romantic : 370
2. Action : 168
3. Thriller : 57
4. Comedy : 56
5. Fantasy : 84
6. Stand-Up : 56
7. Reality TV : 255

[321]:
```
Tv_show[Tv_show["listed_in"].str.contains("Romantic")]["title"].sum()
```

[321]:
```
370
```

[322]:
```
Popular_genre = ["Romantic", "Action", "Thriller", "Comedy",␣
 ↪"Fantasy","Stand-Up","Reality TV"]
```

[323]:
```
count = []
for i in Popular_genre:
    count.append(Tv_show[Tv_show["listed_in"].str.contains(f"{i}")]["title"].
 ↪sum())
    print(f"{i} :", Tv_show[Tv_show["listed_in"].str.contains(f"{i}")]["title"].
 ↪sum())
```

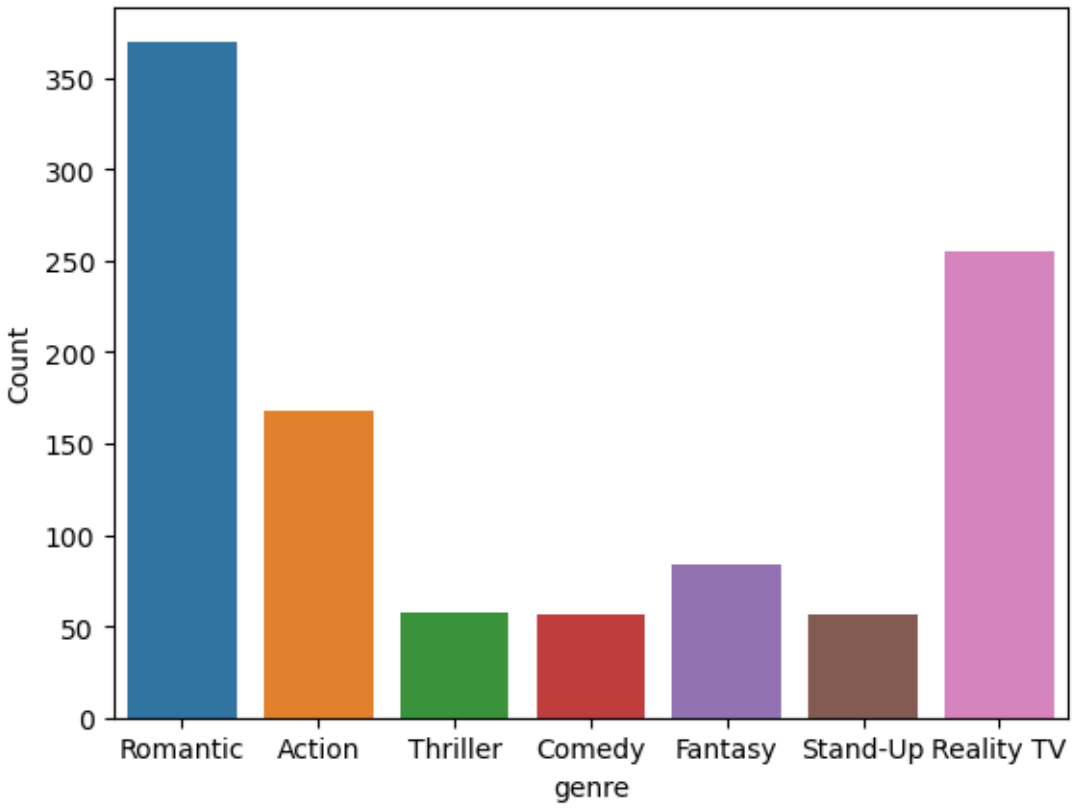
```
Romantic : 370
Action : 168
Thriller : 57
Comedy : 56
Fantasy : 84
Stand-Up : 56
Reality TV : 255
```

[324]:
```
Genre = pd.DataFrame({
    "genre" : Popular_genre,
```

```
    "Count" : count
})
```

[325]:
```
sns.barplot(data=Genre,x="genre",y="Count")
```

[325]:
```
<AxesSubplot:xlabel='genre', ylabel='Count'>
```



[326]:
```
df.groupby("listed_in").agg({"title":"nunique"}).
↪sort_values(by="title",ascending=False).iloc[30:60]
```

