Netflix is one of the most popular media and video streaming platforms. They have over 10000 movies or tv shows available on their platform, as of mid-2021, they have over 222M Subscribers globally. This tabular dataset consists of listings of all the movies and tv shows available on Netflix, along with details such as - cast, directors, ratings, release year, duration, etc.

Business Problem

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

Problem Statement

Perform Univariate and Bivariate analysis to explore which/what factors are playing major role in increasing Netflix viewers. What type of content and who all are adding more value to Netflix

Importing Required Libraries

```
1 import numpy as np
2 import pandas as pd
3 import matplotlib.pyplot as plt
4 import seaborn as sns
```

Reading Data

```
1 df=pd.read_csv("netflix.csv")
2 df.head()
```

	show_id	type	title	director	cast	country	date_added	release_year	rat
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG

Ama

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

```
Movie      6131
TV Show    2676
Name: type, dtype: int64
```

```
1 df.info()
```

```
<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
```

Appying info command, below can be inferred:

1. Except release year being of type numerical, rest of the columns are of object type.
2. Fewer columns have null/missing entries.

```
1 df.describe(include="all")
```

	show_id	type	title	director	cast	country	date_added	release_yea
count	8807	8807	8807	6173	7982	7976	8797	8807.00000
unique	8807	2	8807	4528	7692	748	1767	Nal
top	s1	Movie	Dick Johnson Is Dead	Rajiv Chilaka	David Attenborough	United States	January 1, 2020	Nal
freq	1	6131	1	19	19	2818	109	Nal
mean	NaN	NaN	NaN	NaN	NaN	NaN	NaN	2014.18019
std	NaN	NaN	NaN	NaN	NaN	NaN	NaN	8.81931
min	NaN	NaN	NaN	NaN	NaN	NaN	NaN	1925.00000

```
1 df.shape
```

```
(8807, 12)
```

```
1 df.columns
```

```
Index(['show_id', 'type', 'title', 'director', 'cast', 'country', 'date_added',
       'release_year', 'rating', 'duration', 'listed_in', 'description'],
      dtype='object')
```

Total Rows->8807 and Total cols->12

PREPROCESSING DATA

```
1 #checking null/missing values for all the columns
2 df.isnull().sum()
```

```
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
```

Observations from above:

1. Director, cast, country, date_added,ratings, and duration have null entries
2. date_added,ratings, and duration have limited entries for null so these can be dropped
3. Director, cast, and country have abundant null entries so these can't be dropped as dropping these values would downsample the data and hence need to replace NaN with specific string

```
df["director"].replace(to_replace=np.nan, value="Other director",inplace=True)
df["cast"].replace(to_replace=np.nan, value="Other cast",inplace=True)
df["country"].replace(to_replace=np.nan, value="Other country",inplace=True)
```

```
# As there are very less NaN rows for date_added,rating,duration, so these rows can be dro
df.dropna(subset=["date_added","rating","duration"],axis=0,inplace=True)
```

1. date_added column has type object,this need to be converted to relevant date object
2. Fetching month and year from the date column

```
df["month_added"]=pd.to_datetime(df["date_added"]).dt.month
df["year_added"]=pd.to_datetime(df["date_added"]).dt.year
df["day_added"]=pd.to_datetime(df["date_added"]).dt.day
```

```
# Duration column has 2 different kind of data for TV Shows and movies so adding column To

df["Total_season"]=df["duration"].apply(lambda x: str(x).split(" ")[0] if ("Season" or "Se
df["Total_duration"]=df["duration"].apply(lambda x: str(x).split(" ")[0] if "min" in str(x
```

```
df["rating"].unique()
```

```
array(['PG-13', 'TV-MA', 'PG', 'TV-14', 'TV-PG', 'TV-Y', 'TV-Y7', 'R',
       'TV-G', 'G', 'NC-17', 'NR', 'TV-Y7-FV', 'UR'], dtype=object)
```

```
# Refrenece Taken from https://help.netflix.com/en/node/2064/us

maturity_rating={
    "PG-13":"Teens",
    "TV-MA":"Adults",
    "PG":"Kids-P",
    "TV-14":"Teens",
    "TV-PG":"Kids-P",
    "TV-Y":"Kids",
    "TV-Y7":"Kids>7",
    "R":"Adults",
    "TV-G":"Kids",
```

```
    "G":"Kids",
    "NC-17":"Adults",
    "NR":"Adults",
    "TV-Y7-FV":"Kids-P",
    "UR":"Adults"
}

# NR and UR -> Not Rated and Unrated are marked as Adults
# Kids-P -> can be watched with parental guidance

df["maturity_rating"]=df["rating"].replace(maturity_rating)

# Dropping columns which are not required for analysis
df.drop(["rating","description","date_added","duration"],inplace=True,axis=1)
```

```
# copying original dataset so that it remains intact for graphical analysis
original_data=df.copy()
```

Mentioned columns cast, listed_in, country and director have nested list of values and these need to converted in single items

```
#spliting cast column to get separate item in each column according to title index

cast_split=df["cast"].apply(lambda x: str(x).split(",")).tolist()
cast_new=pd.DataFrame(cast_split,index=df["title"])
cast_new
```

title	0	1	2	3	4	5	6
Dick Johnson Is Dead	Other cast	None	None	None	None	None	None
Blood & Water	Ama Qamata	Khosi Ngema	Gail Mabalane	Thabang Molaba	Dillon Windvogel	Natasha Thahane	Arno Greeff
Ganglands	Sami Bouajila	Tracy Gotoas	Samuel Jouy	Nabiha Akkari	Sofia Lesaffre	Salim Kechiouche	Noureddine Farihi
Jailbirds New Orleans	Other cast	None	None	None	None	None	None
Kota Factory	Mayur More	Jitendra Kumar	Ranjan Raj	Alam Khan	Ahsaas Channa	Revathi Pillai	Urvi Singh

```
#stacking cast column to convert columns to rows for each single item

cast_stack=cast_new.stack()
cast_final=pd.DataFrame(cast_stack)
cast_final
```

title		0
Dick Johnson Is Dead	**0**	Other cast
Blood & Water	**0**	Ama Qamata
	1	Khosi Ngema
	2	Gail Mabalane
	3	Thabang Molaba
...	**...**	...
Zubaan	**3**	Manish Chaudhary
	4	Meghna Malik
	5	Malkeet Rauni
	6	Anita Shabdish
	7	Chittaranjan Tripathy

64841 rows × 1 columns

```
#renaming default column 0 to cast_final
cast_final.rename({0:"casts"},axis=1,inplace=True)
```

```
#spliting listed_in column to get separate item in each column according to title index

listed_in_split=df["listed_in"].apply(lambda x: str(x).split(",")).tolist()
listed_in_new=pd.DataFrame(listed_in_split,index=df["title"])
listed_in_new
```

title	0	1	2
Dick Johnson Is Dead	Documentaries	None	None
Blood & Water	International TV Shows	TV Dramas	TV Mysteries
Ganglands	Crime TV Shows	International TV Shows	TV Action & Adventure
Jailbirds New Orleans	Docuseries	Reality TV	None
Kota Factory	International TV Shows	Romantic TV Shows	TV Comedies
...	...	...	...
Zodiac	Cult Movies	Dramas	Thrillers
Zombie Dumb	Kids' TV	Korean TV Shows	TV Comedies
Zombieland	Comedies	Horror Movies	None
Zoom	Children & Family Movies	Comedies	None
Zubaan	Dramas	International Movies	Music & Musicals

8790 rows × 3 columns

```
#stacking listed_in column to convert columns to rows for each single item

listed_in_stack=listed_in_new.stack()
genres_final=pd.DataFrame(listed_in_stack)
genres_final
```

		0
title		
Dick Johnson Is Dead	**0**	Documentaries
Blood & Water	**0**	International TV Shows
	1	TV Dramas
	2	TV Mysteries

```
1 #renaming default column 0 to genres_final
2 genres_final.rename({0:"genres"},axis=1,inplace=True)
```

Zoom	**0**	Children & Family Movies

```
1 #spliting director column to get separate item in each column according to title index
2
3 director_split=df["director"].apply(lambda x: str(x).split(",")).tolist()
4 director_new=pd.DataFrame(director_split,index=df["title"])
5 director_new
```

	0	1	2	3	4	5	6	7	8	9	10	1
title												
Dick Johnson Is Dead	Kirsten Johnson	None	None	None	None	None	None	None	None	None	None	Nor
Blood & Water	Other director	None	None	None	None	None	None	None	None	None	None	Nor
Ganglands	Julien Leclercq	None	None	None	None	None	None	None	None	None	None	Nor
Jailbirds New Orleans	Other director	None	None	None	None	None	None	None	None	None	None	Nor
Kota Factory	Other director	None	None	None	None	None	None	None	None	None	None	Nor
...	...	...	...	...	...	...	...	...	...	...	...	
Zodiac	David Fincher	None	None	None	None	None	None	None	None	None	None	Nor

```
1 #stacking director column to convert columns to rows for each single item
2
3 director_new_stack=director_new.stack()
4 director_final=pd.DataFrame(director_new_stack)
5 director_final
```

title	0	
Dick Johnson Is Dead	**0**	Kirsten Johnson
Blood & Water	**0**	Other director
Ganglands	**0**	Julien Leclercq
Jailbirds New Orleans	**0**	Other director
Kota Factory	**0**	Other director
...	**...**	...
Zodiac	**0**	David Fincher
Zombie Dumb	**0**	Other director
Zombieland	**0**	Ruben Fleischer
Zoom	**0**	Peter Hewitt
Zubaan	**0**	Mozez Singh

9595 rows × 1 columns

```
#renaming default column 0 to director_final
director_final.rename({0:"directors"},axis=1,inplace=True)
```

```
#spliting country column to get separate item in each column according to title index

country_split=df["country"].apply(lambda x: str(x).split(",")).tolist()
country_new=pd.DataFrame(country_split,index=df["title"])
country_new
```

	0	1	2	3	4	5	6	7	8	9	10	11
title												
Dick Johnson Is Dead	United States	None	None	None	None	None	None	None	None	None	None	None

```
#stacking country column to convert columns to rows for each single item

country_stack=country_new.stack()
country_final=pd.DataFrame(country_stack)
country_final
```

		0
title		
Dick Johnson Is Dead	**0**	United States
Blood & Water	**0**	South Africa
Ganglands	**0**	Other country
Jailbirds New Orleans	**0**	Other country
Kota Factory	**0**	India
...	**...**	...
Zodiac	**0**	United States
Zombie Dumb	**0**	Other country
Zombieland	**0**	United States
Zoom	**0**	United States
Zubaan	**0**	India

10833 rows × 1 columns

```
#renaming default column 0 to country_final

country_final.rename({0:"countries"},axis=1,inplace=True)
country_final.reset_index()
country_final
```

title	countries	
Dick Johnson Is Dead	**0**	United States
Blood & Water	**0**	South Africa
Ganglands	**0**	Other country
Jailbirds New Orleans	**0**	Other country
Kota Factory	**0**	India
...	**...**	...
Zodiac	**0**	United States
Zombie Dumb	**0**	Other country

```
#Merging all the stacked columns cast_final,genres_final,director_final,country_final to m

df=df.merge(cast_final,how='inner',on="title")
df=df.merge(genres_final,how='inner',on="title")
df=df.merge(director_final,how='inner',on="title")
df=df.merge(country_final,how='inner',on="title")
```

```
#checking null values for all the columns
df.isna().sum()
```

```
show_id           0
type              0
title             0
director          0
cast              0
country           0
release_year      0
listed_in         0
month_added       0
year_added        0
day_added         0
Total_season      0
Total_duration    0
maturity_rating   0
casts             0
genres            0
directors         0
countries         0
dtype: int64
```

```
# Now main columns director,cast,country,listed_in are converted to single items so droppp

df.drop(["director","cast","country","listed_in"],axis=1,inplace=True)
```

```
1 df.head(2)
```

	show_id	type	title	release_year	month_added	year_added	day_added	Total_seas
0	s1	Movie	Dick Johnson Is Dead	2020	9	2021	25	
1	s2	TV Show	Blood & Water	2021	9	2021	24	

```
1 df.shape
```

```
(201837, 14)
```

```
1 original_data["type"].value_counts()
```

```
Movie      6126
TV Show    2664
Name: type, dtype: int64
```

There are more movies released in Netflix than TV Shows

```
1 original_data["maturity_rating"].value_counts()
```

```
Adults    4089
Teens     2647
Kids-P    1154
Kids       567
Kids>7     333
Name: maturity_rating, dtype: int64
```

There are more content for Adults and Teens in Netflix

```
1 original_data["release_year"].unique()
```

```
array([2020, 2021, 1993, 2018, 1996, 1998, 1997, 2010, 2013, 2017, 1975,
       1978, 1983, 1987, 2012, 2001, 2014, 2002, 2003, 2004, 2011, 2008,
       2009, 2007, 2005, 2006, 1994, 2015, 2019, 2016, 1982, 1989, 1990,
       1991, 1999, 1986, 1992, 1984, 1980, 1961, 2000, 1995, 1985, 1976,
       1959, 1988, 1981, 1972, 1964, 1945, 1954, 1979, 1958, 1956, 1963,
       1970, 1973, 1925, 1974, 1960, 1966, 1971, 1962, 1969, 1977, 1967,
       1968, 1965, 1946, 1942, 1955, 1944, 1947, 1943])
```

Dataset contains Movies/TV Shows which got released from year 1943 to 2021

```
1 df.loc[df.duplicated()]
```

	show_id	type	title	release_year	month_added	year_added	day_added	Total
39354	s1632	Movie	Rust Creek	2018	11	2020	30	
135651	s6014	Movie	300 Miles to Heaven	1989	10	2019	1	
135652	s6014	Movie	300 Miles to Heaven	1989	10	2019	1	
135653	s6014	Movie	300 Miles to Heaven	1989	10	2019	1	
135654	s6014	Movie	300 Miles to Heaven	1989	10	2019	1	
135655	s6014	Movie	300 Miles to Heaven	1989	10	2019	1	
135656	s6014	Movie	300 Miles to Heaven	1989	10	2019	1	

```
1 #Dropping duplicated values
2 df.drop_duplicates(keep="first",inplace=True)
```

```
1 np.any(df.duplicated())
```

```
False
```

```
1 df.head()
```

	show_id	type	title	release_year	month_added	year_added	day_added	Total_seas
0	s1	Movie	Dick Johnson Is Dead	2020	9	2021	25	
1	s2	TV Show	Blood & Water	2021	9	2021	24	
2	s2	TV Show	Blood & Water	2021	9	2021	24	
3	s2	TV Show	Blood & Water	2021	9	2021	24	

```
1 original_data["Total_season"].value_counts()[1:10]
```

```
1    1791
2     421
3     198
4      94
5      64
6      33
7      23
8      17
9       9
Name: Total_season, dtype: int64
```

