Netflix

July 8, 2023

#Netflix

Netflix is an American subscription video on-demand over-the-top streaming television service owned and operated by Netflix, Inc., a company based in Los Gatos, California. It offers films and television series from various genres, and it is available in multiple languages.

Netflix was launched on January 16, 2007, nearly a decade after Netflix, Inc. began its DVD-by-mail service. With over 232 million paid memberships in more than 190 countries, it is the most-subscribed video on demand streaming service. By 2022, original productions accounted for half of Netflix's library in the United States, and the company had ventured into other categories, such as video game publishing via the Netflix service.

#Problem Statement

Analyze the data and generate insights that could help Netflix in deciding which type of shows/movies to produce and how they can grow the business in different countries.

[1]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
```

[2]:
```
# Importing the Data
df= pd.read_csv("https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/000/
  ↪000/940/original/netflix.csv")
```

[3]:
```
df.head()
```

[3]:

	show_id	type	title	director	cast	country
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban…	South Africa
2	s3	TV Show	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi…	NaN
3	s4	TV Show	Jailbirds New Orleans	NaN		
4	s5	TV Show	Kota Factory	NaN		

```
3                                                   NaN             NaN
4  Mayur More, Jitendra Kumar, Ranjan Raj, Alam K…          India

          date_added  release_year rating   duration  \
0  September 25, 2021          2020  PG-13     90 min
1  September 24, 2021          2021  TV-MA  2 Seasons
2  September 24, 2021          2021  TV-MA   1 Season
3  September 24, 2021          2021  TV-MA   1 Season
4  September 24, 2021          2021  TV-MA  2 Seasons

                                        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 …

                                         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…
```

[4]:
```
df.shape
```

[4]:
```
(8807, 12)
```

##Features Description

Dataset contains 8k rows and 12 columns.

Following are the description of features:

1. Show_id: Unique ID for every Movie / Tv Show
2. Type: Identifier - A Movie or TV Show
3. Title: Title of the Movie / Tv Show
4. Director: Director of the Movie
5. Cast: Actors involved in the movie/show
6. Country: Country where the movie/show was produced
7. Date_added: Date it was added on Netflix
8. Release_year: Actual Release year of the movie/show
9. Rating: TV Rating of the movie/show
10. Duration: Total Duration - in minutes or number of seasons

11. Listed_in: Genre
12. Description: The summary description

[5]:
```
df.dtypes
```

[5]:
```
show_id         object
type            object
title           object
director        object
cast            object
country         object
date_added      object
release_year     int64
rating          object
duration        object
listed_in       object
description     object
dtype: object
```

[6]:
```
#We are converting the datatype of date_added from object to datetime.
df["date_added"]= pd.to_datetime(df['date_added'])
```

[7]:
```
df.dtypes
```

[7]:
```
show_id                 object
type                    object
title                   object
director                object
cast                    object
country                 object
date_added      datetime64[ns]
release_year             int64
rating                  object
duration                object
listed_in               object
description             object
dtype: object
```

The Data has only one integer value that is release_year else all are object.

[8]:
```
#Changing cast datatype from 'Object' to 'String'
df["cast"]= df["cast"].astype('str')
```

[9]:
```
#Changing country datatype from 'Object' to 'String'
df["country"]=df["country"].values.astype('str')
```

[10]:
```
#Removing extra spaces from datapoints
df['type']= df['type'].str.strip()
df['title']= df['title'].str.strip()
df['director']= df['director'].str.strip()
df['cast']= df['cast'].str.strip()
df['listed_in']= df['listed_in'].str.strip()
df['description']= df['description'].str.strip()
```

[11]:
```
df.dtypes
```

[11]:
```
show_id                 object
type                    object
title                   object
director                object
cast                    object
country                 object
date_added      datetime64[ns]
release_year             int64
rating                  object
duration                object
listed_in               object
description             object
dtype: object
```

[12]:
```
#Printing the unique values in each column.
for column in df.columns:
  print(f'{column} : {len(df[column].unique())}')
```

```
show_id : 8807
type : 2
title : 8806
director : 4529
cast : 7693
country : 749
date_added : 1715
release_year : 74
rating : 18
duration : 221
listed_in : 514
description : 8775
```

[13]:
```
#This shows missing values in each column.
df.isna().sum()
```

[13]:
```
show_id            0
type               0
title              0
```

```
director        2634
cast               0
country            0
date_added        10
release_year       0
rating             4
duration           3
listed_in          0
description        0
dtype: int64
```

This shows most of the Null values are present in director column.

[14]:
```
# This describes the whole data
df.describe()
```

[14]:
```
       release_year
count   8807.000000
mean    2014.180198
std        8.819312
min     1925.000000
25%     2013.000000
50%     2017.000000
75%     2019.000000
max     2021.000000
```

8807 movies and TV Shows have been released on Netflix between year 1925 to 2021.

[15]:
```
#We have dropped the missing values rows from each column.
df = df[~df['director'].isna()]
df = df[~df['cast'].isna()]
df = df[~df['country'].isna()]
df = df[~df['date_added'].isna()]
```

[16]:
```
# Number of movies or TV Shows that each country have.
df["country"]= df["country"].str.strip()
```

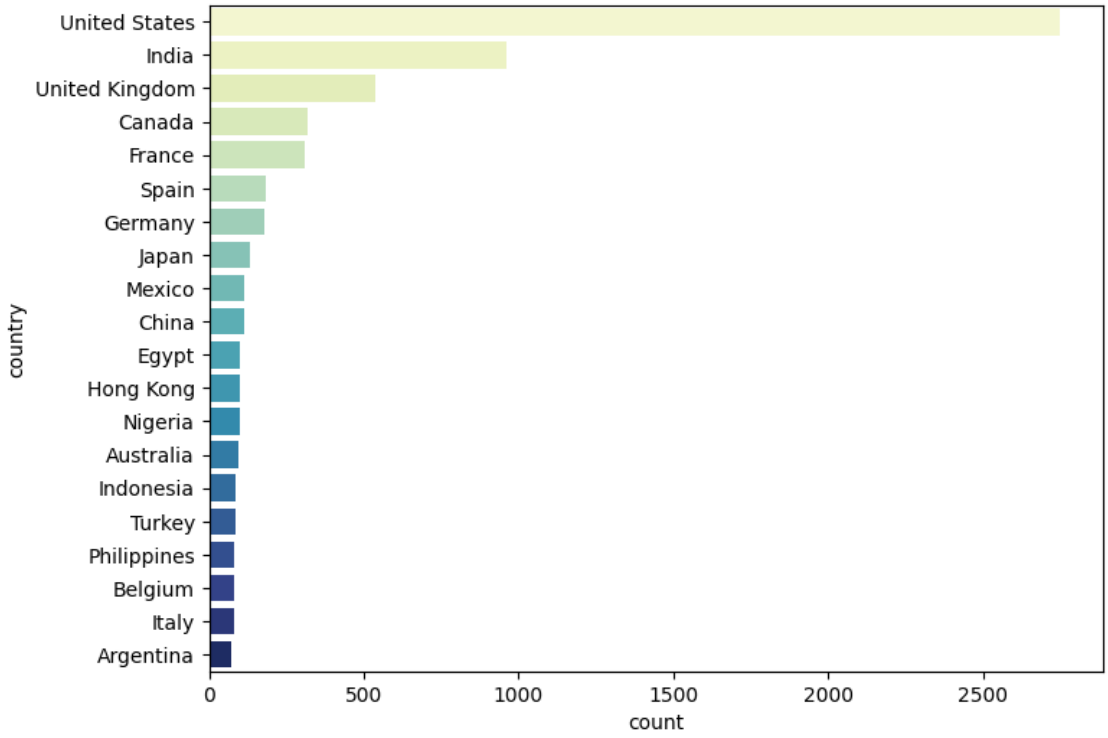
[17]:
```
# Countries That have content on Netflix
country_top10=df["country"].str.split(", ").explode().reset_index()
country_top10=country_top10[country_top10["country"]!="nan"]
country_top10
```

[17]:
```
      index         country
0         0   United States
4         7   United States
5         7           Ghana
6         7    Burkina Faso
7         7  United Kingdom
```