[326]:

listed_in	title
Comedies, Romantic Movies	80
Action & Adventure, Comedies, International Movies	70
TV Comedies	69
International Movies, Thrillers	67
International TV Shows, Korean TV Shows, Romant…	65
Documentaries, Sports Movies	65
Thrillers	65
Action & Adventure, Sci-Fi & Fantasy	62
Crime TV Shows, International TV Shows, Spanish…	62

```
Horror Movies, International Movies                    57
Movies                                                 57
Dramas, International Movies, Music & Musicals         57
Comedies, International Movies, Music & Musicals       55
Horror Movies                                          55
Horror Movies, Thrillers                               54
Dramas, Romantic Movies                                52
Action & Adventure, Comedies                           51
Crime TV Shows, Docuseries                             50
Horror Movies, International Movies, Thrillers         45
Documentaries, International Movies, Sports Movies     44
Documentaries, International Movies, Music & Mu…     41
International TV Shows, TV Comedies, TV Dramas         40
Docuseries, Science & Nature TV                        38
International TV Shows, Reality TV                     38
Action & Adventure, Anime Features, Internation…     38
International TV Shows, TV Comedies                    35
TV Dramas                                              35
Action & Adventure, Dramas                             34
Docuseries, International TV Shows                     33
Dramas, Independent Movies, Thrillers                  31
```

8 Null Values

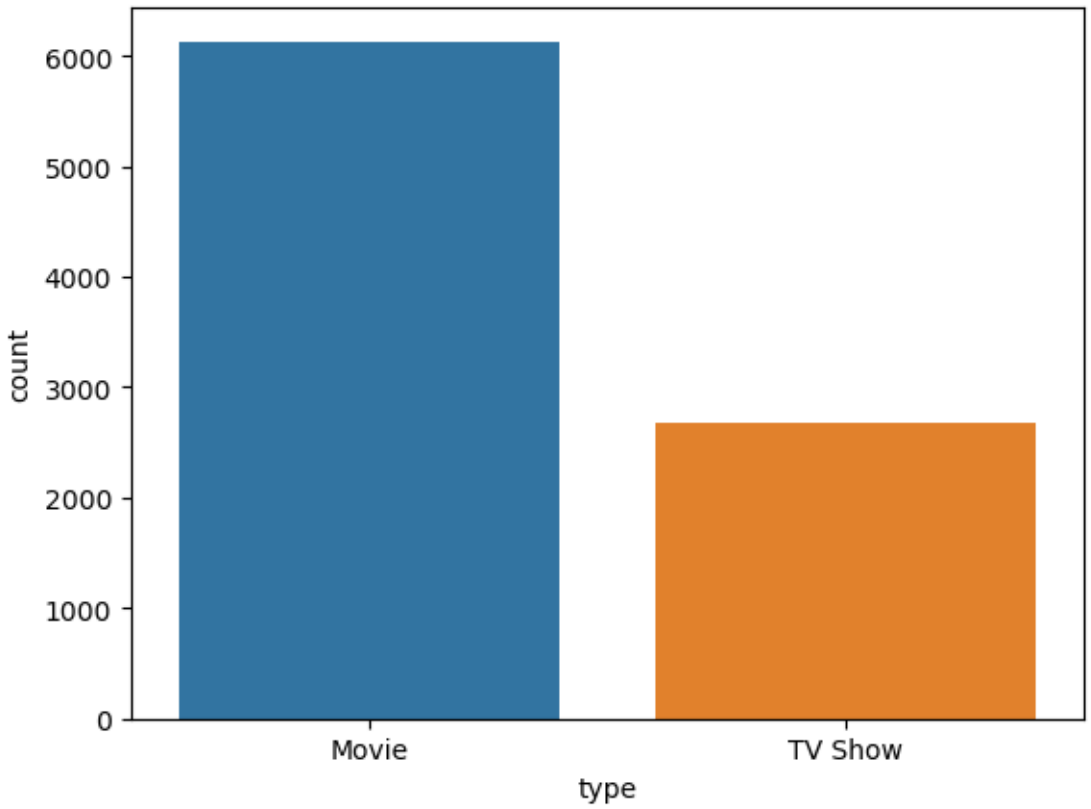
#Null Value Findings: 1. we can't fill all the null values with mode or mean, In the data we can see most of the null value in cast are TV shows and documentaries. 2. Similarly the director's null values are stand-up comedy shows, reality shows. 3. we can fill null values with which we have reference on existing data.