There are more TV Shows which only have 1 season

```
1 original_data["Total_duration"].value_counts()[1:10]
```

```
90     152
97     146
94     146
93     146
91     144
95     137
96     130
92     129
102    122
Name: Total_duration, dtype: int64
```

There are more movies which have duration between 90 to 100 mins

```
1 df["countries"].unique()
```

```
array(['United States', 'South Africa', 'Other country', 'India',
       ' Ghana', ' Burkina Faso', ' United Kingdom', ' Germany',
       ' Ethiopia', 'United Kingdom', 'Germany', ' Czech Republic',
       'Mexico', 'Turkey', 'Australia', ' India', ' France', 'Finland',
       'China', ' Canada', ' United States', ' Japan', 'Nigeria', 'Japan',
```

```
       'Spain', 'France', 'Belgium', 'South Korea', ' Singapore',
       ' Australia', ' Mexico', ' Italy', ' Romania', 'Argentina',
       ' Venezuela', ' Hong Kong', 'Russia', 'Canada', 'Hong Kong',
       ' China', 'Italy', '', ' South Korea', 'Ireland', ' Nepal',
       'New Zealand', ' Brazil', ' Greece', 'Jordan', 'Colombia',
       'Switzerland', 'Israel', 'Brazil', ' Spain', 'Taiwan', ' Nigeria',
       'Bulgaria', ' Algeria', 'Poland', ' Israel', 'Saudi Arabia',
       'Thailand', 'Indonesia', 'Egypt', ' Denmark', ' Switzerland',
       'Kuwait', ' Netherlands', ' Belgium', 'Malaysia', ' New Zealand',
       'Vietnam', ' Hungary', 'Sweden', 'Lebanon', 'Romania', ' Syria',
       'Philippines', 'Iceland', 'Denmark', ' Indonesia',
       ' United Arab Emirates', 'United Arab Emirates', ' Colombia',
       'Netherlands', ' Bulgaria', 'Norway', 'Syria', ' Lebanon',
       ' Qatar', 'Mauritius', ' South Africa', 'Austria', ' Russia',
       'Czech Republic', ' Taiwan', 'Cameroon', ' Palestine', 'Uruguay',
       ' Saudi Arabia', ' Poland', 'Kenya', ' Argentina', ' Chile',
       ' Thailand', 'Chile', 'Luxembourg', ' Cambodia', 'Bangladesh',
       'Portugal', ' Ireland', 'Hungary', ' Cayman Islands', 'Senegal',
       ' Finland', ' Iceland', 'Singapore', ' Serbia', ' Malta',
       ' Luxembourg', ' Norway', 'Serbia', 'Namibia', ' Kenya', ' Angola',
       ' Philippines', 'Peru', 'Mozambique', 'Belarus', 'Ghana', ' Egypt',
       ' Jordan', 'Zimbabwe', ' Turkey', 'Puerto Rico', 'Pakistan',
       'Cyprus', ' Malaysia', ' Sweden', ' Uruguay', ' Guatemala',
       ' Senegal', ' Portugal', ' Peru', ' Iraq', ' Malawi', 'Paraguay',
       ' Pakistan', 'Croatia', ' Iran', ' West Germany', ' Austria',
       ' Albania', 'Cambodia', ' Kuwait', 'Georgia', 'Soviet Union',
       ' Soviet Union', 'Greece', ' Morocco', ' Slovakia', 'West Germany',
       ' Ukraine', ' Bermuda', ' Ecuador', 'Iran', ' Armenia',
       ' Mongolia', ' Bahamas', ' Sri Lanka', ' Bangladesh', ' Zimbabwe',
       ' Latvia', ' Liechtenstein', 'Venezuela', ' Cuba', ' Nicaragua',
       ' Croatia', 'Slovenia', ' Dominican Republic', ' Samoa',
       ' Azerbaijan', ' Botswana', ' Vatican City', 'Guatemala',
       'Ukraine', 'Jamaica', ' Kazakhstan', ' Lithuania', ' Afghanistan',
       'Somalia', ' Sudan', ' Panama', ' Slovenia', ' Namibia', ' Uganda',
       ' East Germany', ' Montenegro'], dtype=object)
```

'United States' and ' United States' are treated as 2 different country values, likewise 'United Kingdom' and ' United Kingdom' are 2 different country values, whitespace need to be trimmed, same can be observed in genre,director and cast columns.

```
1 #trimming whitespace in country column using strip
2 df["countries"]=df["countries"].apply(lambda x: str(x).strip())
3 df["countries"].unique()
```

```
array(['United States', 'South Africa', 'Other country', 'India', 'Ghana',
       'Burkina Faso', 'United Kingdom', 'Germany', 'Ethiopia',
       'Czech Republic', 'Mexico', 'Turkey', 'Australia', 'France',
       'Finland', 'China', 'Canada', 'Japan', 'Nigeria', 'Spain',
       'Belgium', 'South Korea', 'Singapore', 'Italy', 'Romania',
       'Argentina', 'Venezuela', 'Hong Kong', 'Russia', '', 'Ireland',
       'Nepal', 'New Zealand', 'Brazil', 'Greece', 'Jordan', 'Colombia',
       'Switzerland', 'Israel', 'Taiwan', 'Bulgaria', 'Algeria', 'Poland',
       'Saudi Arabia', 'Thailand', 'Indonesia', 'Egypt', 'Denmark',
```

```
       'Kuwait', 'Netherlands', 'Malaysia', 'Vietnam', 'Hungary',
       'Sweden', 'Lebanon', 'Syria', 'Philippines', 'Iceland',
       'United Arab Emirates', 'Norway', 'Qatar', 'Mauritius', 'Austria',
       'Cameroon', 'Palestine', 'Uruguay', 'Kenya', 'Chile', 'Luxembourg',
       'Cambodia', 'Bangladesh', 'Portugal', 'Cayman Islands', 'Senegal',
       'Serbia', 'Malta', 'Namibia', 'Angola', 'Peru', 'Mozambique',
       'Belarus', 'Zimbabwe', 'Puerto Rico', 'Pakistan', 'Cyprus',
       'Guatemala', 'Iraq', 'Malawi', 'Paraguay', 'Croatia', 'Iran',
       'West Germany', 'Albania', 'Georgia', 'Soviet Union', 'Morocco',
       'Slovakia', 'Ukraine', 'Bermuda', 'Ecuador', 'Armenia', 'Mongolia',
       'Bahamas', 'Sri Lanka', 'Latvia', 'Liechtenstein', 'Cuba',
       'Nicaragua', 'Slovenia', 'Dominican Republic', 'Samoa',
       'Azerbaijan', 'Botswana', 'Vatican City', 'Jamaica', 'Kazakhstan',
       'Lithuania', 'Afghanistan', 'Somalia', 'Sudan', 'Panama', 'Uganda',
       'East Germany', 'Montenegro'], dtype=object)
```

```
1 df["genres"].unique()
```

```
array(['Documentaries', 'International TV Shows', ' TV Dramas',
       ' TV Mysteries', 'Crime TV Shows', ' International TV Shows',
       ' TV Action & Adventure', 'Docuseries', ' Reality TV',
       ' Romantic TV Shows', ' TV Comedies', 'TV Dramas', ' TV Horror',
       'Children & Family Movies', 'Dramas', ' Independent Movies',
       ' International Movies', 'British TV Shows', 'Comedies', ' Dramas',
       ' Docuseries', ' Comedies', ' Crime TV Shows', 'TV Comedies',
       ' Spanish-Language TV Shows', 'Thrillers', ' Romantic Movies',
       ' Music & Musicals', 'Horror Movies', ' Sci-Fi & Fantasy',
       ' TV Thrillers', "Kids' TV", ' Thrillers', 'Action & Adventure',
       ' TV Sci-Fi & Fantasy', ' Classic Movies', ' Horror Movies',
       ' Anime Features', 'Reality TV', ' Sports Movies', 'Anime Series',
       " Kids' TV", 'International Movies', ' Korean TV Shows',
       'Sci-Fi & Fantasy', ' Science & Nature TV', ' Teen TV Shows',
       ' Cult Movies', 'Classic Movies', 'TV Shows',
       ' Children & Family Movies', ' Faith & Spirituality',
       ' LGBTQ Movies', 'Stand-Up Comedy', 'TV Action & Adventure',
       'Movies', 'Stand-Up Comedy & Talk Shows', 'Classic & Cult TV',
       ' Stand-Up Comedy & Talk Shows', 'Anime Features',
       ' Documentaries', 'Romantic TV Shows', 'Cult Movies',
       'Independent Movies', 'TV Horror', 'Spanish-Language TV Shows',
       ' Classic & Cult TV', 'Music & Musicals', 'Romantic Movies',
       'LGBTQ Movies', ' Stand-Up Comedy', 'TV Sci-Fi & Fantasy',
       'Sports Movies'], dtype=object)
```

```
1 #trimming whitespace in genre column using strip
2 df["genres"]=df["genres"].apply(lambda x: str(x).strip())
3 df["genres"].unique()
```

```
array(['Documentaries', 'International TV Shows', 'TV Dramas',
       'TV Mysteries', 'Crime TV Shows', 'TV Action & Adventure',
       'Docuseries', 'Reality TV', 'Romantic TV Shows', 'TV Comedies',
       'TV Horror', 'Children & Family Movies', 'Dramas',
       'Independent Movies', 'International Movies', 'British TV Shows',
       'Comedies', 'Spanish-Language TV Shows', 'Thrillers',
       'Romantic Movies', 'Music & Musicals', 'Horror Movies',
```

```
       'Sci-Fi & Fantasy', 'TV Thrillers', "Kids' TV",
       'Action & Adventure', 'TV Sci-Fi & Fantasy', 'Classic Movies',
       'Anime Features', 'Sports Movies', 'Anime Series',
       'Korean TV Shows', 'Science & Nature TV', 'Teen TV Shows',
       'Cult Movies', 'TV Shows', 'Faith & Spirituality', 'LGBTQ Movies',
       'Stand-Up Comedy', 'Movies', 'Stand-Up Comedy & Talk Shows',
       'Classic & Cult TV'], dtype=object)
```

```
df["directors"].nunique()
```

```
5119
```

```
df["directors"]=df["directors"].apply(lambda x: str(x).strip())
df["directors"].nunique()
```

```
4992
```

```
df["casts"].nunique()
```

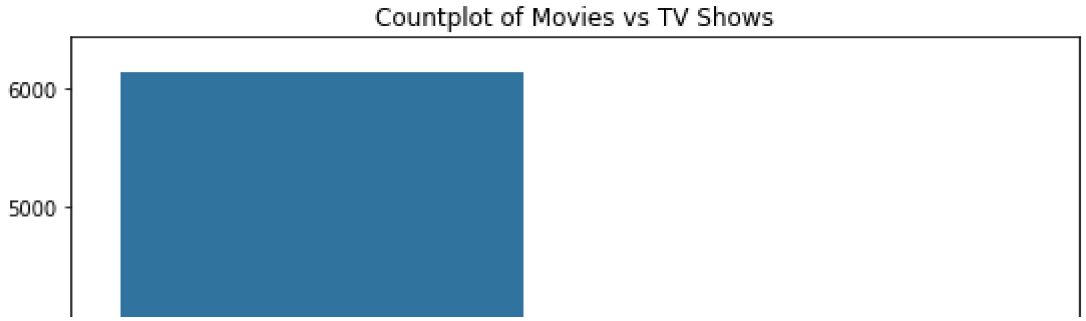
```
39249
```

```
df["casts"]=df["casts"].apply(lambda x : str(x).strip())
df["casts"].nunique()
```

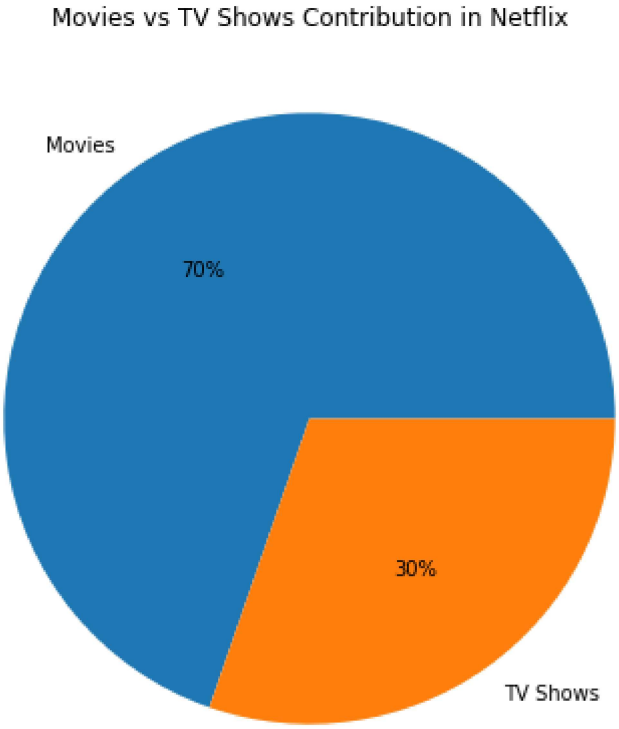
```
36393
```

Univariate Analysis

```
plt.figure(figsize=(9,7))
sns.countplot(data=original_data,x="type")
plt.title("Countplot of Movies vs TV Shows")
plt.show()
```