```
…      …              …
7870   8801           Jordan
7871   8802   United States
7872   8804   United States
7873   8805   United States
7874   8806           India

[7453 rows x 2 columns]
```

[18]:
```
# Top 10 Countries which have shows on Netflix
plt.figure(figsize=(8,6))
sns.countplot(data=country_top10, y="country", order=country_top10["country"].
 ↪value_counts().index[:20], palette="YlGnBu")
plt.show()
```



Hence, Most shows are from United States followed by India.

[ ]:
```
df.shape
```

[ ]:
```
(6173, 12)
```

[ ]:
```
# Splitting the data for Movies and Tv Shows
df_movies= df[df["type"]=="Movie"]
```

```
df_tv= df[df["type"]!="Movie"]
```

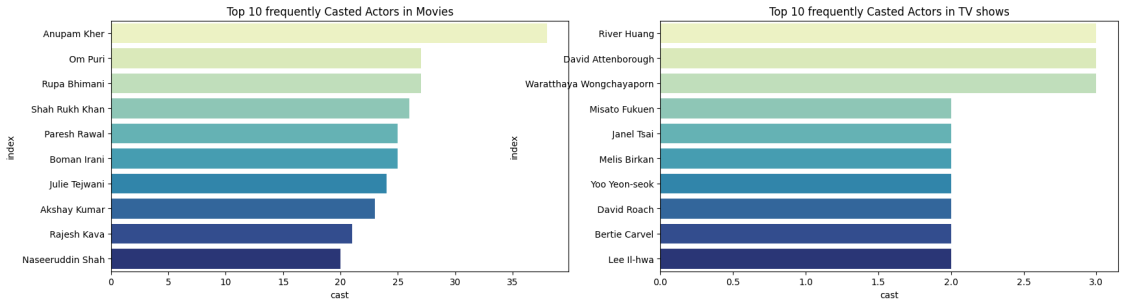
[ ]:
```
# Getting the most frequent actor in Movies
movies_cast= df_movies["cast"].str.split(",").explode().value_counts()
# movies_cast.loc[movies_cast.isna()]
movies_cast= movies_cast.reset_index()
movies_cast= movies_cast[movies_cast["index"]!="nan"]
```

[ ]:
```
# Getting the most frequent actors in TV
tv_cast= df_tv["cast"].str.split(",").explode().value_counts()

tv_cast= tv_cast.reset_index()
tv_cast= tv_cast[tv_cast["index"]!="nan"]
```

[ ]:
```
fig, ax = plt.subplots(1, 2, figsize=(20,5))
colors = ['r','g']
axes = ax.ravel()
movies_cast_top10 = movies_cast.sort_values("cast", ascending=False)[:10]
sns.barplot(data=movies_cast_top10, y="index", x='cast',␣
 ↪palette="YlGnBu",ax=axes[0])
axes[0].set_title("Top 10 frequently Casted Actors in Movies")


tv_cast_top10 = tv_cast.sort_values("cast", ascending=False)[:10]
sns.barplot(data=tv_cast_top10, y="index", x='cast',␣
 ↪palette="YlGnBu",ax=axes[1])
axes[1].set_title("Top 10 frequently Casted Actors in TV shows")
plt.show()
```



Netflix has high number of movies where cast includes Anupam Kher followed by Om Puri and high number of TV Shows where cast includes River Huang followed by David Attenborough.

[ ]:
```
# Getting Top 10 directors in movies
movies_director= df_movies["director"].str.split(",").explode().value_counts()
# movies_cast.loc[movies_cast.isna()]
```

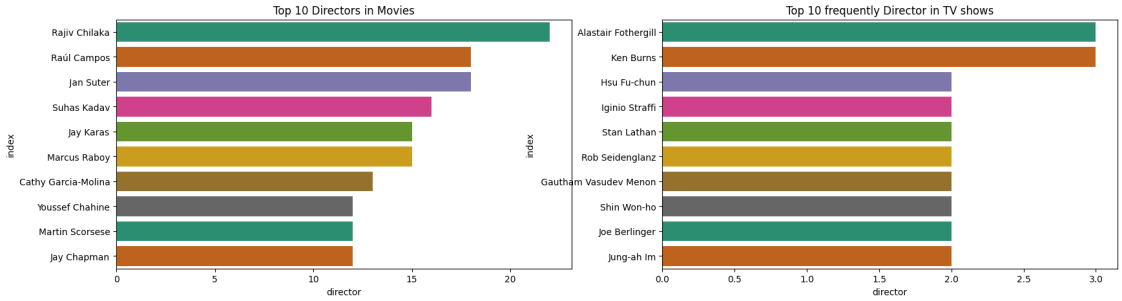
```
movies_director= movies_director.reset_index()
movies_director= movies_director[movies_director["index"]!="nan"]
```

[ ]:
```
# Getting Top 10 directors in TV Shows
tv_director= df_tv["director"].str.split(",").explode().value_counts()

tv_director= tv_director.reset_index()
tv_director= tv_director[tv_director["index"]!="nan"]
```

[ ]:
```
fig, ax = plt.subplots(1, 2, figsize=(20,5))
colors = ['r','g']
axes = ax.ravel()
movies_director_top10 = movies_director.sort_values("director",␣
 ↪ascending=False)[:10]
sns.barplot(data=movies_director_top10, y="index", x='director',␣
 ↪palette="Dark2",ax=axes[0])
axes[0].set_title("Top 10 Directors in Movies")


tv_director_top10 = tv_director.sort_values("director", ascending=False)[:10]
sns.barplot(data=tv_director_top10, y="index", x='director',␣
 ↪palette="Dark2",ax=axes[1])
axes[1].set_title("Top 10 frequently Director in TV shows")
plt.show()
```



Netflix has high number of movies directed by Rajiv Chilaka followed by Raul Campos and Jan Suter. It has high number of TV Shows directed by Alastair Fothergill followed by Ken Burns.

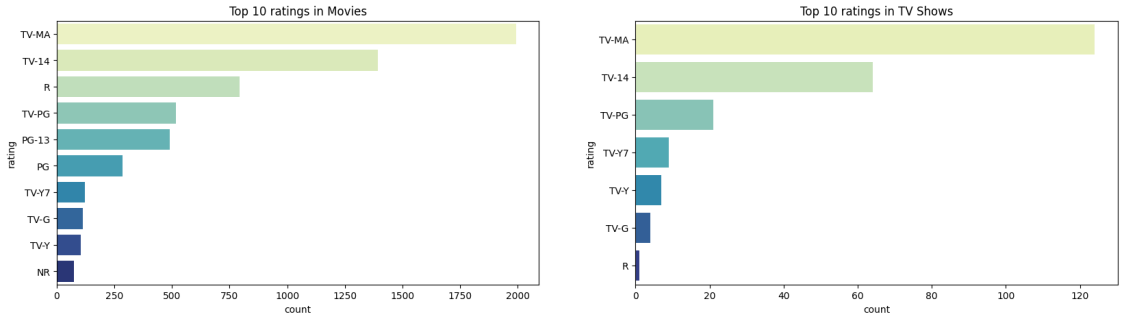
[ ]:
```
# Percentage of Ratings given to different movies and TV shows
df_movies["rating"].value_counts(normalize=True)
```

[ ]:
```
TV-MA       0.335409
TV-14       0.234433
R           0.133625
TV-PG       0.087008
PG-13       0.082296
```