[327]:
```
data.isna().sum()
```

[327]:
```
show_id           0
type              0
title             0
director       2634
cast            825
country         831
date_added       10
release_year      0
rating            4
duration          3
listed_in         0
description       0
date             98
Month             0
Year             10
dtype: int64
```

[328]:
```
sns.countplot(data=data, x="type")
```

[328]:
```
<AxesSubplot:xlabel='type', ylabel='count'>
```



[329]:
```
data[(data["director"].isna()) & (data["type"] == "Movie") & (data["listed_in"].
↪str.contains("Movies"))].groupby("cast").agg({"title":"nunique"}).
↪rename_axis(["Crew"]).reset_index().sort_values(by="title",ascending=False)
```

[329]:

	Crew	title
44	Michela Luci, Jamie Watson, Eric Peterson, Ann…	4
20	David Spade, London Hughes, Fortune Feimster	3
22	Derren Brown	3
62	Stephen Fry, Alex Marty	2
47	Nadia Ramlee, Chio Su-Ping, Jeremy Linn, Marlo…	2
..	…	…
30	Erin Mathews, Sam Vincent, Andrea Libman, Ashl…	1
31	Fatih Şahin, Ece Çeşmioğlu, Halit Özgür Sarı, …	1
32	Fionn Whitehead, Will Poulter, Craig Parkinson…	1
33	Harman Virk, Yuvika Chaudhry, Nirmal Rishi, Sh…	1
67	Zo In-sung, Nam Joo-hyuk, Park Sung-woong, Bae…	1

```
[68 rows x 2 columns]
```

[330]:
```
groupby_cast = data.groupby("cast",dropna=False)["director"].value_counts().
 ↪rename_axis(["Crew","Director_name"]).reset_index().
 ↪sort_values(by="director", ascending=False)
```

[331]:
```
groupby_cast.isna().sum()
```

[331]:
```
Crew             433
Director_name      0
director           0
dtype: int64
```

[332]:
```
groupby_cast[groupby_cast["Crew"].isna()]["Director_name"]
```

[332]:
```
5605                          Hernán Zin
5606                      Cosima Spender
5610                      Tiller Russell
5607                 Orlando von Einsiedel
5608                       Prakash Satam
                        …
5789                           Jason Hehir
5788                           Jason Cohen
5787               Jared Hess, Tyler Measom
5786          Janet Tobias, Claus Wehlisch
6037    Álvaro Longoria, Gerardo Olivares
Name: Director_name, Length: 433, dtype: object
```

[333]:
```
df[df["director"] == "Prakash Satam"]["cast_y"].value_counts().reset_index().
 ↪sort_values(by="cast_y",ascending=False).loc[0][0]
```

[333]:
```
'Sonal Kaushal'
```

[334]:
```
df[df["director"] == "Hernán Zin"]["listed_in"].str.contains("Documentaries").
 ↪max()
```

[334]:
```
True
```

[335]:
```
director = {}
for i in groupby_cast[groupby_cast["Crew"].isna()]["Director_name"]:
    if df[df["director"] == f"{i}"]["listed_in"].str.contains("Documentaries").
 ↪max():
        continue
    director[i] = df[df["director"] == f"{i}"]["cast_y"].value_counts().
 ↪reset_index().sort_values(by="cast_y",ascending=False).loc[0][0]
    print(df[df["director"] == f"{i}"]["cast_y"].value_counts().reset_index().
 ↪sort_values(by="cast_y",ascending=False).loc[0][0])
```

Sonal Kaushal
Saurav Chakraborty
Jigna Bhardwaj
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
Omoni Oboli
Edgar Ramírez
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
Kohtee Aramboy
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan
nan

```
nan
nan
nan
nan
nan
nan
Sam Waterston
nan
nan
Isabelle Carré
nan
nan
nan
```

[336]:
```
null_filled = pd.Series(director)
null_filled = null_filled.rename_axis(["director"]).reset_index()
```

[337]:
```
null_filled
```

[337]:

	director	0
0	Prakash Satam	Sonal Kaushal
1	Suhas Kadav	Saurav Chakraborty
2	Rajiv Chilaka	Jigna Bhardwaj
3	Momoko Kamiya	nan
4	George Ford	nan
..	…	…
56	Julia Willoughby Nason, Jenner Furst	nan
57	Jalil Lespert	Isabelle Carré
58	Guillermo Garcia, David Cantolla	nan
59	Jason Hehir	nan
60	Jared Hess, Tyler Measom	nan

[61 rows x 2 columns]

[338]:
```
null_filled = null_filled[null_filled.iloc[:,1] != "nan"]
```

[339]:
```
null_filled
```

[339]:

	director	0
0	Prakash Satam	Sonal Kaushal
1	Suhas Kadav	Saurav Chakraborty
2	Rajiv Chilaka	Jigna Bhardwaj
16	Omoni Oboli	Omoni Oboli
17	Olivier Megaton	Edgar Ramírez
35	Poj Arnon	Kohtee Aramboy
54	Ken Burns	Sam Waterston
57	Jalil Lespert	Isabelle Carré