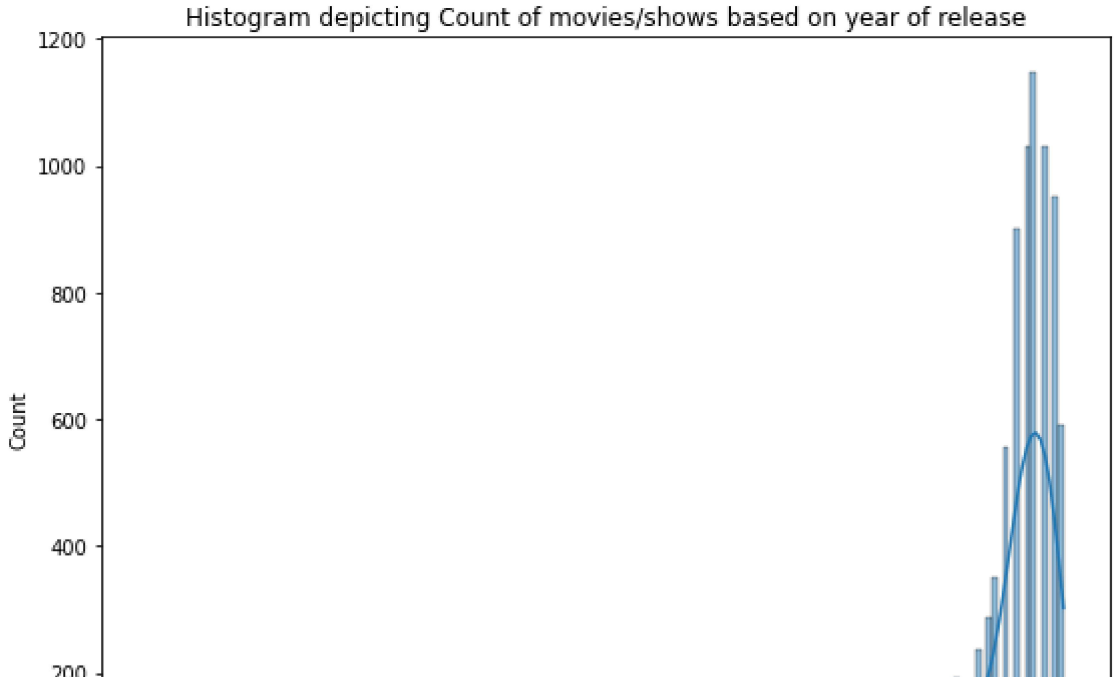



```
plt.figure(figsize=(10,7))
plt.pie(original_data["type"].value_counts().tolist(),labels=["Movies","TV Shows"],autopct
plt.title("Movies vs TV Shows Contribution in Netflix")
plt.show()
```

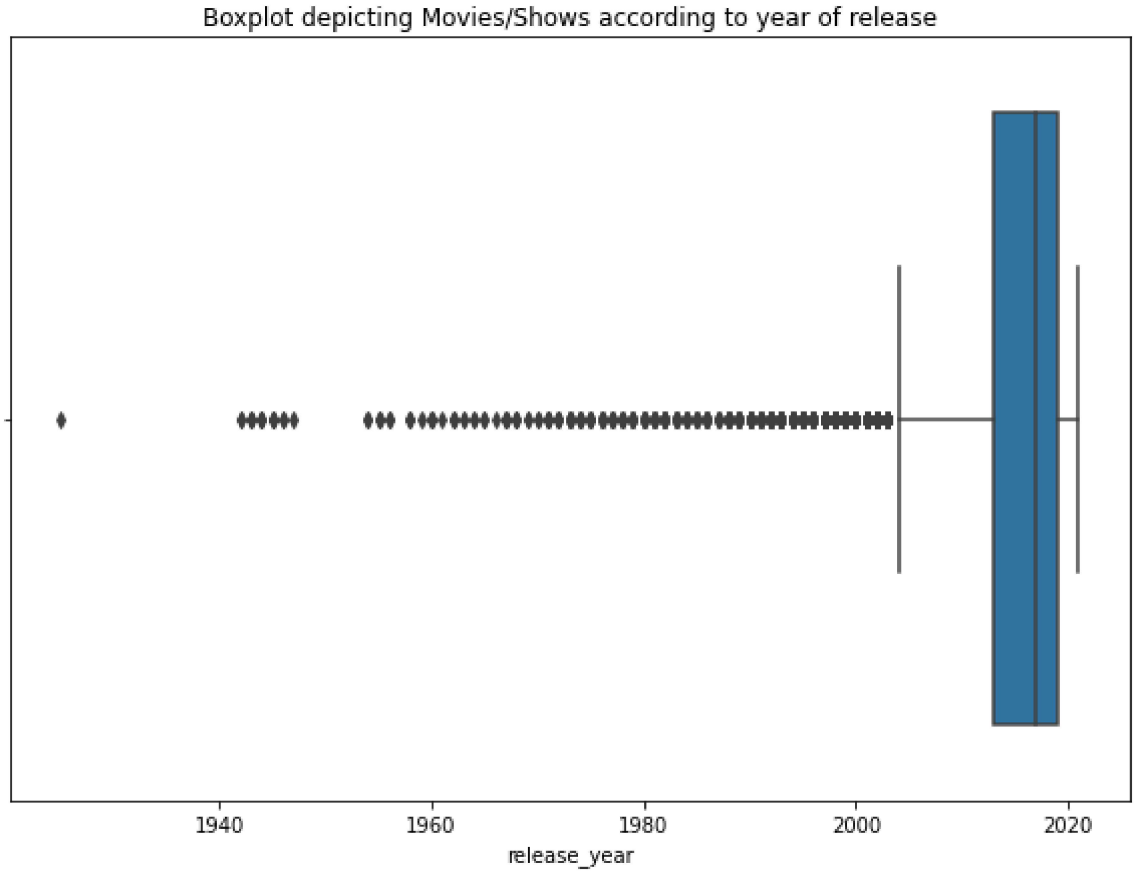


Netfix comprises around 70% movies and remaining 30% denote TV Shows

```
plt.figure(figsize=(9,7))
sns.histplot(data=original_data,x="release_year",kde=True)
plt.title("Histogram depicting Count of movies/shows based on year of release")
plt.show()
```



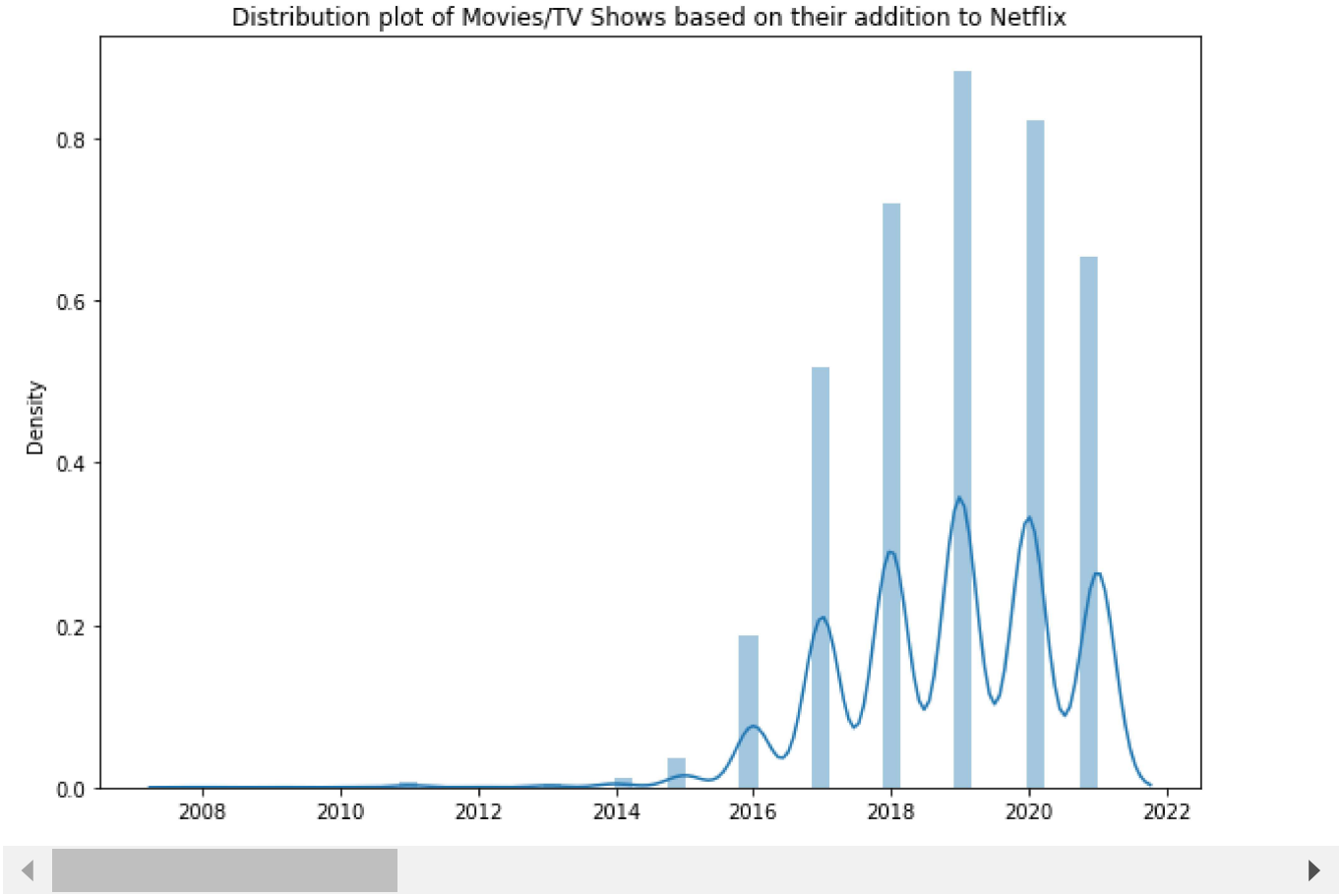

```
1 plt.figure(figsize=(10,7))
2 sns.boxplot(data=original_data,x="release_year")
3 plt.title("Boxplot depicting Movies/Shows according to year of release")
4 plt.show()
```



From above graph we can perceive that movies and TV Shows were predominantly released during 2000-2020 year

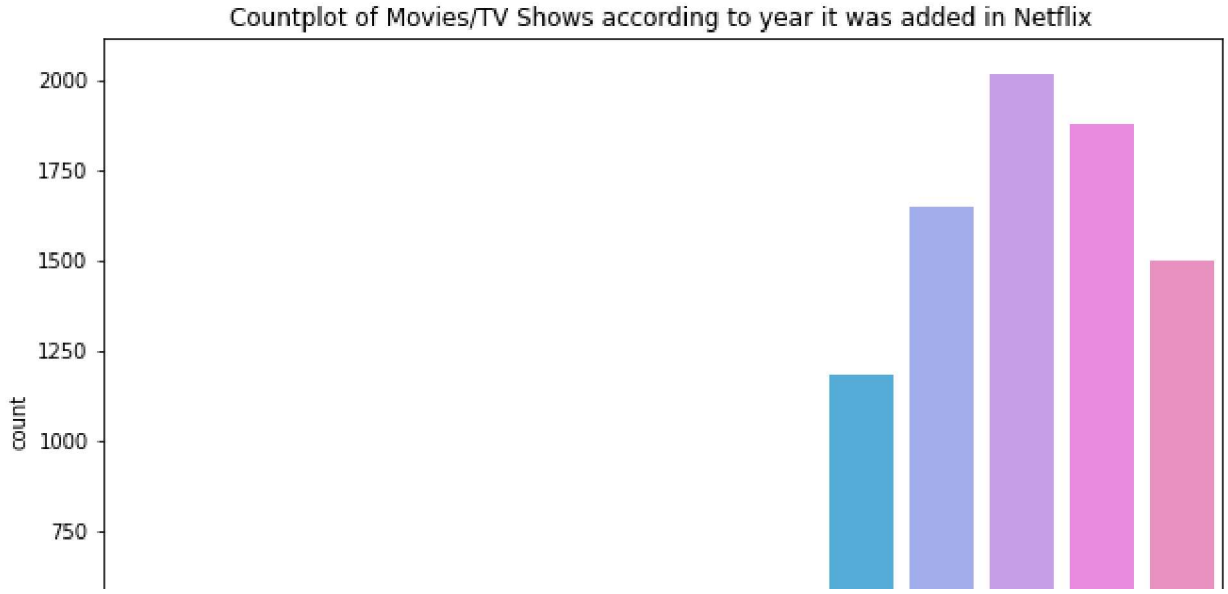
```
1 plt.figure(figsize=(10,7))
2 sns.distplot(x=original_data["year_added"])
3 plt.title("Distribution plot of Movies/TV Shows based on their addition to Netflix")
4 plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:2619: FutureWarning: `di
  warnings.warn(msg, FutureWarning)
```