```
PG          0.048132
TV-Y7       0.020700
TV-G        0.019185
TV-Y        0.017671
NR          0.012622
G           0.006900
TV-Y7-FV    0.000673
UR          0.000505
NC-17       0.000337
74 min      0.000168
84 min      0.000168
66 min      0.000168
Name: rating, dtype: float64
```

[ ]:
```
# Comparing Top 10 ratings in Movies and In Tv Shows
fig, ax = plt.subplots(1, 2, figsize=(20,5))
colors = ['r','g']
axes = ax.ravel()
sns.countplot(data=df_movies, y='rating', order=df_movies['rating'].
 ↪value_counts().index[:10], palette="YlGnBu", ax=axes[0])
axes[0].set_title("Top 10 ratings in Movies")

sns.countplot(data=df_tv, y='rating', order=df_tv['rating'].value_counts().
 ↪index[:10], palette="YlGnBu",ax= axes[1])
axes[1].set_title("Top 10 ratings in TV Shows")
plt.show()
```

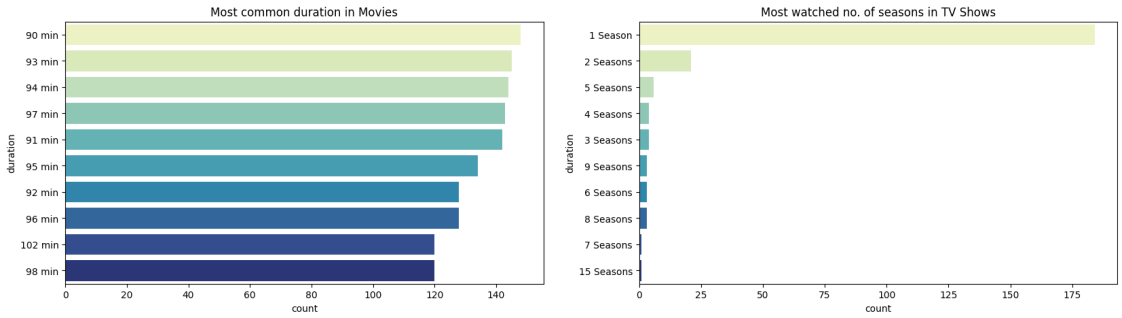


'TV-MA' is the highest rating that has been given to most of the movies, followed by 'TV-14' and 'R'. In case of TV Shows highest rating given is 'TV-MA', followed by 'TV-14' and 'TV_PG'.

[ ]:
```
# Getting Top 10 Most Common Duration for Movies and TV Shows
fig, ax = plt.subplots(1, 2, figsize=(20,5))
colors = ['r','g']
axes = ax.ravel()
```

```
sns.countplot(data=df_movies, y='duration', order=df_movies['duration'].
 ↪value_counts().index[:10], palette="YlGnBu", ax=axes[0])
axes[0].set_title("Most common duration in Movies")

sns.countplot(data=df_tv, y='duration', order=df_tv['duration'].value_counts().
 ↪index[:10], palette="YlGnBu",ax= axes[1])
axes[1].set_title("Most watched no. of seasons in TV Shows")
plt.show()
```



Mostly Movies available on Netflix are of 90 minutes, followed by 93 minutes and 94 minutes. In case of TV Shows, mostly TV shows available consists of 1 season, followed by 2 seasons and 5 seasons.

[ ]:
```
# # sns.lineplot(data=df_movies,x="country",y="release_year")
# sns.lineplot(data=df_tv,x="country",y="release_year")
# plt.show()
# df_movies.groupby(['country', 'release_year']).count()
# df_movies.groupby("country")["release_year"].count()
df_movies.groupby("country")["release_year"].value_counts()
```

[ ]:
```
country            release_year
, France, Algeria  2014            1
Argentina          2018            8
                   2020            7
                   2016            6
                   2019            6
                                  ..
nan                2001            1
                   2003            1
                   2004            1
                   2006            1
                   2008            1
Name: release_year, Length: 1506, dtype: int64
```

[ ]:
```
# All Genres available on Netflix
df_movies["listed_in"].str.split(",").explode().value_counts()
```

[ ]:
```
 International Movies        2582
Dramas                       1587
Comedies                     1186
Action & Adventure            851
 Dramas                       815
Documentaries                 777
 Independent Movies           731
 Romantic Movies              602
Children & Family Movies      570
 Thrillers                    510
 Comedies                     456
 Music & Musicals             340
Stand-Up Comedy               309
Horror Movies                 274
 Sci-Fi & Fantasy             227
 Sports Movies                212
International Movies          123
 LGBTQ Movies                  97
 Horror Movies                 81
Classic Movies                 80
 Faith & Spirituality          65
Thrillers                      65
 Cult Movies                   59
 Anime Features                50
 Classic Movies                36
 Children & Family Movies      35
 Documentaries                 35
Movies                         34
Anime Features                 20
Independent Movies             20
Music & Musicals               18
Sci-Fi & Fantasy               13
Cult Movies                    12
 Stand-Up Comedy               9
Romantic Movies                3
LGBTQ Movies                   1
Name: listed_in, dtype: int64
```

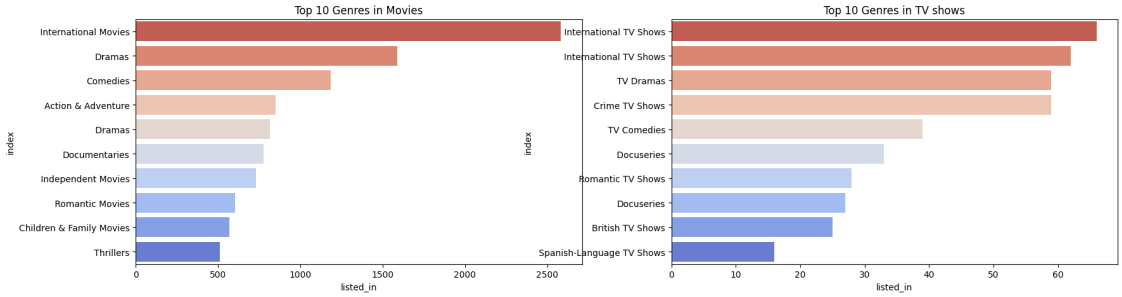
[ ]:
```
# Getting all genres available in Movies
movies_genre= df_movies["listed_in"].str.split(",").explode().value_counts()
movies_genre= movies_genre.reset_index()
movies_genre= movies_genre[movies_genre["index"]!="nan"]
```

[ ]:
```
# Getting all genres available in TV Shows
tv_genre = df_tv["listed_in"].str.split(",").explode().value_counts()