[340]:
```
data.isna().sum()
```

[340]:
```
show_id            0
type               0
title              0
director        2634
cast             825
country          831
date_added        10
release_year       0
rating             4
duration           3
listed_in          0
description        0
date              98
Month              0
Year              10
dtype: int64
```

[341]:
```
data[(data["cast"].isna()) & (data["director"]=="Prakash Satam")]
```

[341]:

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description	date	Month	Year
3390	s3391	Movie	Little Singham: Kaal Ki Tabaahi	Prakash Satam	NaN	NaN	October 19, 2019	2019	TV-Y7	66 min	Children & Family Movies, Comedies	Kaal is back - bigger and badder than ever! Ca…	19	October	2019
7317	s7318	Movie	Little Singham aur Kaal ka Mahajaal	Prakash Satam	NaN	NaN	December 1, 2018	2018	TV-Y7-FV	68 min	Children & Family Movies, Comedies	When Kaal, the vilest demon on earth, threaten…	1	December	2018
7319	s7320	Movie	Little Singham in London	Prakash Satam	NaN	NaN	April 22, 2019	2019	TV-Y7	66 min	Children & Family Movies, Comedies	Little Singham is in London to meet the queen,…	22	April	2019

[342]:
```
data[
    (data["cast"].isna()) &
    (data["director"] == "Prakash Satam")
    ].fillna(null_filled[null_filled["director"] == "Prakash Satam"].iloc[0,1])
```

[342]:
```
     show_id   type                                title       director  \
3390   s3391  Movie      Little Singham: Kaal Ki Tabaahi  Prakash Satam
7317   s7318  Movie  Little Singham aur Kaal ka Mahajaal  Prakash Satam
7319   s7320  Movie              Little Singham in London  Prakash Satam

                cast        country        date_added  release_year    rating  \
3390  Sonal Kaushal  Sonal Kaushal  October 19, 2019          2019     TV-Y7
7317  Sonal Kaushal  Sonal Kaushal  December 1, 2018          2018  TV-Y7-FV
7319  Sonal Kaushal  Sonal Kaushal    April 22, 2019          2019     TV-Y7

     duration                             listed_in  \
3390   66 min  Children & Family Movies, Comedies
7317   68 min  Children & Family Movies, Comedies
7319   66 min  Children & Family Movies, Comedies

                                              description date     Month  Year
3390  Kaal is back - bigger and badder than ever! Ca…   19   October  2019
7317  When Kaal, the vilest demon on earth, threaten…    1  December  2018
7319  Little Singham is in London to meet the queen,…   22     April  2019
```

[343]:
```
data.isna().sum()
```

[343]:
```
show_id            0
type               0
title              0
director        2634
cast             825
country          831
date_added        10
release_year       0
rating             4
duration           3
listed_in          0
description        0
date              98
Month              0
Year              10
dtype: int64
```

[344]:
```
data.fillna(data.groupby('director',dropna=False).transform(lambda x:x.
 ↪mode()),inplace=True)
```

[345]:
```
data.isna().sum()
```

[345]:
```
show_id            0
type               0
title              0
```

```
director        2634
cast             794
country          768
date_added        10
release_year       0
rating             4
duration           3
listed_in          0
description        0
date              97
Month              0
Year              10
dtype: int64
```

[346]:
```
data.fillna(data.groupby('cast',dropna=False).transform(lambda x:x.
↪mode()),inplace=True)
```

[347]:
```
data.isna().sum()
```

[347]:
```
show_id           0
type              0
title             0
director       2614
cast            794
country         749
date_added       10
release_year      0
rating            4
duration          3
listed_in         0
description       0
date             95
Month             0
Year             10
dtype: int64
```

9 Actionable insights

1. We can see Tv Show count is increasing than Movie in the period of 2019 to 2021, because of Pandemic period. In future if Netflix can increase their Tv show compared to Movies with the genre of Romantic,action, thriller, Fantasy.
2. Most of the movies/Tv Show in netflix are having mature audience rating, Netflix can focus on mature audience films over than children movies.
3. Mostly movies/Tv show are added to netflix in the month of july, December and in the dates of 1st and 15th. They can improve business by releasing movies on festive dates, and weekend dates.
4. Netflix can recommend based on the location of users, Because we can able to see that based

on the country the genre and content of movie/Tv show is dynamically varies.