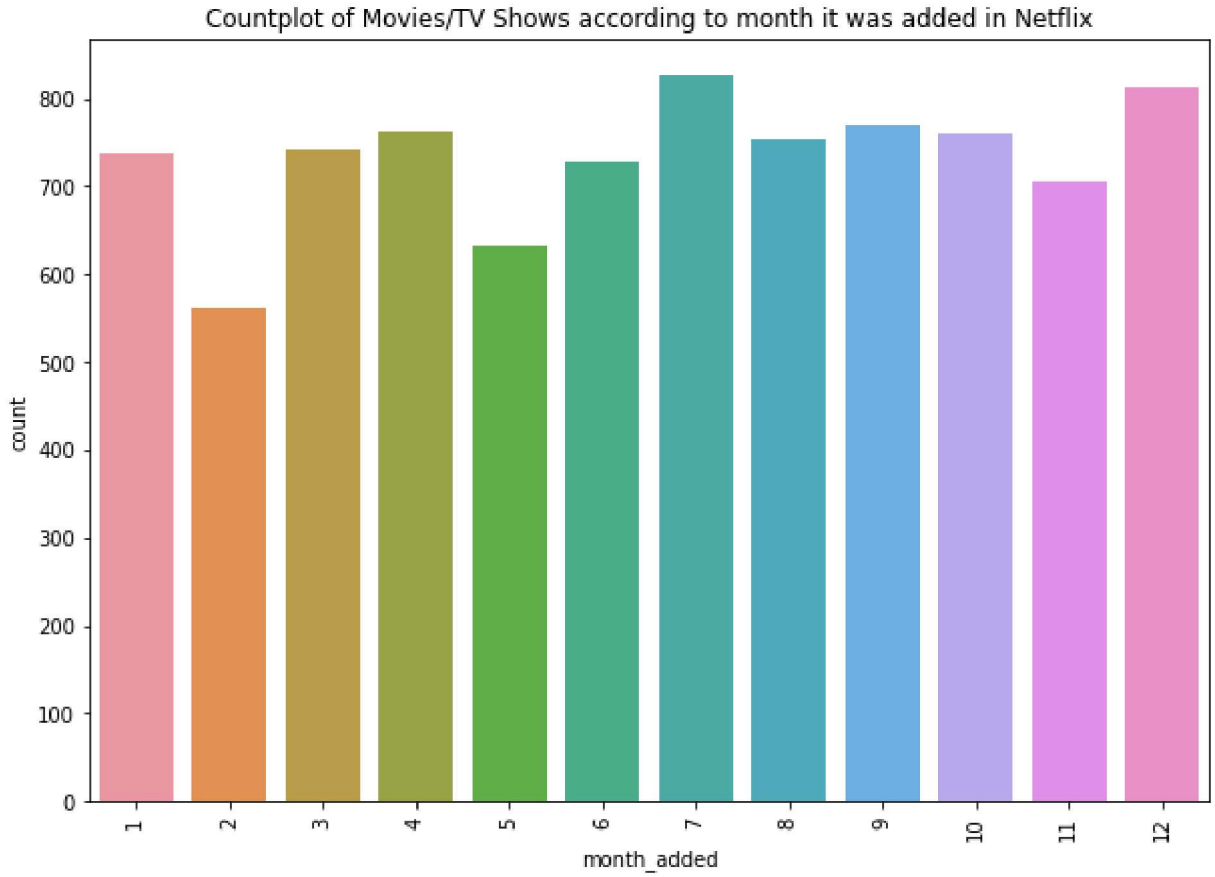
Max movies are added in Netflix in year 2019

```
1 plt.figure(figsize=(10,7))
2 sns.countplot(data=original_data,x="year_added")
3 plt.xticks(rotation=90)
4 plt.title("Countplot of Movies/TV Shows according to year it was added in Netflix")
5 plt.show()
```



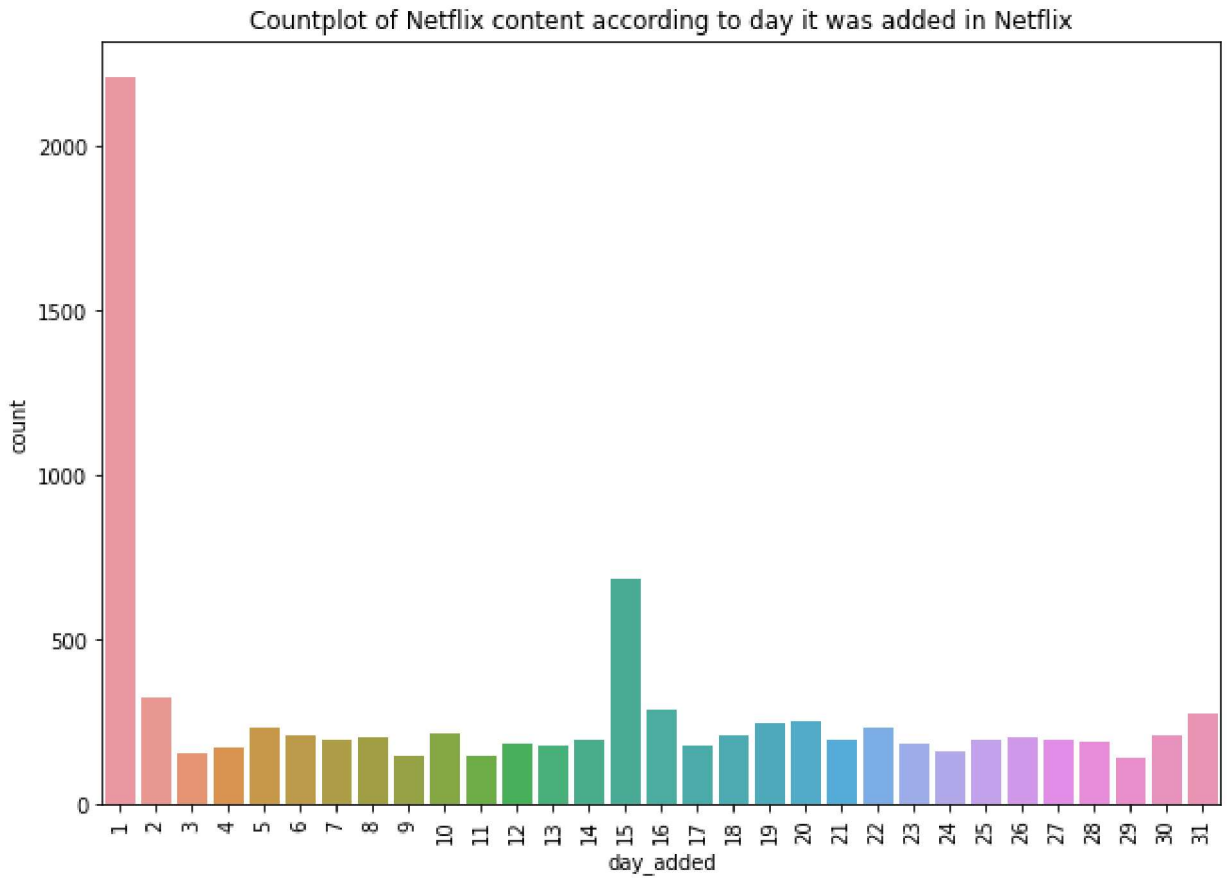
Most of the Movies/TV Shows are added on Netflix from 2017 onwards

```
1 plt.figure(figsize=(10,7))
2 sns.countplot(data=original_data,x="month_added")
3 plt.xticks(rotation=90)
4 plt.title("Countplot of Movies/TV Shows according to month it was added in Netflix")
5 plt.show()
```



Most of the TV Shows were added in July and December month but there does not seems to be any pattern on month feature

```
1 plt.figure(figsize=(10,7))
2 sns.countplot(data=original_data,x="day_added")
3 plt.xticks(rotation=90)
4 plt.title("Countplot of Netflix content according to day it was added in Netflix")
5 plt.show()
```



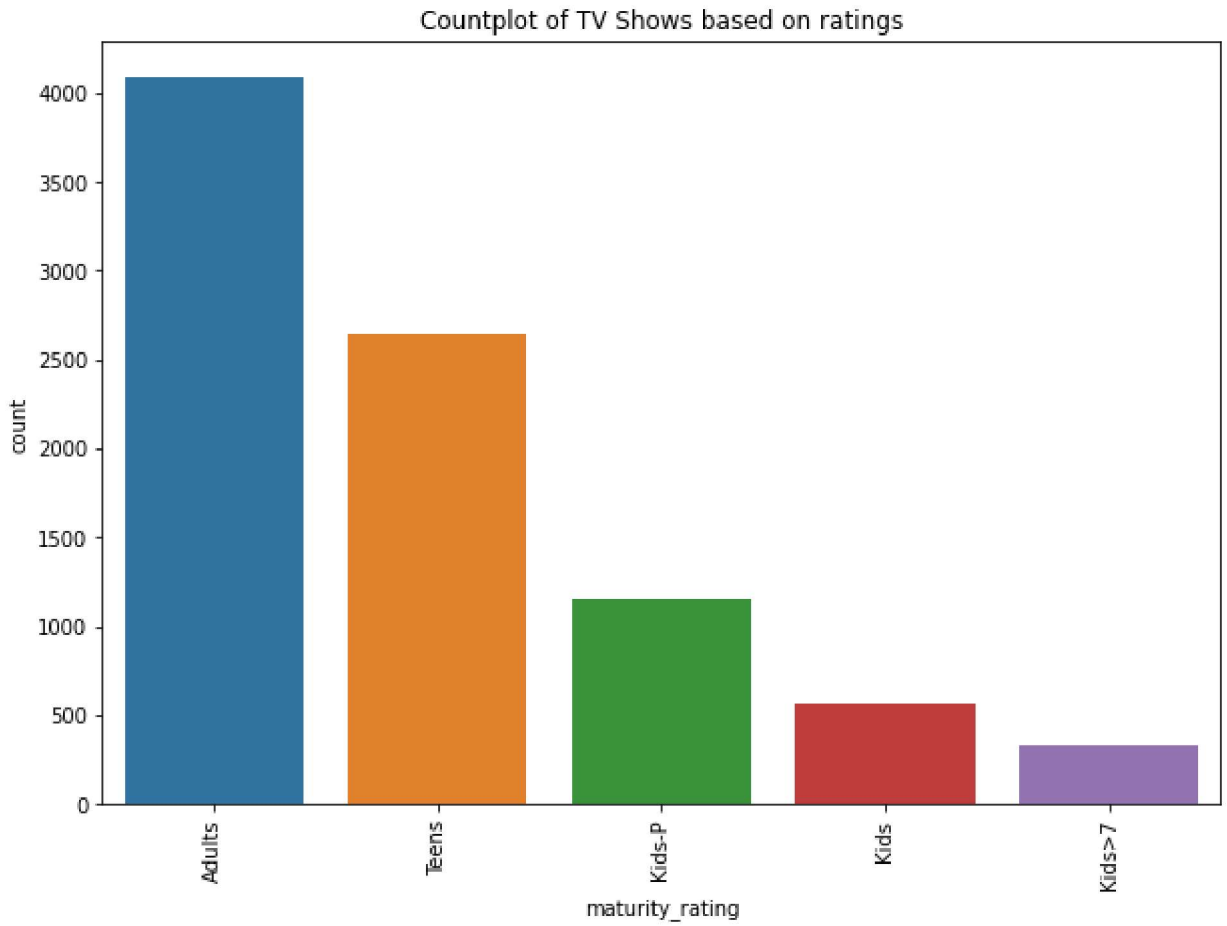
Most of the content in Netflix are either added on 1st of every month or 15th of every month

```
1 original_data["maturity_rating"].value_counts()
```

```
Adults    4089
Teens     2647
Kids-P    1154
Kids       567
Kids>7     333
Name: maturity_rating, dtype: int64
```

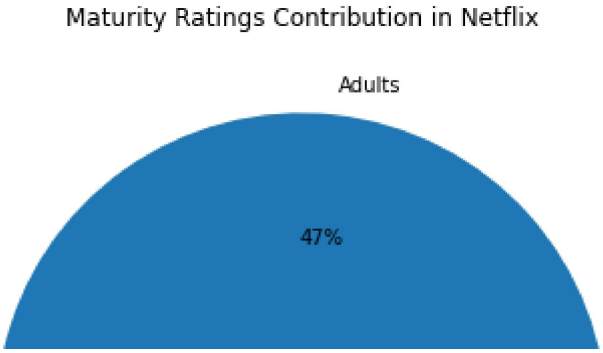
```
1 plt.figure(figsize=(10,7))
2 sns.countplot(data=original_data,x="maturity_rating",order=original_data['maturity_rating'
3 plt.xticks(rotation=90)
```

```
plt.title("Countplot of TV Shows based on ratings")
plt.show()
```



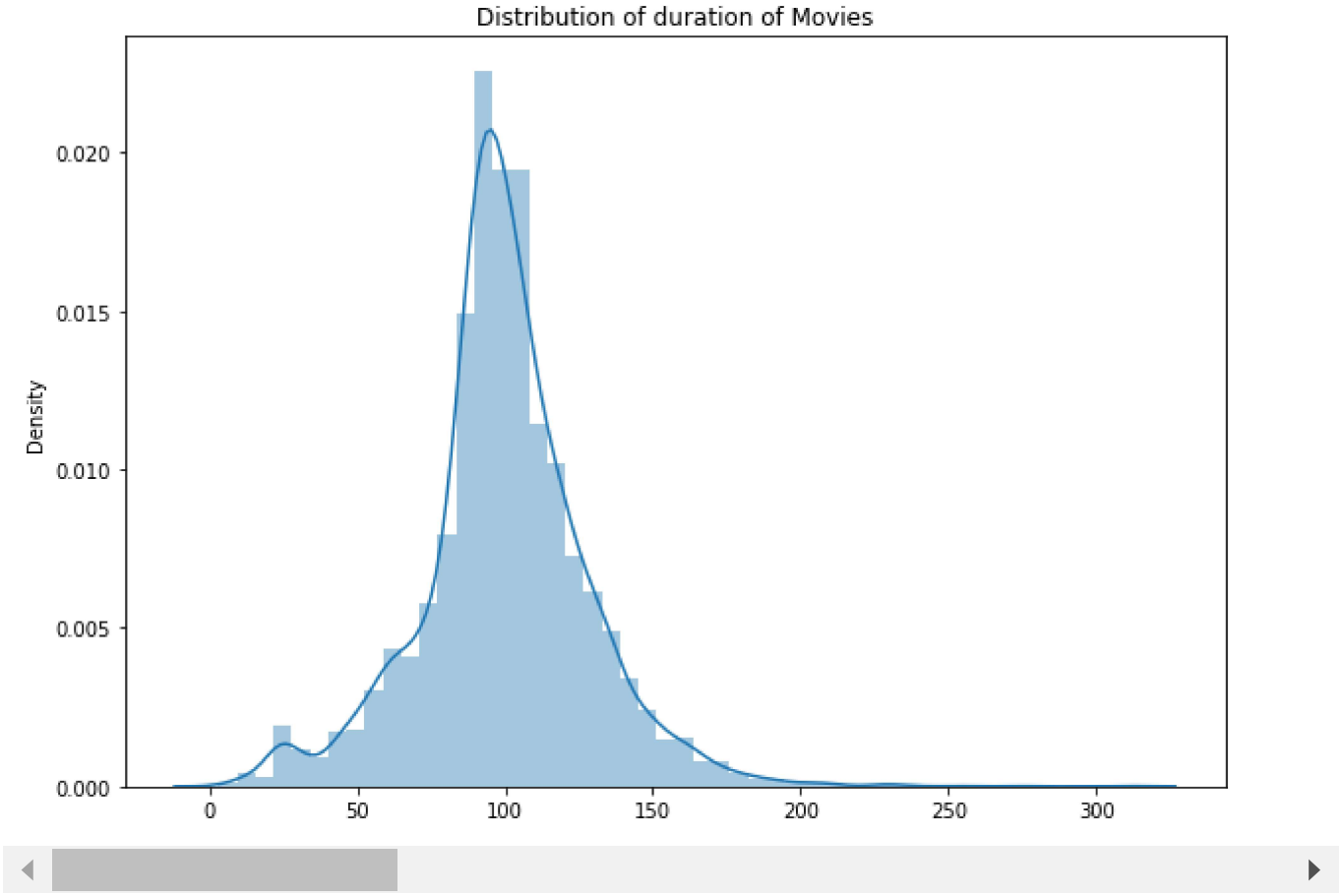
Maximum content are for Adults and Teens

```
plt.figure(figsize=(10,7))
plt.pie(original_data["maturity_rating"].value_counts().tolist(),labels=["Adults","Teens",
plt.title("Maturity Ratings Contribution in Netflix")
plt.show()
```




```
1 plt.figure(figsize=(10,7))
2 sns.distplot(x=original_data[original_data.Total_duration!=0]["Total_duration"])
3 plt.title("Distribution of duration of Movies")
4 plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:2619: FutureWarning: `di
  warnings.warn(msg, FutureWarning)
```