tv_genre= tv_genre.reset_index()
tv_genre= tv_genre[tv_genre["index"]!="nan"]
```

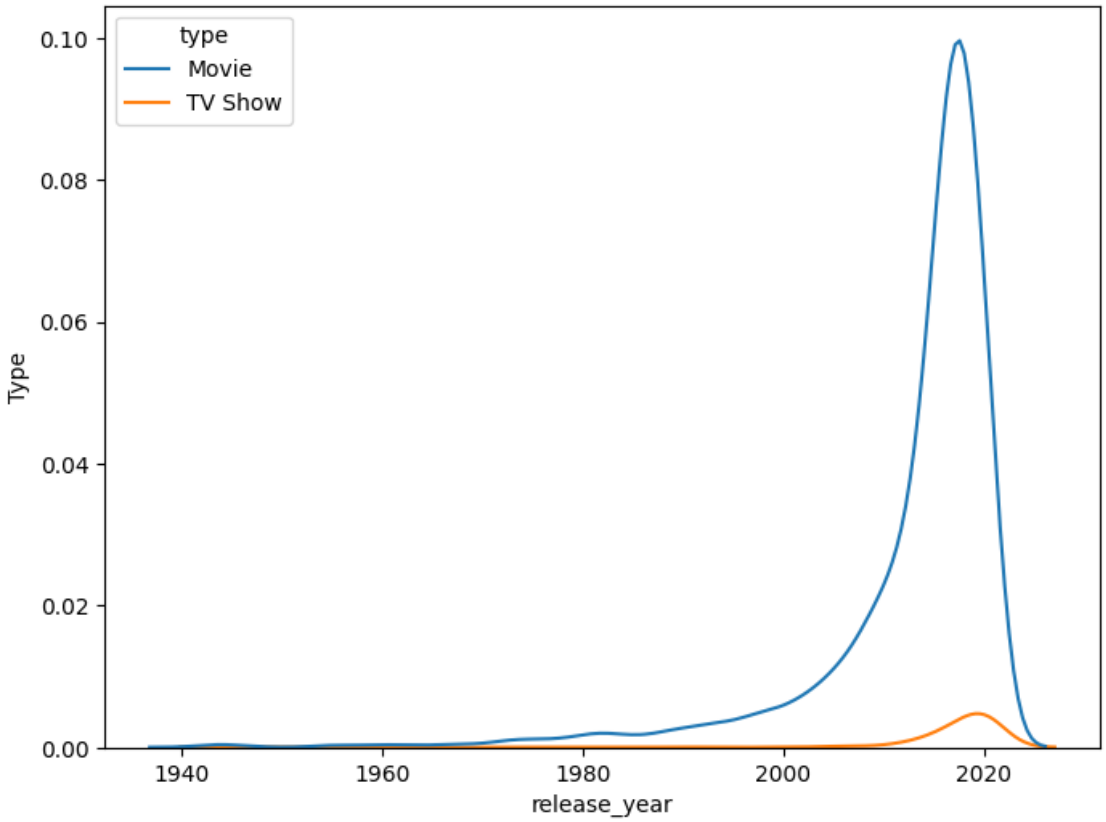
[ ]:
```
# Top 10 genres in Movies and TV Shows
fig, ax = plt.subplots(1, 2, figsize=(20,5))
colors = ['r','g']
axes = ax.ravel()
movies_genre_top10 = movies_genre.sort_values("listed_in", ascending=False)[:10]
sns.barplot(data=movies_genre_top10, y="index", x='listed_in',␣
 ↪palette="coolwarm_r",ax=axes[0])
axes[0].set_title("Top 10 Genres in Movies")


tv_genre_top10 = tv_genre.sort_values("listed_in", ascending=False)[:10]
sns.barplot(data=tv_genre_top10, y="index", x='listed_in',␣
 ↪palette="coolwarm_r",ax=axes[1])
axes[1].set_title("Top 10 Genres in TV shows")
plt.show()
```



International movies and TV Shows are the most commonly available on Netflix, followed by Dramas and Comedies in Movies and followed by Drama and Crime in TV Shows.

[ ]:
```
# No. of Movies and TV Shows released per year
plt.figure(figsize=(8,6))
sns.kdeplot(x='release_year',
 hue='type',
 data=df).set_ylabel("Type")
plt.show()
```



Most of the Movies and TV Shows available on Netflix were released around 2020.

[ ]:
```
df["type"].value_counts()
```

[ ]:
```
Movie      5943
TV Show     230
Name: type, dtype: int64
```

[ ]:
```
# Splitting Director Names and making a list
c1= df["director"].apply(lambda x: str(x).split(",")).tolist()
c1
```

[ ]:
```
[['Kirsten Johnson'],
 ['Julien Leclercq'],
 ['Mike Flanagan'],
 ['Robert Cullen', ' José Luis Ucha'],
 ['Haile Gerima'],
 ['Andy Devonshire'],
 ['Theodore Melfi'],
 ['Kongkiat Komesiri'],
 ['Christian Schwochow'],
```

```
['Bruno Garotti'],
['Pedro de Echave García', ' Pablo Azorín Williams'],
['Adam Salky'],
['Olivier Megaton'],
['K.S. Ravikumar'],
['Alex Woo', ' Stanley Moore'],
['S. Shankar'],
['Rajiv Menon'],
['Dennis Dugan'],
['Scott Stewart'],
['Robert Luketic'],
['Ashwiny Iyer Tiwari', ' Abhishek Chaubey', ' Saket Chaudhary'],
['Daniel Sandu'],
['Cédric Jimenez'],
['George Nolfi'],
['Steven Spielberg'],
['Jeannot Szwarc'],
['Joe Alves'],
['Joseph Sargent'],
['Tyler Greco'],
['Daniel Espinosa'],
['Bunmi Ajakaiye'],
['Antoine Fuqua'],
['Toshiya Shinohara'],
['Toshiya Shinohara'],
['Toshiya Shinohara'],
['Toshiya Shinohara'],
['Masahiko Murata'],
['Hajime Kamegaki'],
['Masahiko Murata'],
['Hajime Kamegaki'],
['Masahiko Murata'],
['Hirotsugu Kawasaki'],
['Toshiyuki Tsuru'],
['Tensai Okamura'],
['David Yarovesky'],
['Hanns-Bruno Kammertöns', ' Vanessa Nöcker', ' Michael Wech'],
['David A. Vargas'],
['Kemi Adetiba'],
['Ben Simms'],
['Prakash Satam'],
['Delhiprasad Deenadayalan'],
['Delhiprasad Deenadayalan'],
['Tomer Eshed'],
['Cedric Nicolas-Troyan'],
['JJC Skillz', ' Funke Akindele'],
['Thomas Sieben'],
```

```
['Marcus Clarke'],
['Alice Waddington'],
['Mona Achache', ' Patricia Tourancheau'],
['Alexis Almström'],
['Raja Gosnell'],
['Stephen Kijak'],
['Chapman Way', ' Maclain Way'],
['Jason Hehir'],
['Yemi Amodu'],
['Lijo Jose Pellissery'],
['David de Vos'],
['Luis Alfaro', ' Javier Gómez Santander'],
['Sara Colangelo'],
['Stephen Herek'],
['Rahul Rawail'],
['Jane Campion'],
['Nagesh Kukunoor'],
['Luke Holland'],
['Shanker Raman'],
['JP Habac'],
['Jane Campion'],
['Vidhu Vinod Chopra'],
['Mark Rosman'],
['Gilles Paquet-Brenner'],
['Lasse Hallström'],
['Scott Pleydell-Pearce'],
['Ridley Scott'],
['Neill Blomkamp'],
['Phillip Noyce'],
['Renny Harlin'],
['Anthony Minghella'],
['Simon Wincer'],
['Lasse Hallström'],
['Spike Lee'],
['Sebastián Schindel'],
['Steven C. Miller'],
['Richard LaGravenese'],
['Martin Campbell'],
['Reginald Hudlin'],
['George Jackson', ' Doug McHenry'],
['Eric Meza'],
['Gerhard Mostert'],
['Michael Martin'],
['Michael Rymer'],
['Andrew Lau Wai-keung', ' Alan Mak'],
['Brett Weiner'],
['Jim Henson'],
```

```
['Gary Winick'],
['Danishka Esterhazy'],
['Troy Byer'],
['Pang Ho-cheung'],
['Tim Burton'],
['Reginald Hudlin'],
['David Zucker'],
['Kinka Usher'],
['Sergio Leone'],
["Matthew O'Callaghan", ' Todd Wilderman'],
['Bobby Farrelly', ' Peter Farrelly'],
['Wolfgang Petersen'],
['Peter Spirer'],
['Michael Carney'],
['Richard Linklater'],
['Amy Rice'],
['Antoine Fuqua'],
['Randal Kleiser'],
['Michael Ritchie'],
['J. Lee Thompson'],
['Evan Goldberg', ' Seth Rogen'],
['Tom Shadyac'],
['Peter Segal'],
['Malcolm D. Lee'],
['Wolfgang Petersen'],
['Chapman Way', ' Maclain Way'],
['Ramzy Bedia', ' Éric Judor'],
['Sharan Koppisetty'],
['Taylor Sheridan'],
['Sachin Yardi'],
['Saurabh Kabra'],
['Mark Waters'],
['Kemi Adetiba'],
['Partho Mitra'],
['Santram Varma'],
['Anil V. Kumar', ' Anurag Basu'],
['Sangeeth Sivan'],
['Umesh Ghadge'],
['Sachin Yardi'],
['David Dhawan'],
['Dibakar Banerjee'],
['Apoorva Lakhia'],
['Milan Luthria'],
['Milan Luthria'],
['Pawan Kripalani'],
['Bhushan Patel'],
['Magnus Martens'],
```

```
['Apoorva Lakhia'],
['Raj Nidimoru', ' Krishna D.K.'],
['Milan Luthria'],
['Joshua Rofé'],
['Brad Anderson'],
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Dick Johnson Is Dead	Kirsten Johnson		None	None
Ganglands	Julien Leclercq		None	None
Midnight Mass	Mike Flanagan		None	None
My Little Pony: A New Generation	Robert Cullen	José Luis Ucha	None	
Sankofa	Haile Gerima		None	None
…	…	…	…	
Zinzana	Majid Al Ansari		None	None
Zodiac	David Fincher		None	None
Zombieland	Ruben Fleischer		None	None
Zoom	Peter Hewitt		None	None

```
Zubaan                                    Mozez Singh             None  None

                                    3     4     5     6     7     8     9   \
title
Dick Johnson Is Dead              None  None  None  None  None  None  None
Ganglands                         None  None  None  None  None  None  None
Midnight Mass                     None  None  None  None  None  None  None
My Little Pony: A New Generation  None  None  None  None  None  None  None
Sankofa                           None  None  None  None  None  None  None
…                                  …     …     …     …     …     …     …
Zinzana                           None  None  None  None  None  None  None
Zodiac                            None  None  None  None  None  None  None
Zombieland                        None  None  None  None  None  None  None
Zoom                              None  None  None  None  None  None  None
Zubaan                            None  None  None  None  None  None  None

                                   10    11    12
title
Dick Johnson Is Dead              None  None  None
Ganglands                         None  None  None
Midnight Mass                     None  None  None
My Little Pony: A New Generation  None  None  None
Sankofa                           None  None  None
…                                  …     …     …
Zinzana                           None  None  None
Zodiac                            None  None  None
Zombieland                        None  None  None
Zoom                              None  None  None
Zubaan                            None  None  None

[6173 rows x 13 columns]
```

[ ]:
```
# Stacking the Names of Directors
df_new1= df_new1.stack()
df_new1
```

[ ]:
```
title
Dick Johnson Is Dead              0    Kirsten Johnson
Ganglands                         0    Julien Leclercq
Midnight Mass                     0      Mike Flanagan
My Little Pony: A New Generation  0      Robert Cullen
                                  1     José Luis Ucha
                                              …
Zinzana                           0    Majid Al Ansari
Zodiac                            0      David Fincher
Zombieland                        0    Ruben Fleischer
Zoom                              0       Peter Hewitt
```

```
Zubaan                              0        Mozez Singh
Length: 6978, dtype: object
```

[ ]:
```
df_new1=pd.DataFrame(df_new1.reset_index())
df_new1
```

[ ]:
```
                                 title  level_1               0
0                 Dick Johnson Is Dead        0  Kirsten Johnson
1                            Ganglands        0  Julien Leclercq
2                        Midnight Mass        0    Mike Flanagan
3     My Little Pony: A New Generation        0    Robert Cullen
4     My Little Pony: A New Generation        1   José Luis Ucha
…                                    …      …               …
6973                          Zinzana        0  Majid Al Ansari
6974                           Zodiac        0    David Fincher
6975                       Zombieland        0  Ruben Fleischer
6976                             Zoom        0     Peter Hewitt
6977                          Zubaan         0      Mozez Singh

[6978 rows x 3 columns]
```

[ ]:
```
# Renaming the columns
df_new1.rename(columns={0:"Directors"},inplace=True)
df_new1
```

[ ]:
```
                                 title  level_1        Directors
0                 Dick Johnson Is Dead        0  Kirsten Johnson
1                            Ganglands        0  Julien Leclercq
2                        Midnight Mass        0    Mike Flanagan
3     My Little Pony: A New Generation        0    Robert Cullen
4     My Little Pony: A New Generation        1   José Luis Ucha
…                                    …      …               …
6973                          Zinzana        0  Majid Al Ansari
6974                           Zodiac        0    David Fincher
6975                       Zombieland        0  Ruben Fleischer
6976                             Zoom        0     Peter Hewitt
6977                          Zubaan         0      Mozez Singh

[6978 rows x 3 columns]
```

[ ]:
```
# Dropping unnecessary columns
df_new1.drop(['level_1'],axis=1,inplace=True)
```

[ ]:
```
# Unnested Director Column
df_new1
```

[ ]:
```
                                title        Directors
0                Dick Johnson Is Dead  Kirsten Johnson
1                           Ganglands  Julien Leclercq
2                       Midnight Mass    Mike Flanagan
3     My Little Pony: A New Generation    Robert Cullen
4     My Little Pony: A New Generation   José Luis Ucha
…                                  …              …
6973                        Zinzana  Majid Al Ansari
6974                         Zodiac    David Fincher
6975                     Zombieland  Ruben Fleischer
6976                           Zoom     Peter Hewitt
6977                         Zubaan      Mozez Singh

[6978 rows x 2 columns]
```

[ ]:
```
# Splitting Cast Names and making a list
c2= df["cast"].apply(lambda x: str(x).split(",")).tolist()
# Converting list of Names of Actors to a DataFrame
df_new2=pd.DataFrame(c2,index=df["title"])
# Stacking the Names of Directors
df_new2= df_new2.stack()
df_new2=pd.DataFrame(df_new2.reset_index())
# Renaming the columns
df_new2.rename(columns={0:"Actors"},inplace=True)
# Dropping unnecessary columns
df_new2.drop(['level_1'],axis=1,inplace= True)
df_new2
```

[ ]:
```
                    title                Actors
0      Dick Johnson Is Dead                   nan
1                 Ganglands          Sami Bouajila
2                 Ganglands           Tracy Gotoas
3                 Ganglands            Samuel Jouy
4                 Ganglands          Nabiha Akkari
…                       …                     …
45933             Zubaan       Manish Chaudhary
45934             Zubaan           Meghna Malik
45935             Zubaan          Malkeet Rauni
45936             Zubaan         Anita Shabdish
45937             Zubaan   Chittaranjan Tripathy

[45938 rows x 2 columns]
```

[ ]:
```
# Splitting Country names and making a list
c3= df["country"].apply(lambda x: str(x).split(",")).tolist()
# Converting List to DataFrame
df_new3= pd.DataFrame(c3,index=df["title"])
```

```
# Stacking the country Names
df_new3= df_new3.stack()
df_new3= pd.DataFrame(df_new3.reset_index())
# Renaming the columns
df_new3.rename(columns={0:"countries"},inplace=True)
# Dropping unnecessary columns
df_new3.drop(['level_1'],axis=1,inplace= True)
df_new3
```

[ ]:

```
                                title      countries
0                 Dick Johnson Is Dead  United States
1                            Ganglands            nan
2                        Midnight Mass            nan
3     My Little Pony: A New Generation            nan
4                              Sankofa  United States
…                                  …            …
7875                           Zinzana         Jordan
7876                            Zodiac  United States
7877                        Zombieland  United States
7878                              Zoom  United States
7879                           Zubaan          India

[7880 rows x 2 columns]
```

[ ]:

```
# Splitting Genre names and making a list
c4= df["listed_in"].apply(lambda x: str(x).split(",")).tolist()
# Converting List to DataFrame
df_new4= pd.DataFrame(c4,index=df["title"])
# Stacking the country Names
df_new4= df_new4.stack()
df_new4= pd.DataFrame(df_new4.reset_index())
# Renaming the columns
df_new4.rename(columns={0:"Genre"},inplace=True)
# Dropping unnecessary columns
df_new4.drop(['level_1'],axis=1,inplace= True)
df_new4
```