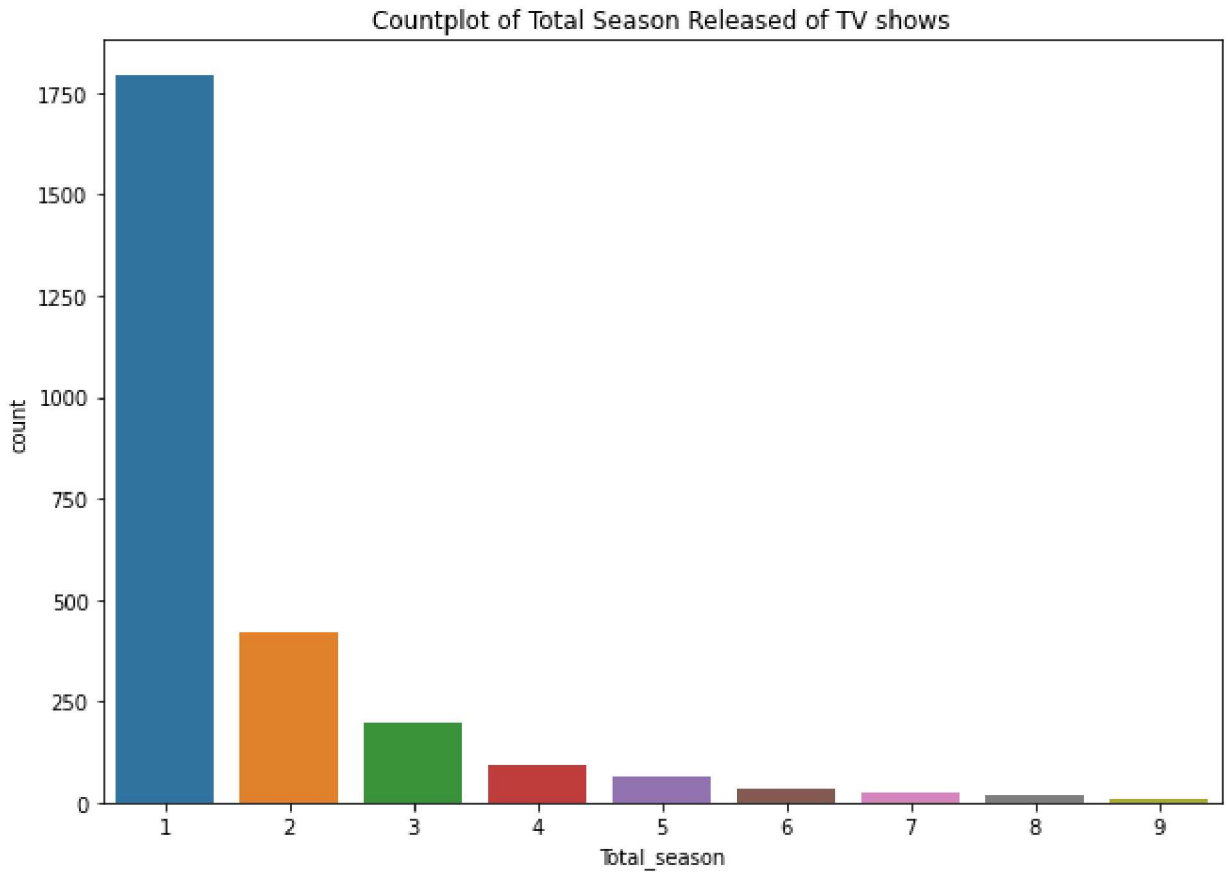
Maximum movies fall under the duration between 90 to 110 mins

```
1 original_data["Total_season"].value_counts()[1:]
```

```
2     421
3     198
4      94
```

```
5       64
6       33
7       23
8       17
9        9
10       6
13       2
15       2
12       2
17       1
11       1
Name: Total_season, dtype: int64
```

```
1 plt.figure(figsize=(10,7))
2 sns.countplot(x=original_data["Total_season"],order=original_data["Total_season"].value_co
3 plt.title("Countplot of Total Season Released of TV shows")
4 plt.show()
```

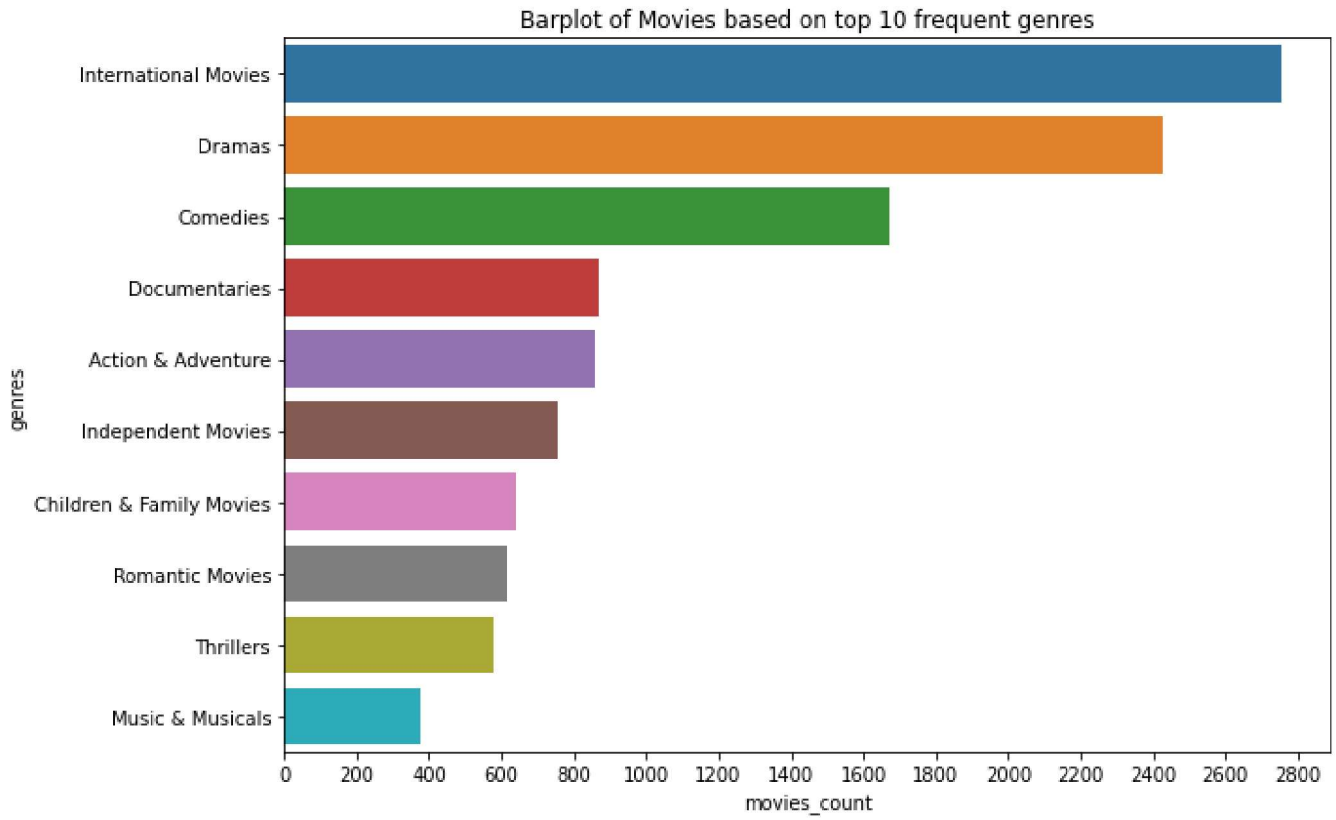


Netflix has more shows which only have season 1 and season 2

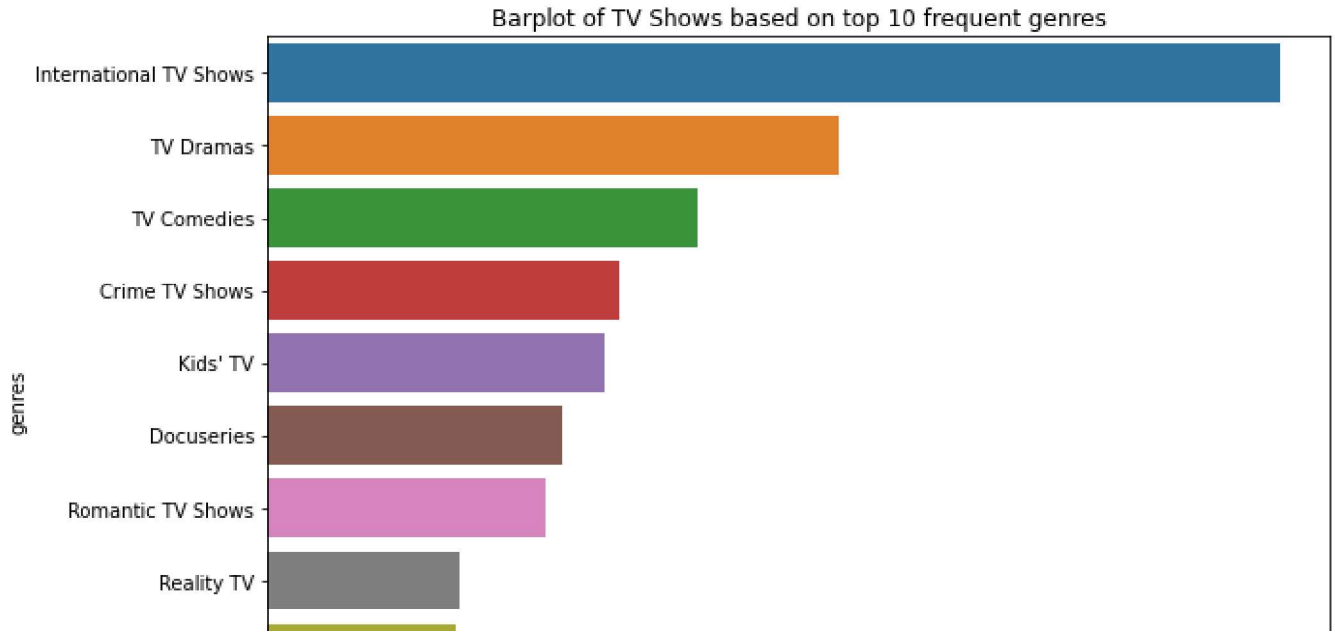
Bivariate Analysis

```
1 TV_Show=df.loc[df["type"]=="TV Show"]
2 Movies=df.loc[df["type"]=="Movie"]
```

```
Unique_Movie_genres=Movies.groupby(["genres"])["title"].unique().reset_index()
Unique_Movie_genres["movies_count"]=Unique_Movie_genres["title"].apply(lambda x: len(x))

plt.figure(figsize=(10,7))
sns.barplot(data=Unique_Movie_genres.sort_values("movies_count",ascending=False)[:10],x="m
plt.xticks(np.arange(0,3000,step=200))
plt.title("Barplot of Movies based on top 10 frequent genres")
plt.show()
```




```
Unique_TVshow_genres=TV_Show.groupby(["genres"])["title"].unique().reset_index()
Unique_TVshow_genres["tvshow_count"]=Unique_TVshow_genres["title"].apply(lambda x: len(x))

plt.figure(figsize=(10,7))
sns.barplot(data=Unique_TVshow_genres.sort_values("tvshow_count",ascending=False)[:10],x="
plt.xticks(np.arange(0,1400,step=150))
plt.title("Barplot of TV Shows based on top 10 frequent genres")
plt.show()
```



There are more Drama,Comedy and International Movies/TV Shows compared to other genres present in Netflix


```
1 Unique_Movie_Directors=Movies.groupby(["directors"])["title"].unique().reset_index()
2 Unique_Movie_Directors["movies_count"]=Unique_Movie_Directors["title"].apply(lambda x: len
3
4 plt.figure(figsize=(10,7))
5 sns.barplot(data=Unique_Movie_Directors.sort_values("movies_count",ascending=False)[1:10],
6 plt.title("Barplot of Movies based on top 10 frequent directors")
7 plt.show()
```

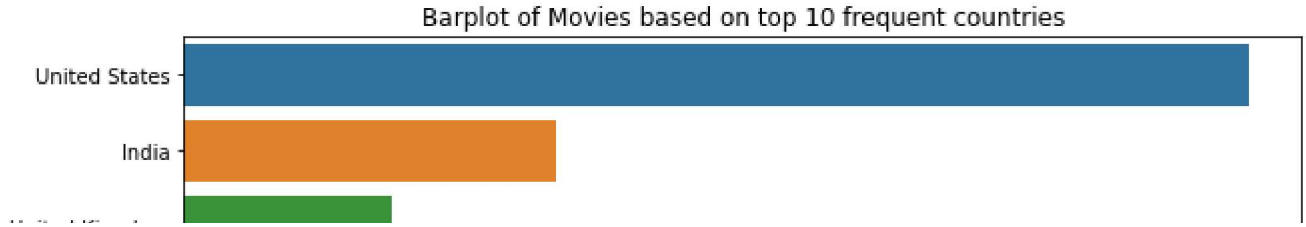
Rajiv Chilaka and Jan Suter directed most of the movies released in Netflix

```
1 Unique_TVShows_Directors=TV_Show.groupby(["directors"])["title"].unique().reset_index()
2 Unique_TVShows_Directors["tvshows_count"]=Unique_TVShows_Directors["title"].apply(lambda x
3 Unique_TVShows_Directors.sort_values("tvshows_count",ascending=False)[:5]
```

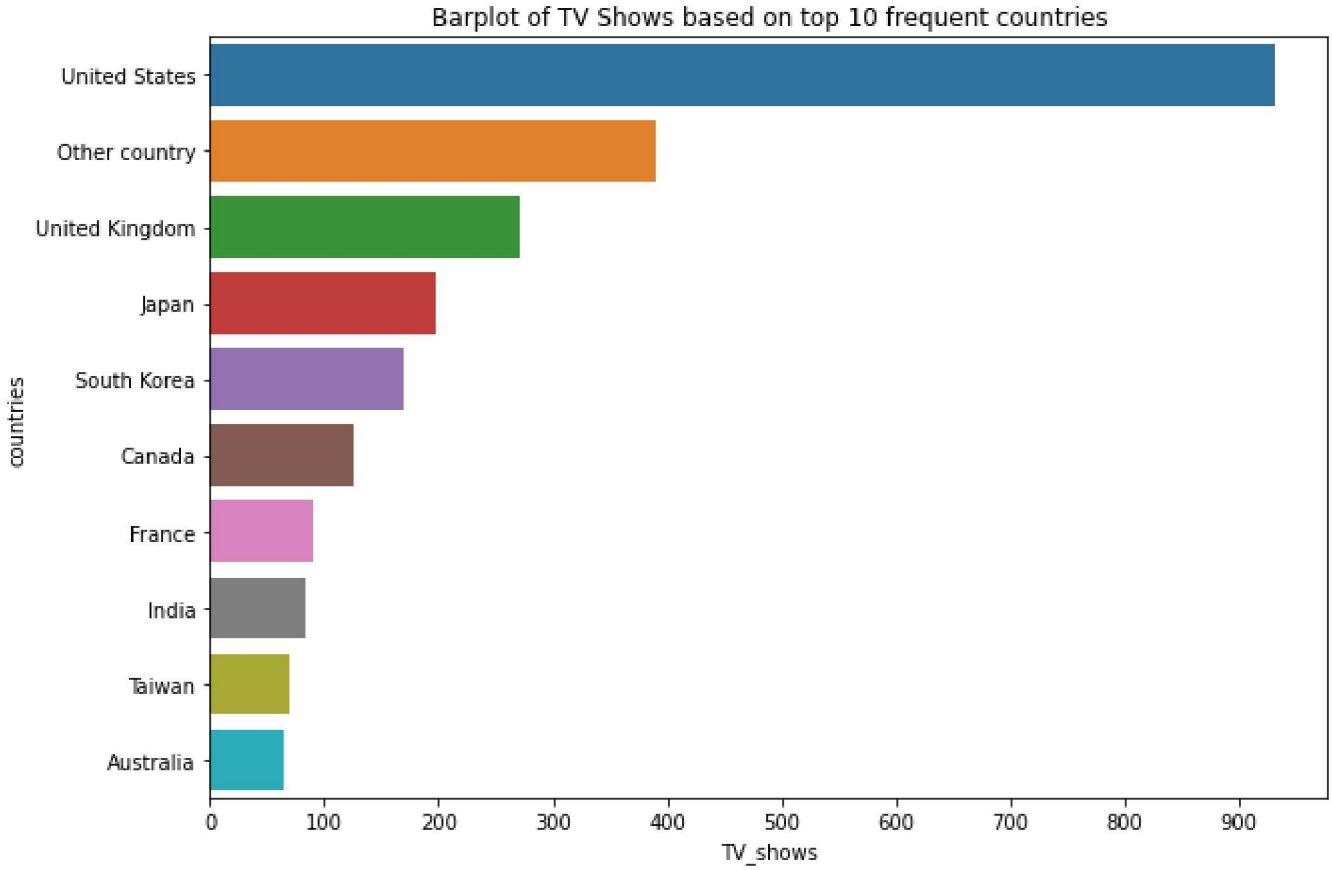
	directors	title	tvshows_count
207	Other director	[Blood & Water, Jailbirds New Orleans, Kota Fa...	2434
146	Ken Burns	[Ken Burns: The Civil War, Ken Burns: The Roos...	3
8	Alastair Fothergill	[Frozen Planet, Planet Earth: The Complete Col...	3
140	Jung-ah Im	[Men on a Mission, Abnormal Summit]	2
252	Shin Won-ho	[Reply 1994, Reply 1997]	2

TV Shows directors have more than 90% null values so this column cant be analysed

```
1 unique_countries=Movies.groupby(["countries"])["title"].unique().reset_index()
2 unique_countries["Total_movies"]=unique_countries["title"].apply(lambda x: len(x))
3
4 plt.figure(figsize=(10,7))
5 sns.barplot(data=unique_countries.sort_values("Total_movies",ascending=False)[:10],x="Tota
6 plt.xticks(np.arange(0,3000,step=200))
7 plt.title("Barplot of Movies based on top 10 frequent countries")
8 plt.show()
```




```
unique_countries=TV_Show.groupby(["countries"])["title"].unique().reset_index()
unique_countries["TV_shows"]=unique_countries["title"].apply(lambda x: len(x))

plt.figure(figsize=(10,7))
sns.barplot(data=unique_countries.sort_values("TV_shows",ascending=False)[:10],x="TV_shows
plt.xticks(np.arange(0,1000,step=100))
plt.title("Barplot of TV Shows based on top 10 frequent countries")
plt.show()
```

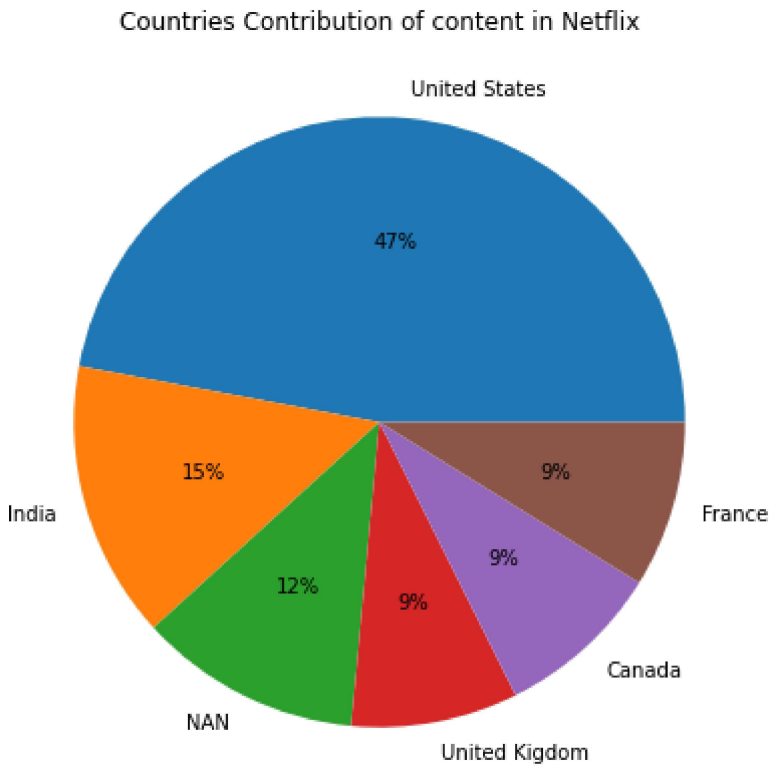


There are more TV Shows/Movies released in United States and India compared to other Countries

```
content_countries=df.groupby(["countries"])["title"].unique().reset_index()
content_countries["TV_shows"]=unique_countries["title"].apply(lambda x: len(x))
content_countries.sort_values("TV_shows",ascending=False)[:10]
```

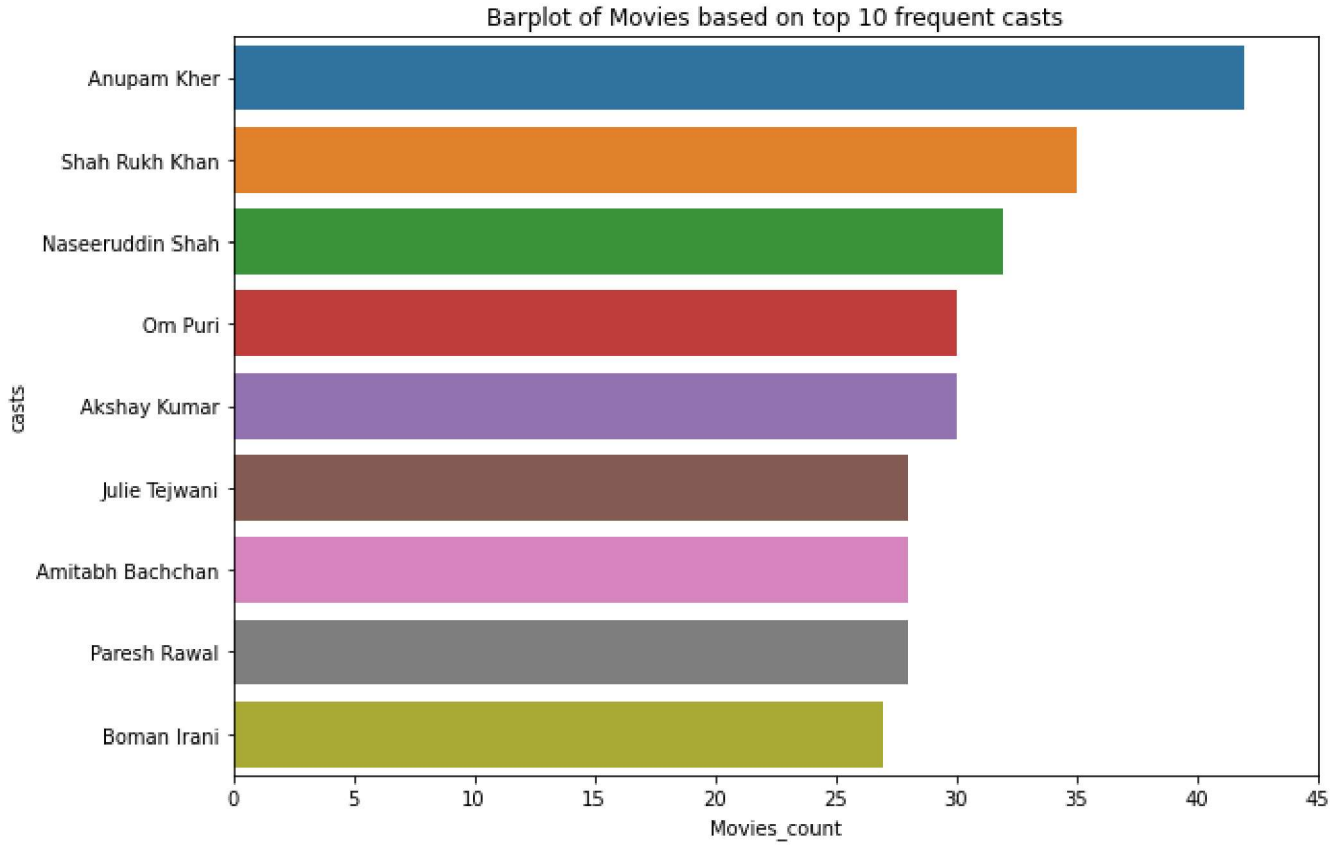
	countries	title	TV_shows
64	Malawi	[The Boy Who Harnessed the Wind]	932.0
43	Hong Kong	[Initial D, Love in a Puff, Marshall, Ratchet ...	390.0
63	Luxembourg	[Capitani, Black '47, The Take, Funan, The Com...	271.0
30	Denmark	[Lift Like a Girl, LEGO Friends: The Power of ...	197.0
53	Jamaica	[Sprinter]	170.0
8	Austria	[The Strange House, What We Wanted, Freud, Min...	126.0
19	Cambodia	[War Dogs, Funan, Jailbreak, First They Killed...	90.0
25	Colombia	[Lokillo: Nothing's the Same, Las muñecas de l...	84.0

```
content_countries=df.groupby(["countries"])["title"].unique().reset_index()
content_countries["content"]=unique_countries["title"].apply(lambda x: len(x))
content_countries.sort_values("content",ascending=False)[:10]

plt.figure(figsize=(10,7))
plt.pie(content_countries["content"].value_counts().tolist()[:6],labels=["United States","
plt.title("Countries Contribution of content in Netflix")
plt.show()
```



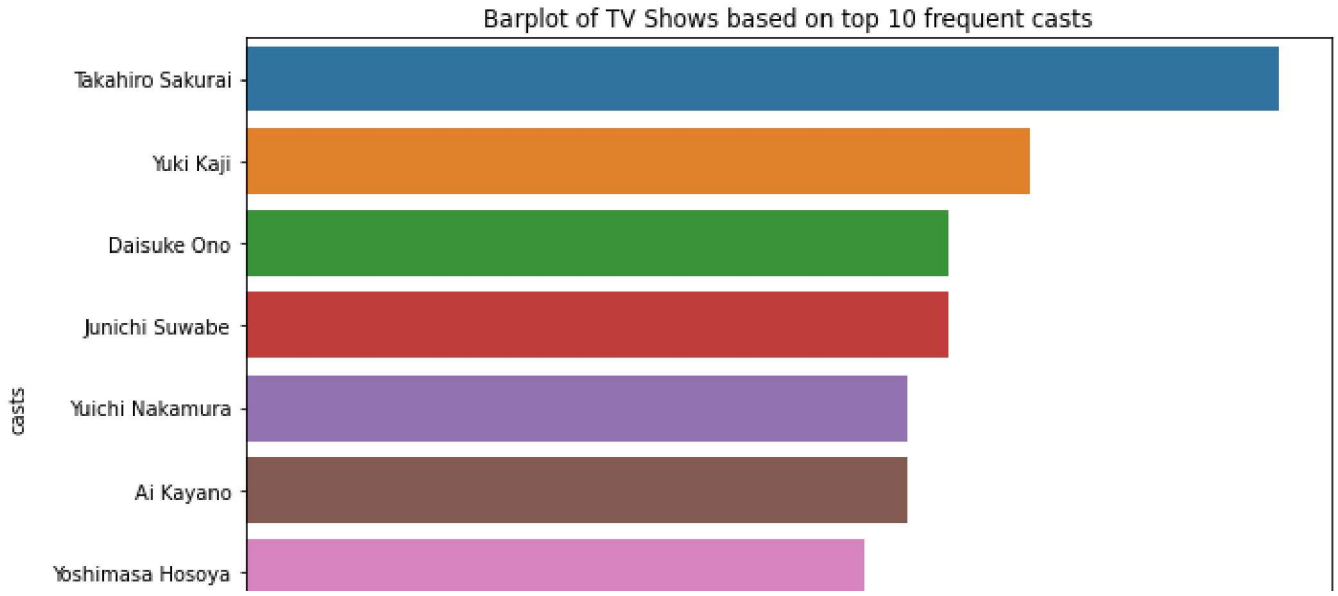

```
Unique_Movie_cast=Movies.groupby(["casts"])["title"].unique().reset_index()
Unique_Movie_cast["Movies_count"]=Unique_Movie_cast["title"].apply(lambda x: len(x))