[ ]:

```
                     title                    Genre
0      Dick Johnson Is Dead              Documentaries
1                 Ganglands             Crime TV Shows
2                 Ganglands     International TV Shows
3                 Ganglands      TV Action & Adventure
4             Midnight Mass                  TV Dramas
…                       …                          …
13434                 Zoom  Children & Family Movies
13435                 Zoom                  Comedies
13436               Zubaan                    Dramas
```

```
13437                Zubaan      International Movies
13438                Zubaan          Music & Musicals

[13439 rows x 2 columns]
```

[ ]:
```
# merging the unnested director data with unnested actor data
df_new5= df_new2.merge(df_new1,on=['title'],how='inner')
# merging the above merged data with unnested country data
df_new6= df_new5.merge(df_new3,on=['title'],how='inner')
# merging the above merged data with unnested genre data
df_new7= df_new6.merge(df_new4,on=['title'],how='inner')
df_new7
```

[ ]:
```
                      title                  Actors        Directors  \
0       Dick Johnson Is Dead                     nan  Kirsten Johnson
1                  Ganglands           Sami Bouajila  Julien Leclercq
2                  Ganglands           Sami Bouajila  Julien Leclercq
3                  Ganglands           Sami Bouajila  Julien Leclercq
4                  Ganglands            Tracy Gotoas  Julien Leclercq
…                        …                       …               …
151753              Zubaan          Anita Shabdish      Mozez Singh
151754              Zubaan          Anita Shabdish      Mozez Singh
151755              Zubaan   Chittaranjan Tripathy      Mozez Singh
151756              Zubaan   Chittaranjan Tripathy      Mozez Singh
151757              Zubaan   Chittaranjan Tripathy      Mozez Singh

            countries                     Genre
0       United States             Documentaries
1                 nan           Crime TV Shows
2                 nan   International TV Shows
3                 nan    TV Action & Adventure
4                 nan           Crime TV Shows
…                 …                         …
151753          India     International Movies
151754          India         Music & Musicals
151755          India                   Dramas
151756          India     International Movies
151757          India         Music & Musicals

[151758 rows x 5 columns]
```

[ ]:
```
# merging unnested data with the original data
df_final= df_new7.
  ↪merge(df[['show_id','type','title','date_added','release_year','rating','duration']],on=['t
df_final.head()
```

[ ]:
```
                  title         Actors        Directors      countries  \
0  Dick Johnson Is Dead            nan  Kirsten Johnson  United States
1             Ganglands  Sami Bouajila  Julien Leclercq            nan
2             Ganglands  Sami Bouajila  Julien Leclercq            nan
3             Ganglands  Sami Bouajila  Julien Leclercq            nan
4             Ganglands   Tracy Gotoas  Julien Leclercq            nan

                    Genre show_id     type date_added  release_year rating  \
0           Documentaries      s1    Movie 2021-09-25          2020  PG-13
1         Crime TV Shows       s3  TV Show 2021-09-24          2021  TV-MA
2  International TV Shows      s3  TV Show 2021-09-24          2021  TV-MA
3   TV Action & Adventure      s3  TV Show 2021-09-24          2021  TV-MA
4         Crime TV Shows       s3  TV Show 2021-09-24          2021  TV-MA

   duration
0    90 min
1  1 Season
2  1 Season
3  1 Season
4  1 Season
```

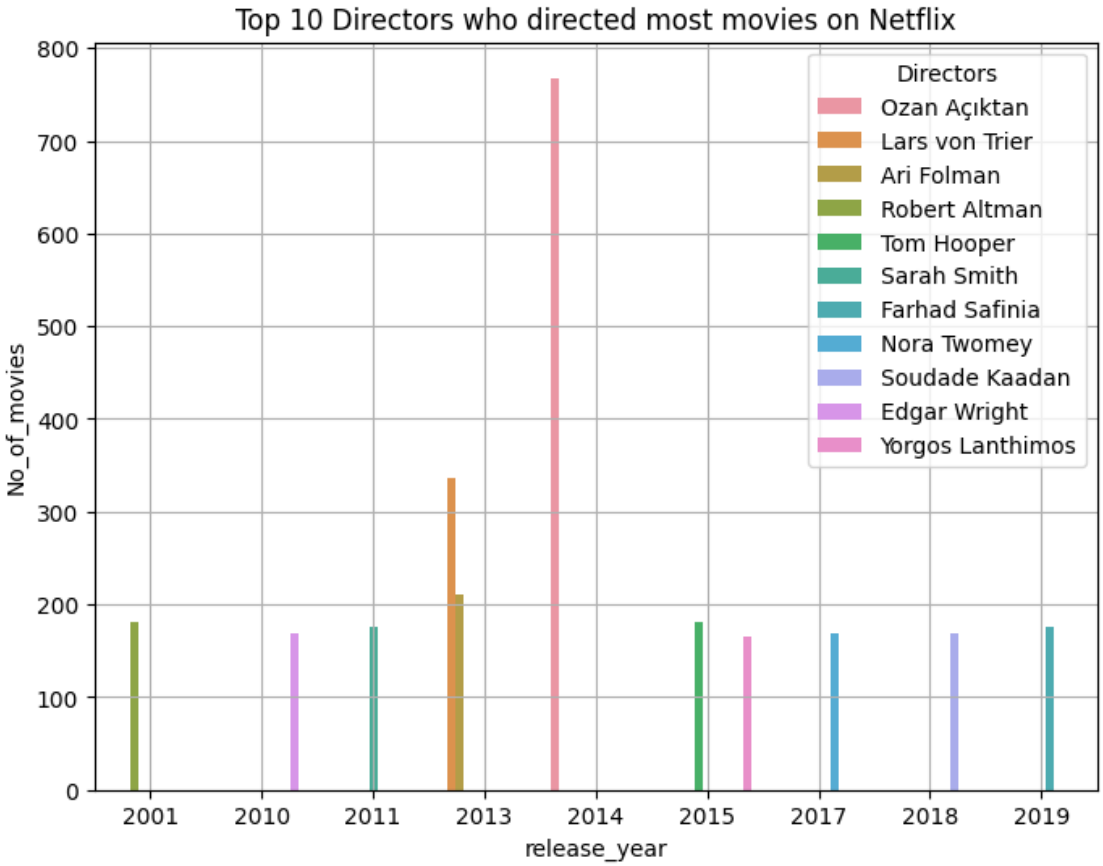
[ ]:
```
# Splitting data into 2 parts movie and TV
movie= pd.DataFrame(df_final[df_final["type"]=="Movie"])
TV= pd.DataFrame(df_final[df_final["type"]!="Movie"])
```

[ ]:
```
# Top 10 Directors who directed most movies on Netflix
top_10= pd.DataFrame(movie.groupby("release_year")[["Directors"]].
 ↪value_counts().sort_values(ascending=False).reset_index()[:11])
top_10.rename(columns={0:"No_of_movies"},inplace=True)
top_10
```

[ ]:
```
    release_year         Directors  No_of_movies
0           2014      Ozan Açıktan           768
1           2013    Lars von Trier           336
2           2013        Ari Folman           210
3           2001     Robert Altman           180
4           2015        Tom Hooper           180
5           2011       Sarah Smith           176
6           2019    Farhad Safinia           176
7           2017       Nora Twomey           168
8           2018    Soudade Kaadan           168
9           2010      Edgar Wright           168
10          2015  Yorgos Lanthimos           165
```

[ ]:
```
plt.figure(figsize=(8,6))
sns.barplot(data=top_10,x="release_year",y="No_of_movies",hue="Directors").
 ↪set_title("Top 10 Directors who directed most movies on Netflix")
```

```
plt.grid()
plt.show()
```



Ozan Aciktan has most released movies on Netflix in the year 2014, followed by Lars von Trier who have most movies released in 2013 and Ari Folman who have most movies released in 2013.