```

```
plt.figure(figsize=(10,7))
sns.barplot(data=Unique_Movie_cast.sort_values("Movies_count",ascending=False)[1:10],x="Mo
plt.xticks(np.arange(0,50,step=5))
plt.title("Barplot of Movies based on top 10 frequent casts")
plt.show()
```



Anupam Kher and Shahrukh khan worked in maximum movies present on netflix

```
Unique_TVshow_cast=TV_Show.groupby(["casts"])["title"].unique().reset_index()
Unique_TVshow_cast["TVshow_count"]=Unique_TVshow_cast["title"].apply(lambda x: len(x))

plt.figure(figsize=(10,7))
sns.barplot(data=Unique_TVshow_cast.sort_values("TVshow_count",ascending=False)[1:10],x="T
plt.xticks(np.arange(0,30,step=5))
plt.title("Barplot of TV Shows based on top 10 frequent casts")
plt.show()
```



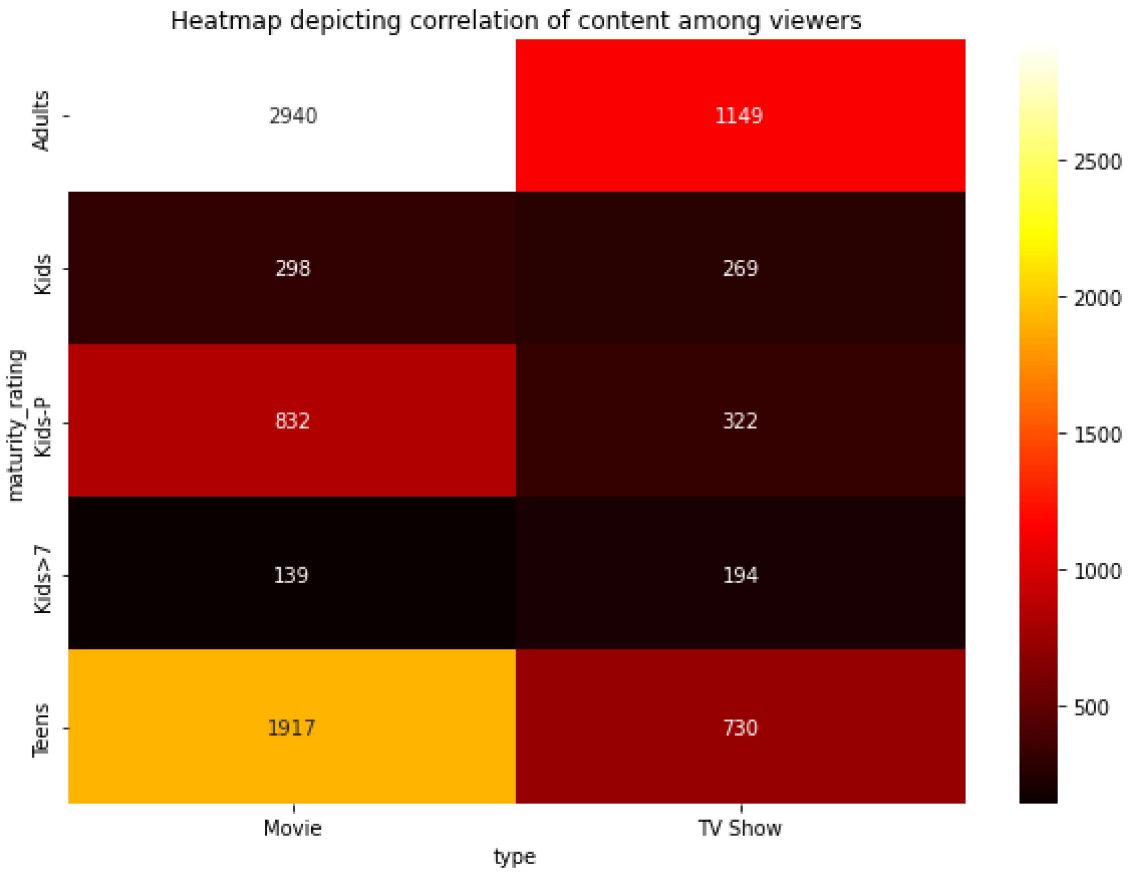
Takahiro Sakurai and Yuki Kaji worked in maximum TV Shows present on netflix

```
plt.figure(figsize=(10,7))
sns.countplot(data=original_data,x="maturity_rating",order=original_data['maturity_rating'
plt.xticks(rotation=90)
plt.title("Comparision of Movies vs TV Shows based on ratings")
plt.yticks(np.arange(0,3001,step=200))
plt.show()
```

```
1 RatingVSContent=pd.crosstab(original_data["maturity_rating"],original_data["type"])
2 RatingVSContent
```

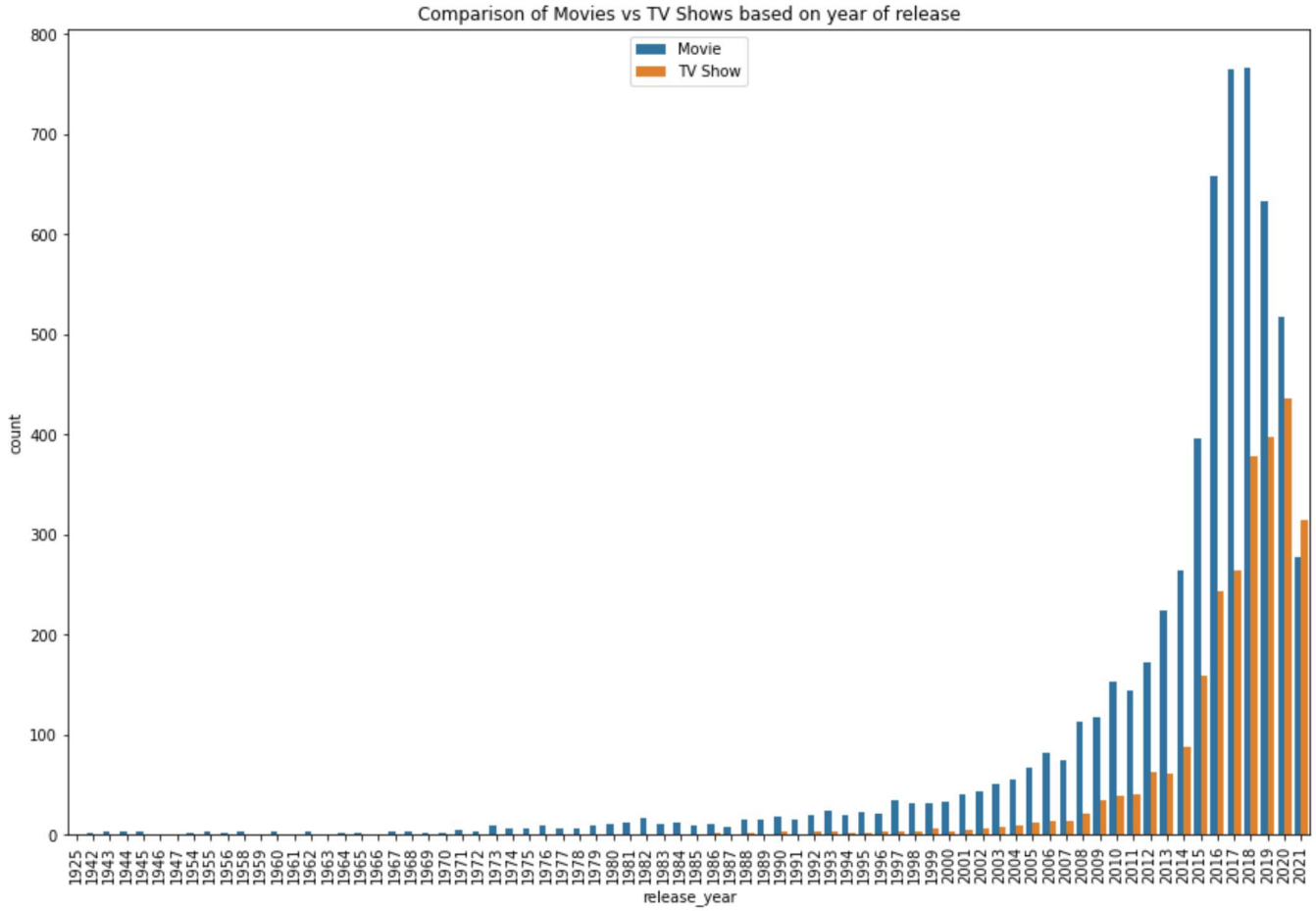
type	Movie	TV Show
maturity_rating		
Adults	2940	1149
Kids	298	269
Kids-P	832	322
Kids>7	139	194
Teens	1917	730

```
1 plt.figure(figsize=(10,7))
2 sns.heatmap(RatingVSContent,annot=True,cmap="hot", fmt='g')
3 plt.title("Heatmap depicting correlation of content among viewers")
4 plt.show()
```

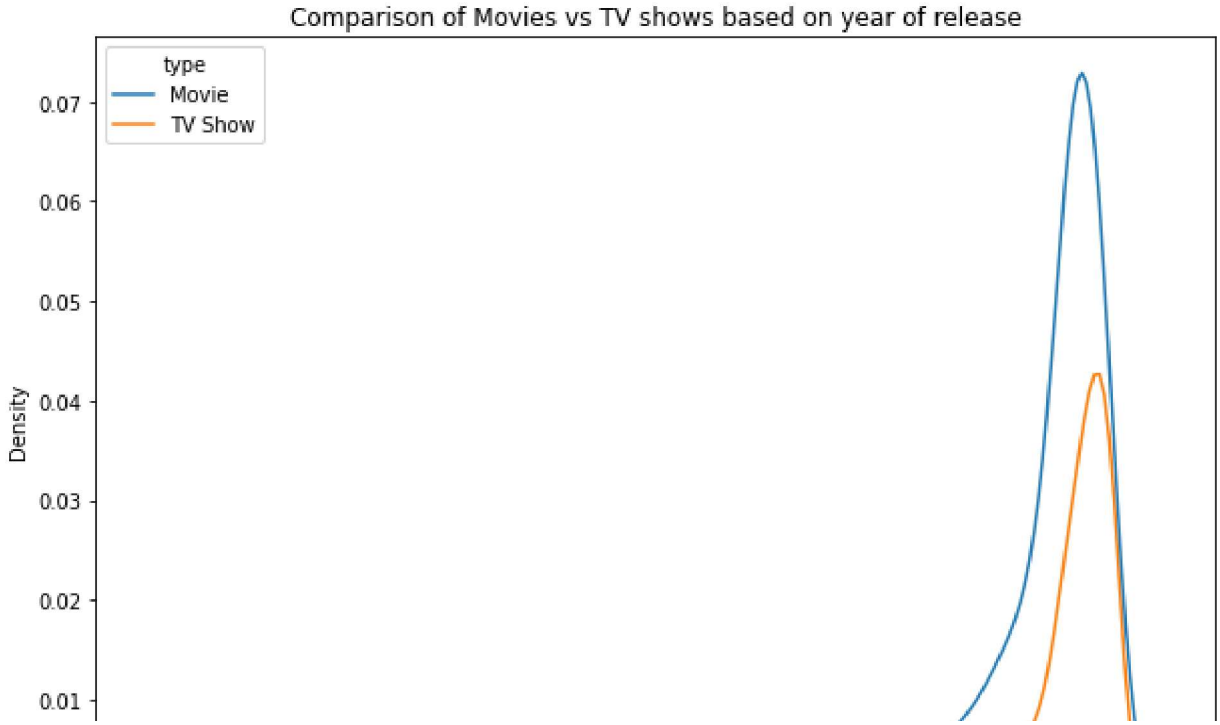


Adults and Teens prefer to watch movies over TV Shows whereas kids prefer to watch both in almost equal proportions

```
plt.figure(figsize=(15,10))
sns.countplot(data=original_data,x="release_year",hue="type")
plt.xticks(rotation=90)
plt.title("Comparison of Movies vs TV Shows based on year of release")
plt.legend(loc="upper center")
plt.show()
```

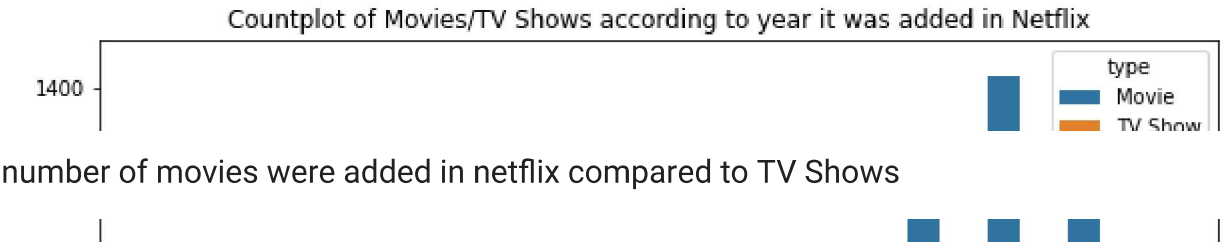



```
plt.figure(figsize=(10,7))
sns.kdeplot(data=original_data,x="release_year",hue="type")
plt.title("Comparison of Movies vs TV shows based on year of release")
plt.show()
```