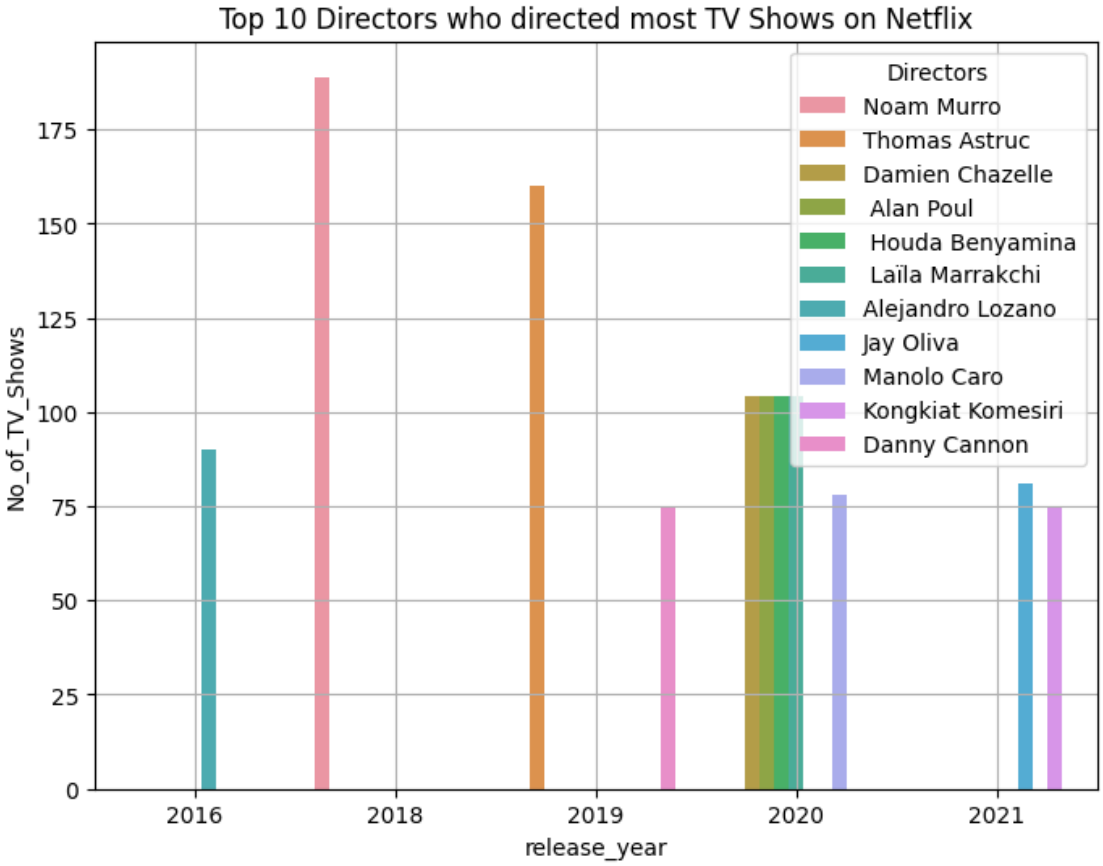
[ ]:
```
# Top 10 Directors who directed most TV Shows on Netflix
top_10_tv= pd.DataFrame(TV.groupby("release_year")[["Directors"]].
  ↪value_counts().sort_values(ascending=False).reset_index()[:11])
top_10_tv.rename(columns={0:"No_of_TV_Shows"},inplace=True)
top_10_tv
```

[ ]:

	release_year	Directors	No_of_TV_Shows
0	2018	Noam Murro	189
1	2019	Thomas Astruc	160
2	2020	Damien Chazelle	104
3	2020	Alan Poul	104
4	2020	Houda Benyamina	104
5	2020	Laïla Marrakchi	104
6	2016	Alejandro Lozano	90

```
7           2021          Jay Oliva              81
8           2020        Manolo Caro              78
9           2021  Kongkiat Komesiri              75
10          2019       Danny Cannon              75
```

[ ]:
```
plt.figure(figsize=(8,6))
sns.barplot(data=top_10_tv,x="release_year",y="No_of_TV_Shows",hue="Directors").
  ↪set_title("Top 10 Directors who directed most TV Shows on Netflix")
plt.grid()
plt.show()
```



Nuam Murro has most released TV Shows on Netflix in the year 2018,followed by Thomas Astruc in year 2019 and Damien Chazelle in the year 2020.

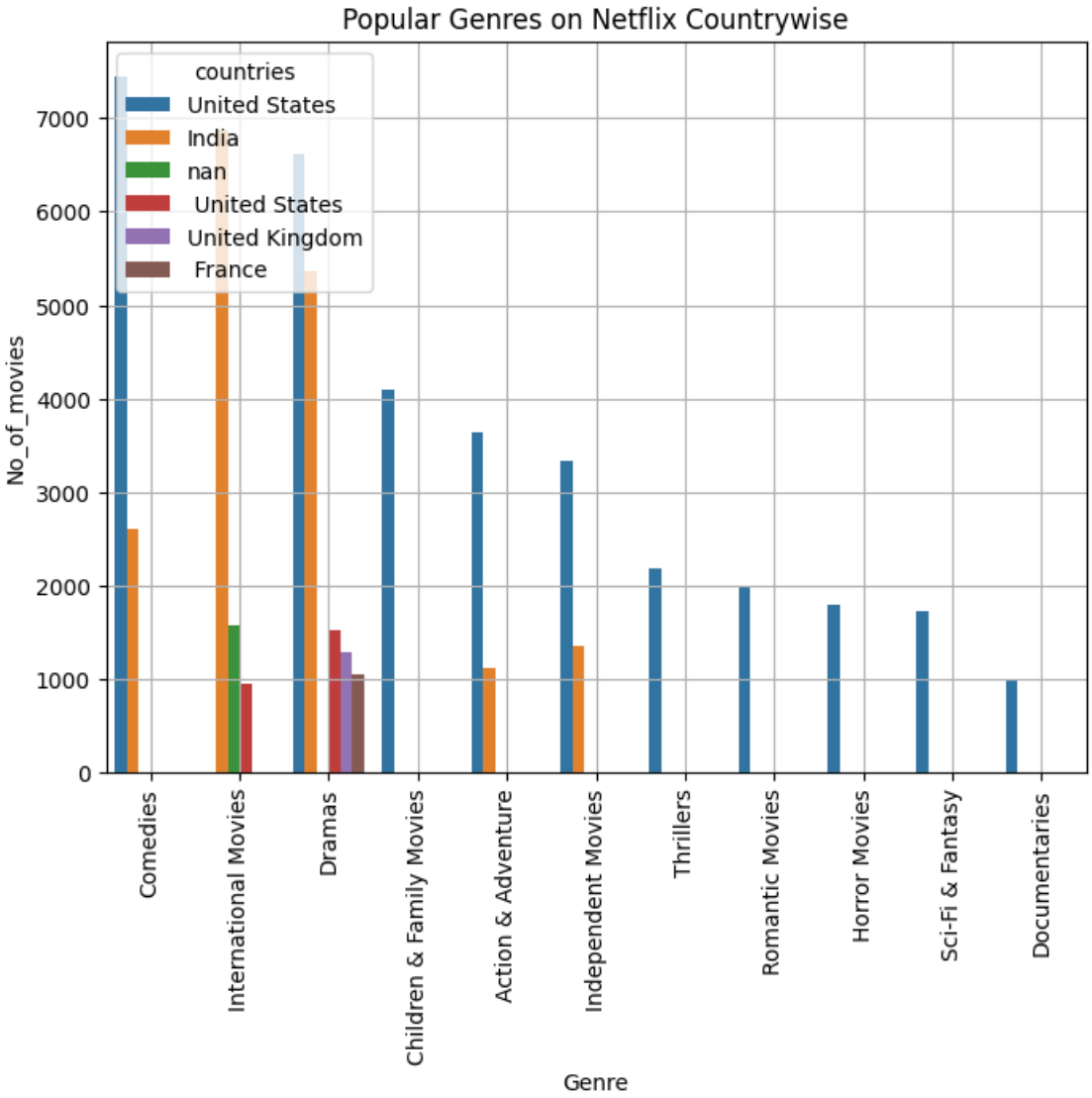
[ ]:
```
# Most Popular Genre available on Netflix countrywise
df_final["Genre"]=df_final["Genre"].str.strip()
top_genre = pd.DataFrame(df_final.groupby("Genre")[["countries"]].
  ↪value_counts().sort_values(ascending=False).reset_index())[:20]
top_genre.rename(columns={0:"No_of_movies"},inplace=True)
# nan values to be removed
```

```
top_genre
```