There are more movies in Netflix which got released from year 2000 onwards compared to TV shows

```
plt.figure(figsize=(10,7))
sns.countplot(data=original_data,x="year_added",hue="type")
plt.xticks(rotation=90)
plt.title("Countplot of Movies/TV Shows according to year it was added in Netflix")
plt.show()
```

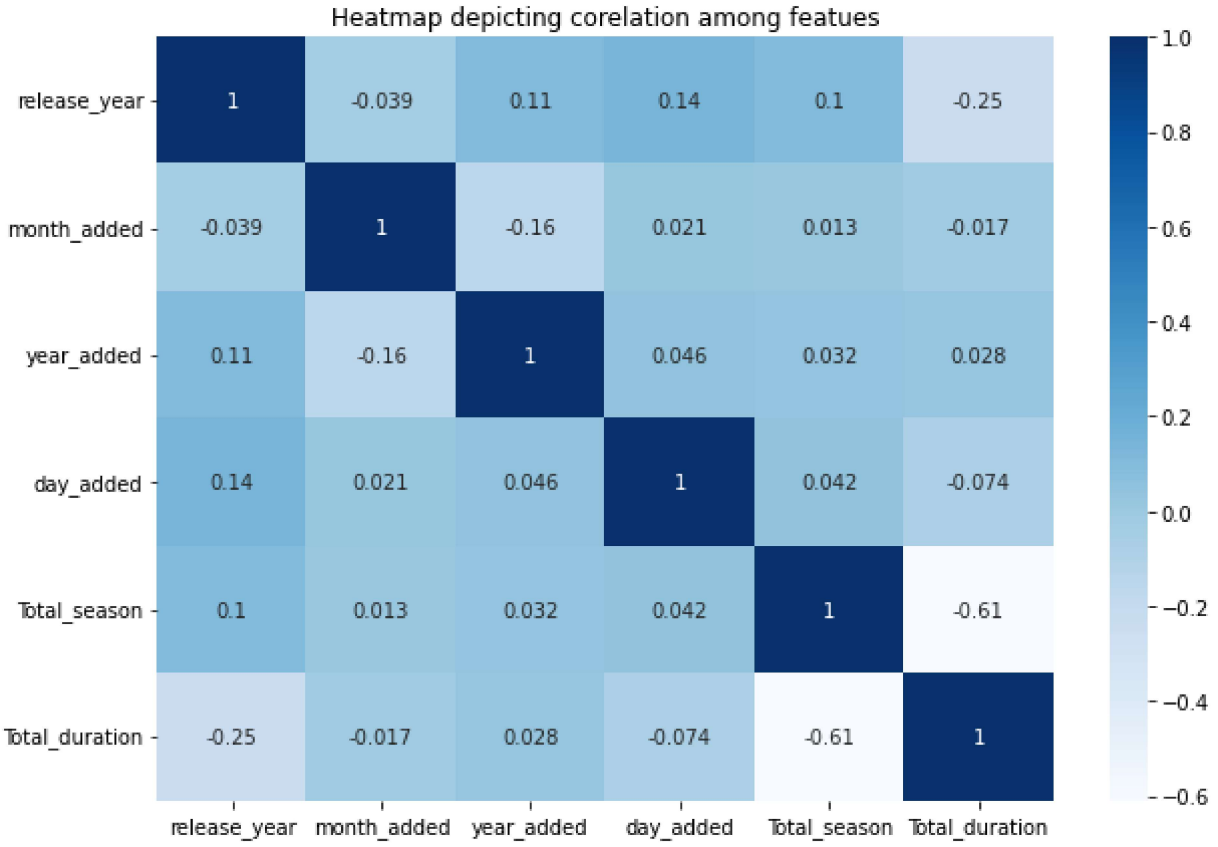


More number of movies were added in netflix compared to TV Shows


```
1 original_data.corr()
```

	release_year	month_added	year_added	day_added	Total_season	Total_dur
release_year	1.000000	-0.039031	0.111624	0.140190	0.104115	-0.2
month_added	-0.039031	1.000000	-0.160650	0.020705	0.013238	-0.0
year_added	0.111624	-0.160650	1.000000	0.045679	0.031913	0.0
day_added	0.140190	0.020705	0.045679	1.000000	0.041752	-0.0
Total_season	0.104115	0.013238	0.031913	0.041752	1.000000	-0.6
Total_duration	-0.248928	-0.017371	0.027903	-0.073613	-0.609842	1.0

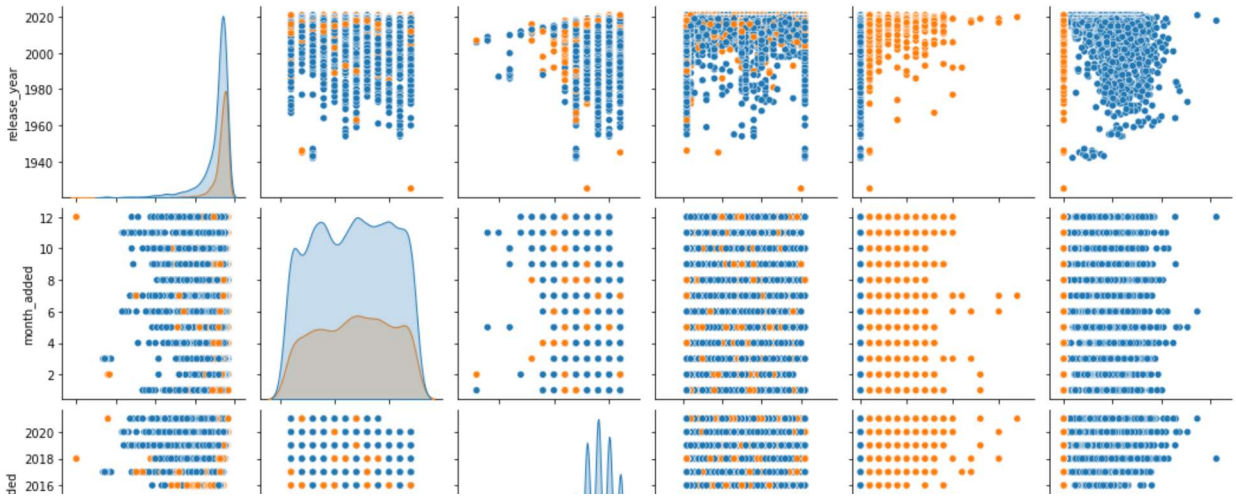
```
1 plt.figure(figsize=(10,7))
2 sns.heatmap(original_data.corr(),annot=True,cmap="Blues")
3 plt.title("Heatmap depicting corelation among featues")
4 plt.show()
```



There seems to be very weak corelation among numerical features

```
1 plt.figure(figsize=(10,7))
2 sns.pairplot(original_data,hue="type")
3 plt.show()
```

```
<Figure size 720x504 with 0 Axes>
```



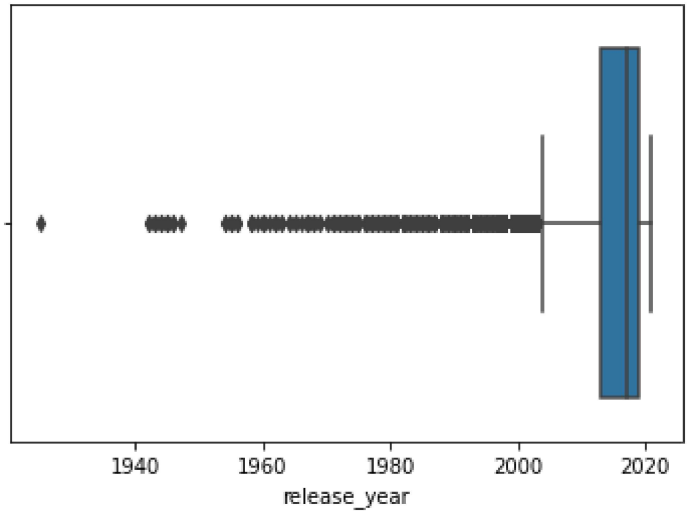
As Release year is increasing, duration is somewhat getting decreased, same can be depicted from heatmap which is showing negative correlation between release year and duration

As Release year is increasing, total season is somewhat getting increased

Checking Outliers

```
1 sns.boxplot(data=original_data,x="release_year")
```

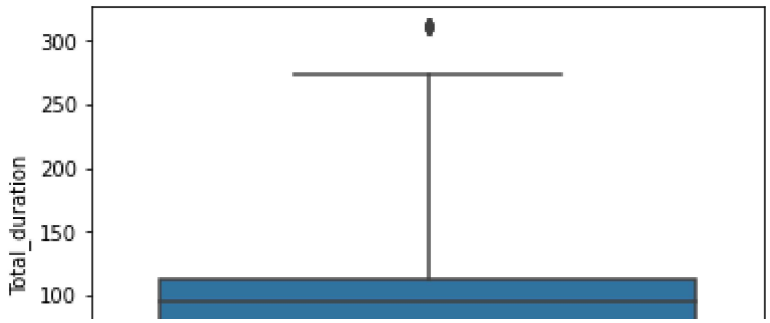
```
<matplotlib.axes._subplots.AxesSubplot at 0x7fcd616c8350>
```



Release year have numerous outliers from 1940 year to 2000

```
1 sns.boxplot(data=df,y="Total_duration")
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fcd674a5510>
```

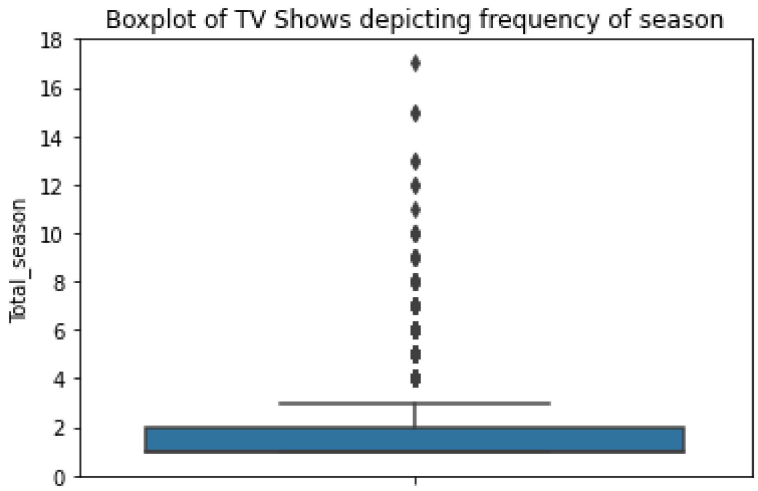



```
1 original_data.loc[original_data["Total_duration"]>270,"title"].unique()
```

```
array(['Headspace: Unwind Your Mind', 'Black Mirror: Bandersnatch'],
      dtype=object)
```

There are only 2 movies which have duration greater than 270 min so these will be outliers and median is somewhere close to 100 min

```
1 sns.boxplot(data=original_data.loc[original_data["Total_season"]!=0],y="Total_season")
2 plt.yticks(np.arange(0,20,step=2))
3 plt.title("Boxplot of TV Shows depicting frequency of season")
4 plt.show()
```




```
1 original_data.loc[(original_data["Total_season"]>3) & (original_data["Total_season"]!=0)][
```

```
254
```

There are 254 out of 2664 TV Shows which have more than 3 season so these will be outliers and median is somewhere close to 1 season

Business Insights

1. There are 70% movies and 30% TV Shows present in Netflix->Viewers prefer watching movies over TV Shows.
2. There are 47% movies/TV Shows for Adults and 30% content for Teens-> Netflix has more content which are suitable for Adults. Also Netflix offers content for wide range of audience inclusive of children, youngsters and adults
3. There are more International Movies,Dramas,and Comedy genres present in Netflix.->Drama is most preferred genre. Viewers also prefer comedy and International Movies/TV Shows over other genres.
4. Maximum movies fall under the duration between 90 to 110 mins-> People prefer to watch more movies whose median time is somewhere 100 min
5. There are only 2 movies which have duration greater than 270 min ->Most of the people are not watching movies which are very lengthy.
6. There are somewhere around 1791 TV Shows which only have 1 season and that's the maximum in shows.-> People watch 1st season of maximum shows released but tends to stop watching it when further season of that show got released.
7. Maximum movies/tv shows present are released from 2000-2020.-> Plenty of movies/tv shows were watched which were released during 2000-2020.
8. Most of the movies are added in Netflix from 2017 onwards-> People started appreciating the content of netflix from 2017
9. There are only 1 or 2 TV shows which have more than 10 seasons. ->Most of the people are not watching shows which are very lengthy (more than 10 season)
10. There are more shows/movies which are released in United States,India and United Kingdom->Audience of these countries spend most of the time watching netflix content compared to other countries.
11. Anupam Kher and Shahrukh khan are most popular actor who have worked in max movies present in netflix.

Recommendations

1. There are 70% movies present in netflix whereas 30% are TV Shows. So recommending to add more movies to gain more viewers
2. Most of the TV shows only have season 1 and season 2: Audience enjoy watching TV Shows which have fewer seasons so its preferable to add more TV shows which dont have multiple seasons.
3. There are more movies which have duration between 90 to 110 mins: Viewers tend to watch movies which are not bit lengthy so its preferable to add more movies which have avg running time of 100 min.

4. Anupam Kher and Shahrukh khan worked in max movies present in netflix. These actors are more welcomed among all actors so recommending to include more of their content.
5. Rajiv Chilaka and Jan Suter directed most of the movies released in Netflix.Content of these directors are more accepted so recommending to add more of their content.
6. There are 70% shows/movies which are released in United States(58%) and India(12%) ->Audience of these countries spend most of the time watching netflix content compared to other contries so netflix can consider to add relatable content.
7. Almost 77% of content present in Netflix are for Adult and Teens that means people prefer to watch Adult/Teen content in Netflix so more of these content can be added to gain more viewers.
8. Maximum movies are added on 1st or 15th day of every month. So considering a new movies/ TV show to be released, these dates can be considered.