[ ]:

	Genre	countries	No_of_movies
0	Comedies	United States	7450
1	International Movies	India	6880
2	Dramas	United States	6611
3	Dramas	India	5373
4	Children & Family Movies	United States	4093
5	Action & Adventure	United States	3644
6	Independent Movies	United States	3331
7	Comedies	India	2606
8	Thrillers	United States	2176
9	Romantic Movies	United States	1971
10	Horror Movies	United States	1798
11	Sci-Fi & Fantasy	United States	1729
12	International Movies	nan	1580
13	Dramas	United States	1522
14	Independent Movies	India	1346
15	Dramas	United Kingdom	1287
16	Action & Adventure	India	1121
17	Dramas	France	1043
18	Documentaries	United States	1001
19	International Movies	United States	949

[ ]:
```
plt.figure(figsize=(8,6))
sns.barplot(data=top_genre,x="Genre",y="No_of_movies",hue="countries").
 ↪set_title("Popular Genres on Netflix Countrywise")
plt.xticks(rotation=90)
plt.grid()
plt.show()
```



Hence, International movies are mostly popular among Indian audience followed by Comedies and Dramas. Similarly In United States Comedies are popular followed by Dramas and Children and Family Movies. Documentaries seems less available in United States. Action and Adventure are available in less number in India.

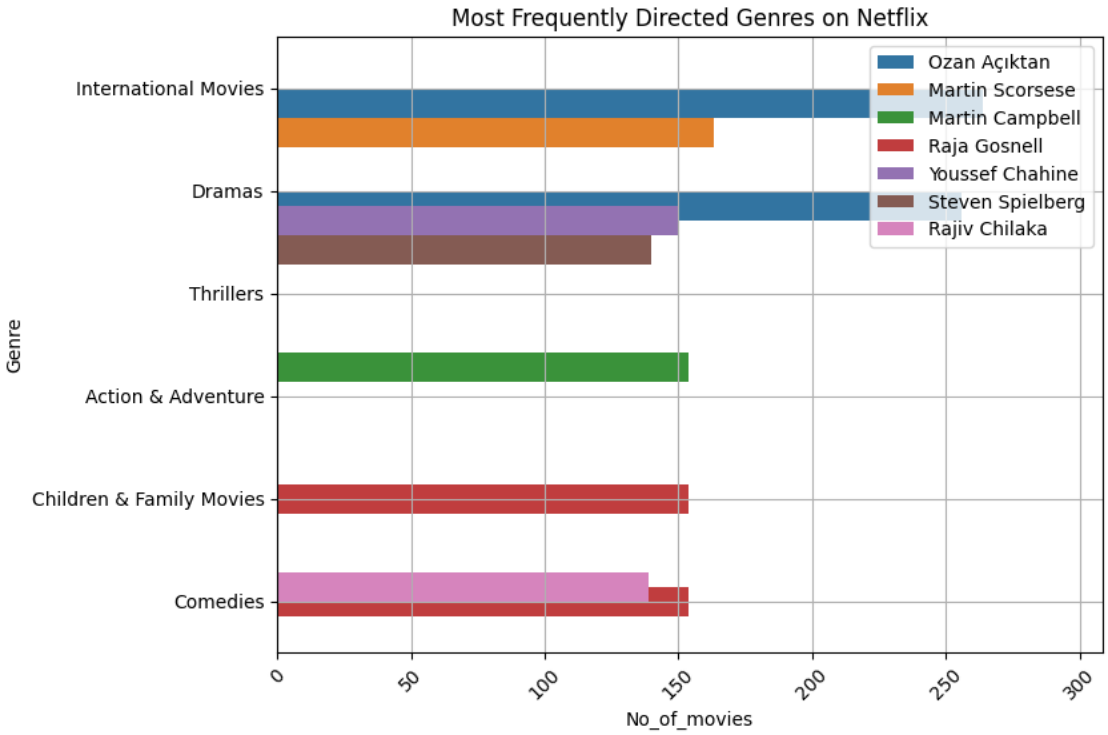
[ ]:
```
# Most Frequently Directed Genres on Netflix
top_directors= pd.DataFrame(df_final.groupby("Genre")[["Directors"]].
 ↪value_counts().sort_values(ascending=False)).reset_index()[:10]
top_directors.rename(columns={0:"No_of_movies"},inplace=True)
top_directors
```

[ ]:

	Genre	Directors	No_of_movies
0	International Movies	Ozan Açıktan	294

1	Dramas	Ozan Açıktan	264
2	Thrillers	Ozan Açıktan	256
3	Dramas	Martin Scorsese	163
4	Action & Adventure	Martin Campbell	154
5	Children & Family Movies	Raja Gosnell	154
6	Comedies	Raja Gosnell	154
7	Dramas	Youssef Chahine	150
8	Dramas	Steven Spielberg	140
9	Children & Family Movies	Rajiv Chilaka	139

[ ]:
```
plt.figure(figsize=(8,6))
sns.
 ↪barplot(data=top_directors,y="Genre",x="No_of_movies",hue="Directors",width=2).
 ↪set_title("Most Frequently Directed Genres on Netflix")
plt.legend(loc='upper right')
plt.xticks(rotation=45)
plt.grid()
plt.show()
```



Hence, Netflix has most International Movies directed by Ozan Aciktan followed by Martin Scorsese. Netflix has most Comedy movies directed by Rajiv Chilaka and Raja Gosnell. In Action and Adventure Martin Campbell has the highest number of movies on Netflix.Ozan Aciktan has high number of movies in Dramas as well

0.1 Business Insights

1. Most of the content is available in the form of Movies having duration of 90 mins (1.5 Hrs).
2. Majority content is coming from United States & United Kingdom.
3. In Movies, most popular genre is Action & Adventure. In TV Shows, most popular genre is British T.V Shows.
4. Most of the content was uploaded during the year of 2018-2021.
5. TV-MA is the most popular rating among other ratings.
6. Most movies are available in 90 min duration, while T.V Shows are available in single season.

0.2 Recommendations

1. Netflix should focus on adding more movies with durations ranging from 90 to 95 minutes.
2. Generally, Q4 and Q1 are the best times to upload content to the platform.
3. TV-MA, TV-14, TV-PG, and R are some of the most popularly rated contents that should be available.
4. Action and Adventure, British TV Shows, Anime Series, and Comedy are a few of the genres that should be featured on the platform.
5. Netflix should upload more movies and content from those countries that have lower content on the platform, such as Argentina, Belgium, Italy, the Philippines, etc.
6. We can observe that people prefer watching their local actors movies. So Netflix can try to include Actors from those countries that have low content on the platform, geography-wise. So that more viewers from such countries get encouraged to watch shows and movies of their favorite local actors.
7. As per the observation, the following ratings have the lowest contribution genre-wise: G,TV-Y7-FV, UR, and NC-17. Hence, Netflix should upload more of such content.
8. For the USA audience, 80–120 minutes is the recommended length for movies, and Kids TV Shows are also popular along with the genres in the first point, hence recommended. For the UK audience, the recommended length for movies is the same as that of the USA (80–120 minutes).
9. The target audience in the USA and India is recommended to be 14+ and above, while for the UK, it is recommended to be completely mature or R content.

[ ]: