Netflix EDA

In [1]:
```
import numpy as np
import pandas as pd
import warnings
warnings.filterwarnings('ignore')
```

Importing Dataset

In [2]:
```
df =pd.read_csv('D:/Data Science Course PR/data set/netflix_titles.csv')
```

In [3]:
```
df.head(5)
```

Out[3]:

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90 min	Documentaries	As her father nears the end of his life, filmm...
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	After crossing paths at a party, a Cape Town t...
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...	To protect his family from a powerful drug lor...
3	s4	TV Show	Jailbirds New Orleans	NaN	NaN	NaN	September 24, 2021	2021	TV-MA	1 Season	Docuseries, Reality TV	Feuds, flirtations and toilet talk go down amo...
4	s5	TV Show	Kota Factory	NaN	Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...	India	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, Romantic TV Shows, TV ...	In a city of coaching centers known to train I...

In [4]:
```
a = df['listed_in'].to_list()
al = []
for i in a:
    if ' International TV Shows' in i:
        a = i
        b = a.replace(' International TV Shows','International TV Shows')
        al.append(b)
    else:
        al.append(i)
df['listed_in'] = al
```

In [5]:
```
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
```

Finding the unique values

In [6]:
```
for i in (df.columns.to_list()):
    b = len(df[i].unique())
    print(f"{i} = {b}")
```

```
show_id = 8807
type = 2
title = 8807
director = 4529
cast = 7693
country = 749
date_added = 1768
release_year = 74
rating = 18
duration = 221
listed_in = 514
description = 8775
```

Handling the missing data and deleting duplicates

It is important to handle missing data because any statistical results based on a dataset with non-random missing values could be biased. So you really want to see if these are random or non-random missing values.

Drop the columns which has high number of missing values.

We can impute(filling the missing values using the available information such as mean, median) but we should carefully see the pattern of the column before doing imputation.

For example - You want to fill the height of a person who male. Simpley adding 0 in the missing column would not make sense. So we can take the averega of male height and use that value inplace of missing values.

1>Rating - manually filling the data using data from wedsite.

2>Country - replacing blank countries with the most common country using Mode.

3>Cast - replacing null value with "Data not available".

4>Director - replacing null value with "Data not available".

In [7]:
```
# Rating data is mentioned incorrectly for few titles in the input file.
# Hence correcting it by checking the Maturity rating online
```

```
df['rating'] = df['rating'].replace({'74 min': 'TV-MA', '84 min': 'TV-MA', '66 min': 'TV-MA'})
df['rating'] = df['rating'].replace({'TV-Y7-FV': 'TV-Y7'})
```

In [8]:
```
# using Agreration method
df['rating'] = df['rating'].replace({
                'PG-13': 'Teens - Age above 12',
                'TV-MA': 'Adults',
                'PG': 'Kids - with parental guidence',
                'TV-14': 'Teens - Age above 14',
                'TV-PG': 'Kids - with parental guidence',
                'TV-Y': 'Kids',
                'TV-Y7': 'Kids - Age above 7',
                'R': 'Adults',
                'TV-G': 'Kids',
                 'G': 'Kids',
                'NC-17': 'Adults',
                'NR': 'NR',
                'UR' : 'UR'

})
```

In [9]:
```
df['rating'].unique()
```

Out[9]:
```
array(['Teens - Age above 12', 'Adults', 'Kids - with parental guidence',
       'Teens - Age above 14', 'Kids', 'Kids - Age above 7', 'NR', nan,
       'UR'], dtype=object)
```

In [10]:
```
df.isnull().sum()
```

Out[10]:
```
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
```

Replacing Null values

In [11]:
```
df['cast'].replace(np.nan, 'No Data',inplace  = True)
df['director'].replace(np.nan, 'No Data',inplace  = True)

# Drop Duplicates
df.drop_duplicates(inplace= True)

df.isnull().sum()
df["country"].fillna(df["country"].mode()[0], inplace = True)
```

In [12]:
```
df['month'] = pd.DatetimeIndex(df['date_added']).month
```

In [13]:
```
df['release_year'] = df['release_year'].astype('int')
```

In [14]:
```
# splitting the genres in different rows to use it in the visualzation  later
df_genre = df[['show_id', 'title','type', 'listed_in' ]]
df_genre = (df_genre.drop('listed_in', axis=1)
             .join
             (
             df_genre.listed_in
             .str
             .split(',',expand=True)
             .stack()
             .reset_index(drop=True, level=1)
             .rename('listed_in')
             ))

df_genre.head()
```

Out[14]:

	show_id	title	type	listed_in
0	s1	Dick Johnson Is Dead	Movie	Documentaries
1	s2	Blood & Water	TV Show	International TV Shows
1	s2	Blood & Water	TV Show	TV Dramas
1	s2	Blood & Water	TV Show	TV Mysteries
2	s3	Ganglands	TV Show	Crime TV Shows

In [15]:

```
# splitting the countries in different rows
df_country = df[['show_id', 'title','type', 'country' ]]
df_country = (df_country.drop('country', axis=1)
              .join
              (
              df_country.country
              .str
              .split(', ',expand=True)
              .stack()
              .reset_index(drop=True, level=1)
              .rename('country')
              ))

df_country.head()
```

Out[15]:

	show_id	title	type	country
0	s1	Dick Johnson Is Dead	Movie	United States
1	s2	Blood & Water	TV Show	South Africa
2	s3	Ganglands	TV Show	United States
3	s4	Jailbirds New Orleans	TV Show	United States
4	s5	Kota Factory	TV Show	India

Data Visualization

In [16]:
```
import matplotlib.pyplot as plt
import seaborn as sns
```

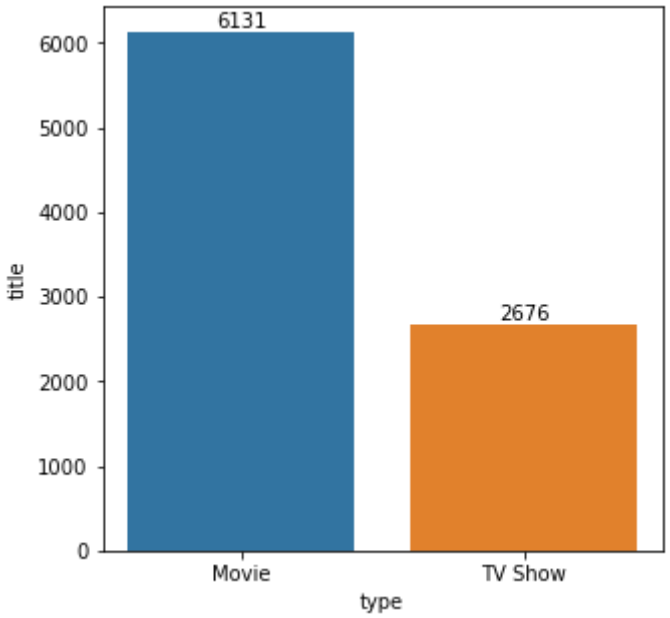
In [17]:
```
a = df.groupby(['type'])['title'].count().reset_index()
a
```

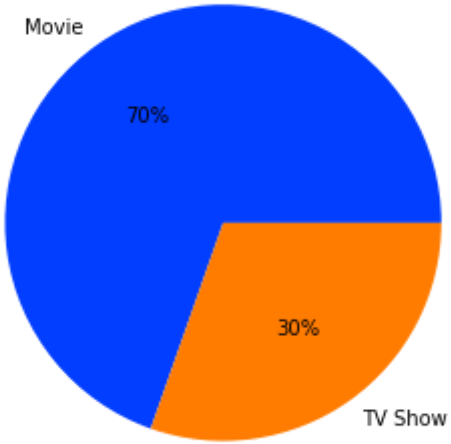
Out[17]:

	type	title
0	Movie	6131
1	TV Show	2676

In [18]:
```
plt.figure(figsize=(5,5))
ax =sns.barplot(data = a , x = 'type', y = 'title',errwidth=0)
ax.bar_label(ax.containers[0])
plt.plot()

plt.figure(figsize=(5,5))
x = a['title'].tolist()
y = a['type'].tolist()
palette_color = sns.color_palette('bright')
plt.pie(x, labels=y,colors=palette_color, autopct='%.0f%%')
plt.plot()
```

Out[18]:
```
[]
```

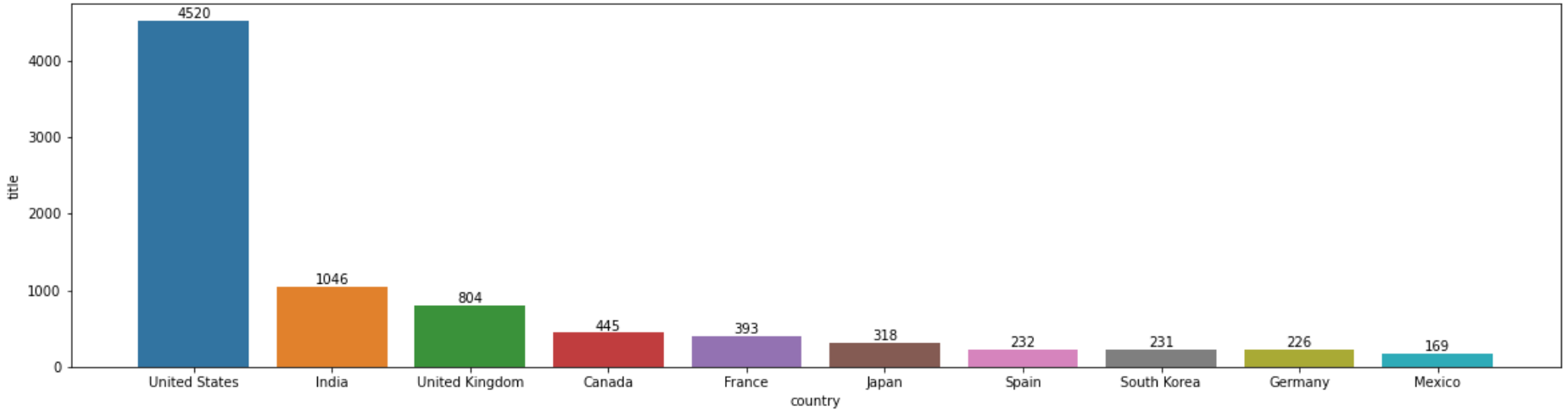


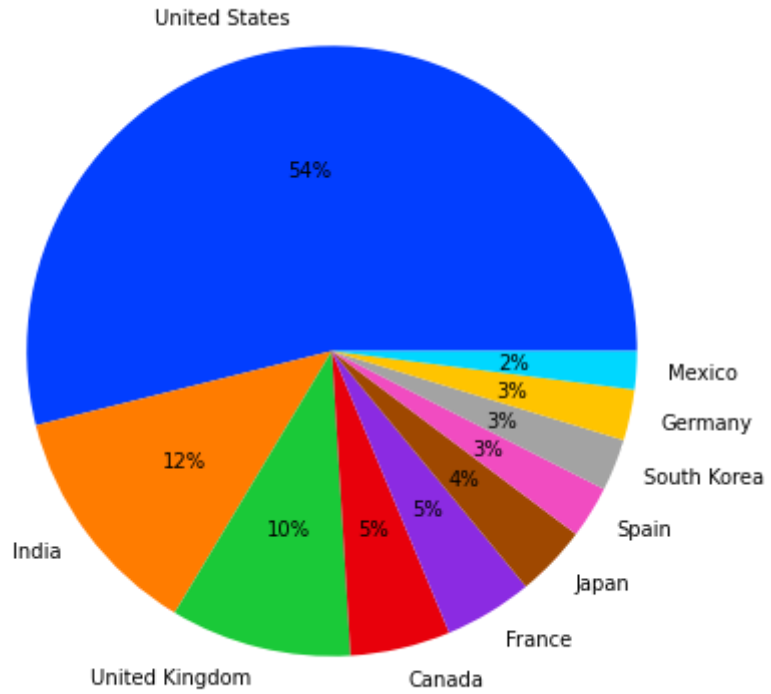


Netflix main focus is on movies rather than Tv Shows

In [19]:
```
a =df_country.groupby(['country'])['title'].count().reset_index().sort_values(["title"],ascending=False).head(10)
plt.figure(figsize=(20,5))
ax =sns.barplot(data = a , x = 'country', y = 'title',errwidth=0,)
ax.bar_label(ax.containers[0])[0]
plt.plot()

x = a['title'].tolist()
y = a['country'].tolist()
plt.figure(figsize=(7,7))
palette_color = sns.color_palette('bright')
plt.pie(x, labels=y,colors=palette_color, autopct='%.0f%%')[0]
plt.plot()
```

Out[19]:
```
[]
```





- **Most Of the Netflix Content is US base as it is aquiring more than 50% of pie chart .**

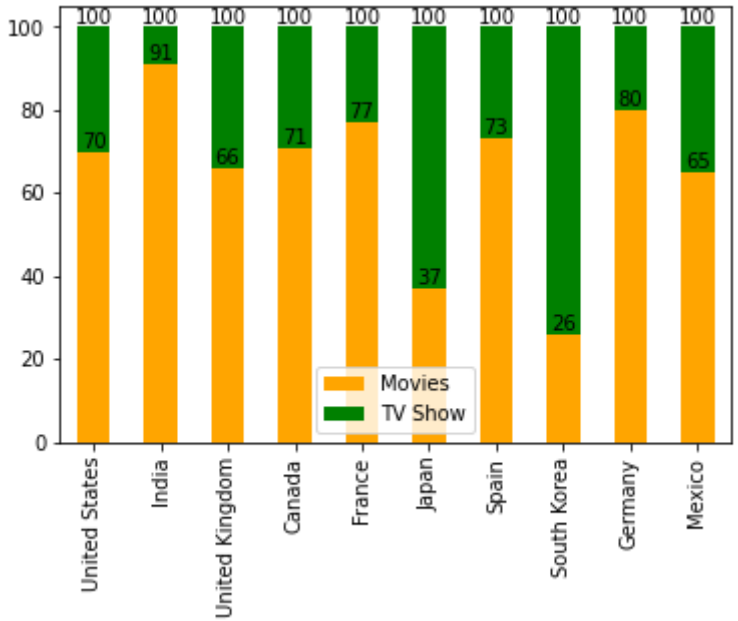
In [20]:
```
a =df_country.groupby(['country'])['title'].count().reset_index().sort_values(["title"],ascending=False).head(10)
top_10_country = a['country'].to_list()
total_count = a['title'].to_list()
```

In [21]:
```
# for movies
mov = df_country[df_country['type'] == 'Movie']
b  =mov.groupby(['country'])['title'].count().reset_index().sort_values(["title"])
Mov_num = []
for i in top_10_country:
    for j in range (0,b.shape[0]):
        if i == b.iloc[j,0]:
            c = b.iloc[j,1]
            Mov_num.append(c)
        else:
```

```
            pass

mov_per = []
for i in range (len(Mov_num)):
    per = int((Mov_num[i]/total_count[i]*100))
    mov_per.append(per)

# fro TV show
mov = df_country[df_country['type'] == 'TV Show']
b  =mov.groupby(['country'])['title'].count().reset_index().sort_values(["title"])
TV_num = []
for i in top_10_country:
    for j in range (0,b.shape[0]):
        if i == b.iloc[j,0]:
            c = b.iloc[j,1]
            TV_num.append(c)
        else:
            pass

tv_per =[]
for i in mov_per:
    a = 100-i
    tv_per.append(a)
```

In [22]:
```
ndf = pd.DataFrame({'Movies': mov_per,'TV Show': tv_per,} ,index= top_10_country)
ax = ndf.plot(kind='bar', stacked=True, color=['orange', 'green'])
ax.bar_label(ax.containers[0])[0]
ax.bar_label(ax.containers[1])[0]
plt.plot()
```

Out[22]:
```
[]
```



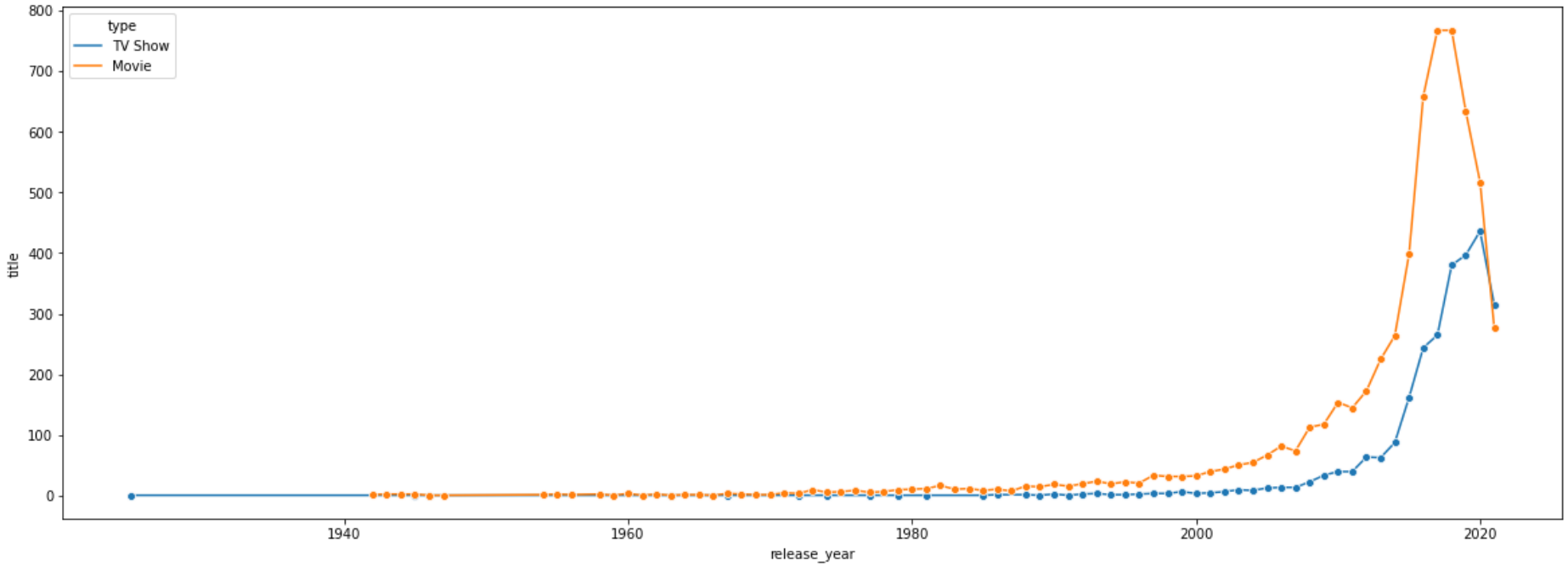
Conclation

We can say that in India Movie percentage is more as comapire the rest of countries because of Bollowood and recent growth in South indurtries.

South Korea have more Tv show percentage as compair to rest of the countries because of their love for K-Drama.

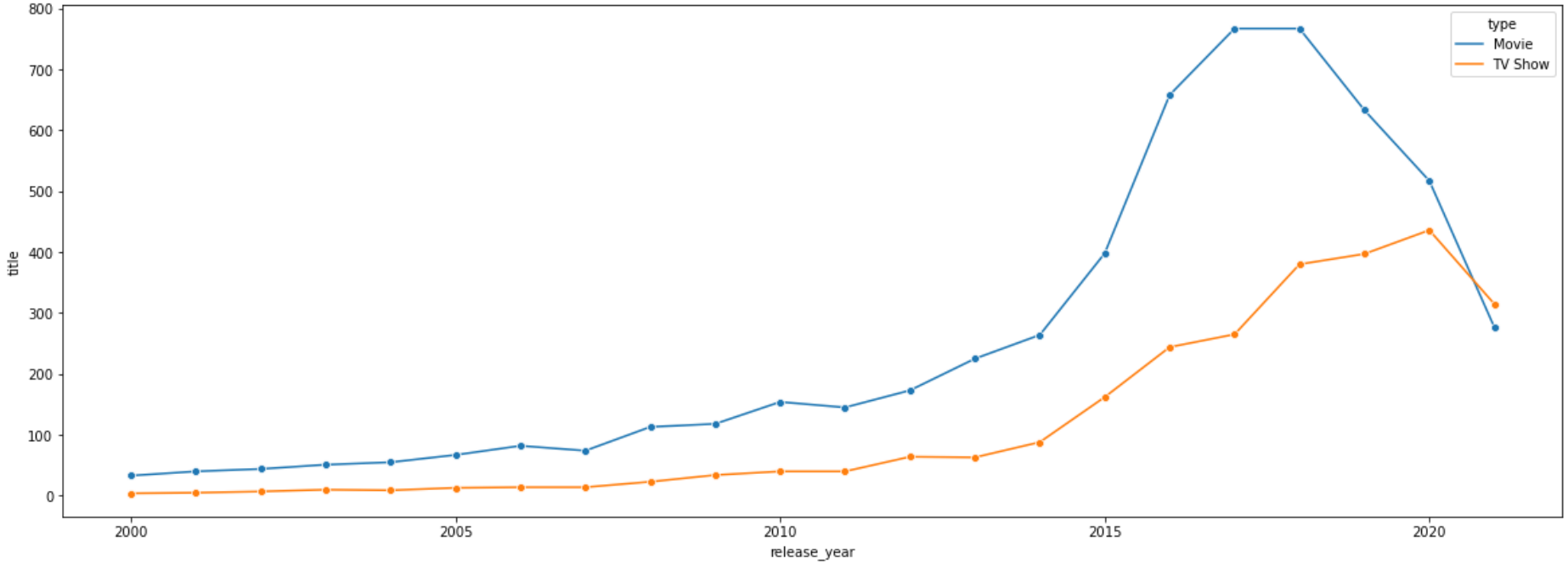
In [23]:
```
a = df.groupby(['release_year','type'])['title'].count().reset_index()
```

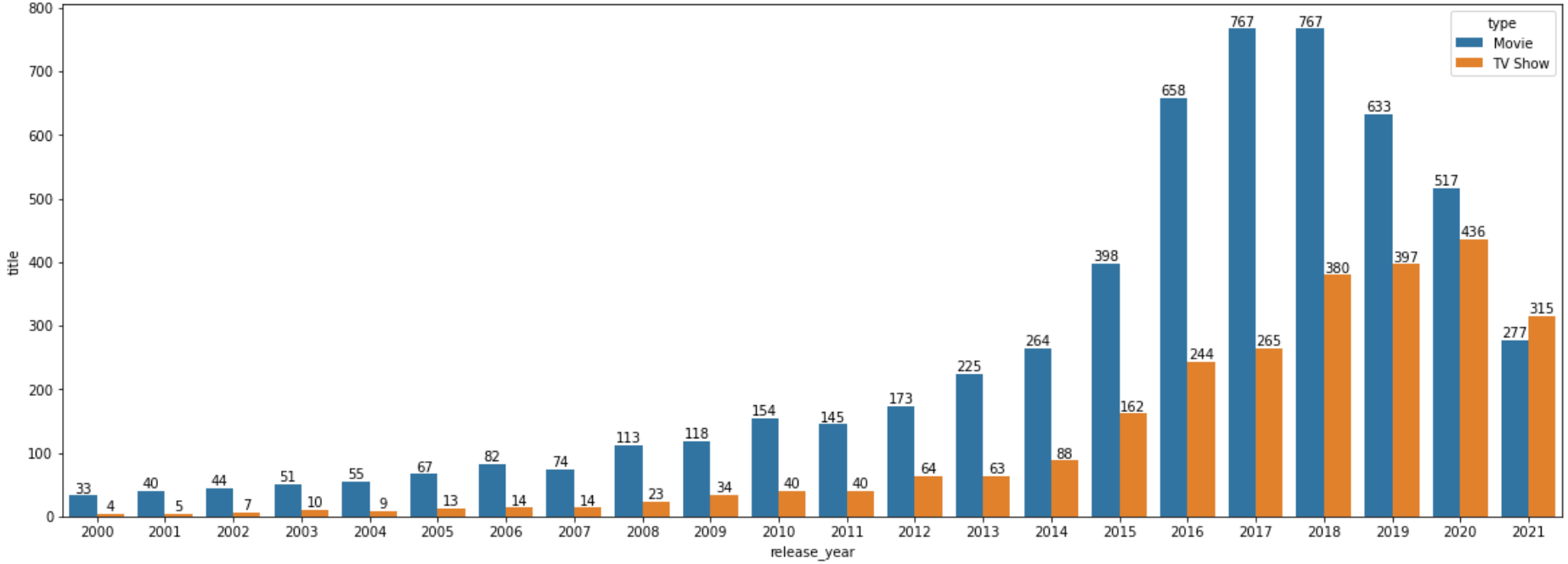
In [24]:
```
plt.figure(figsize=(20,7))
sns.lineplot(data=a, x="release_year", y="title" ,hue = "type",marker = "o")
plt.show()
```



In [25]:
```
a = a[a['release_year']>=2000]
```

In [26]:
```
plt.figure(figsize=(20,7))
sns.lineplot(data=a, x="release_year", y="title" ,hue = "type",marker = "o")
plt.show()
plt.figure(figsize=(20,7))
ax =sns.barplot(data=a, x="release_year", y="title" ,hue = "type")
ax.bar_label(ax.containers[1])[0]
ax.bar_label(ax.containers[0])[0]
plt.show()
```


type
Movie
TV Show
title
release_year
0
100
200
300
400
500
600
700
800
2000
2005
2010
2015
2020

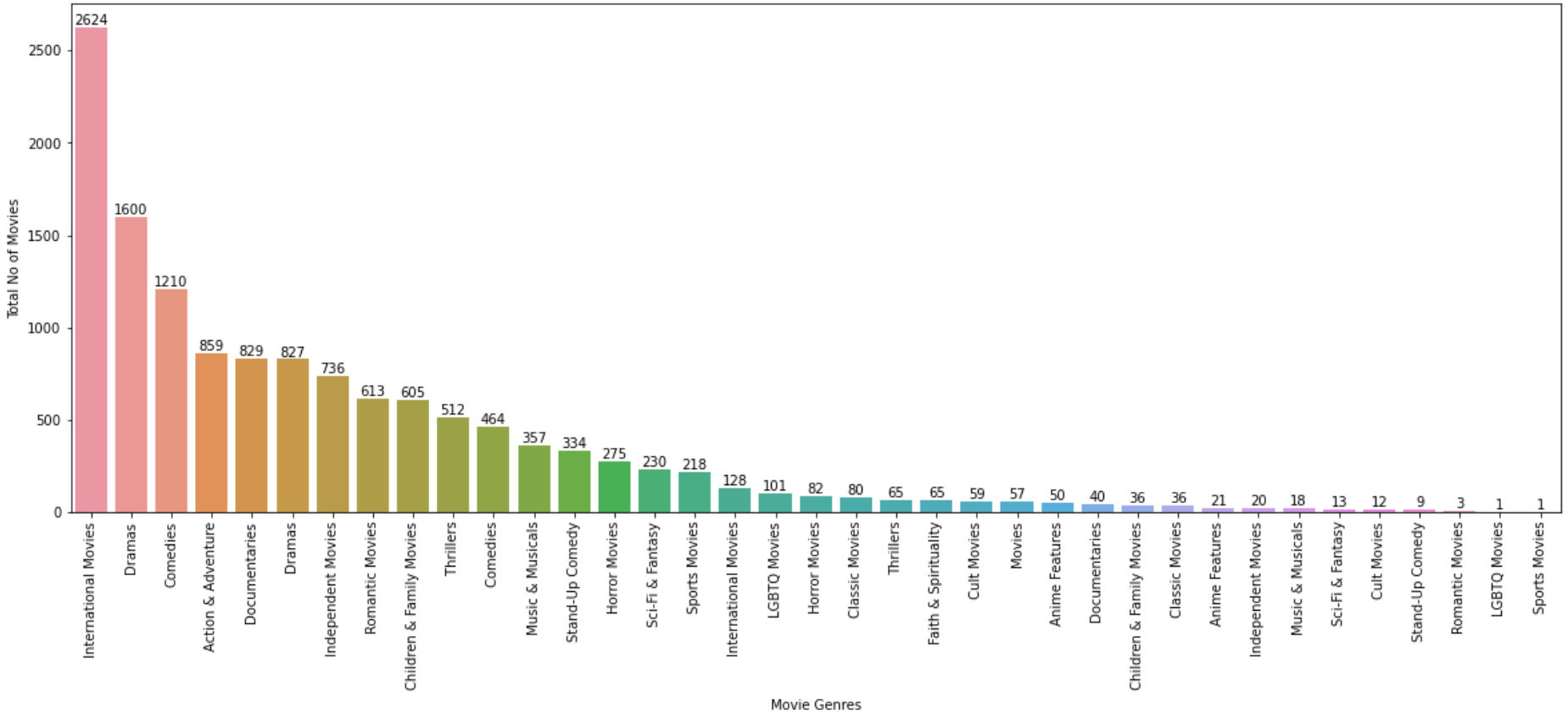

type
Movie
TV Show
title
release_year
33
4
40
5
44
7
51
10
55
9
67
13
82
14
74
14
113
23
118
34
154
40
145
40
173
64
225
63
264
88
398
162
658
244
767
265
767
380
633
397
517
436
277
315
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021

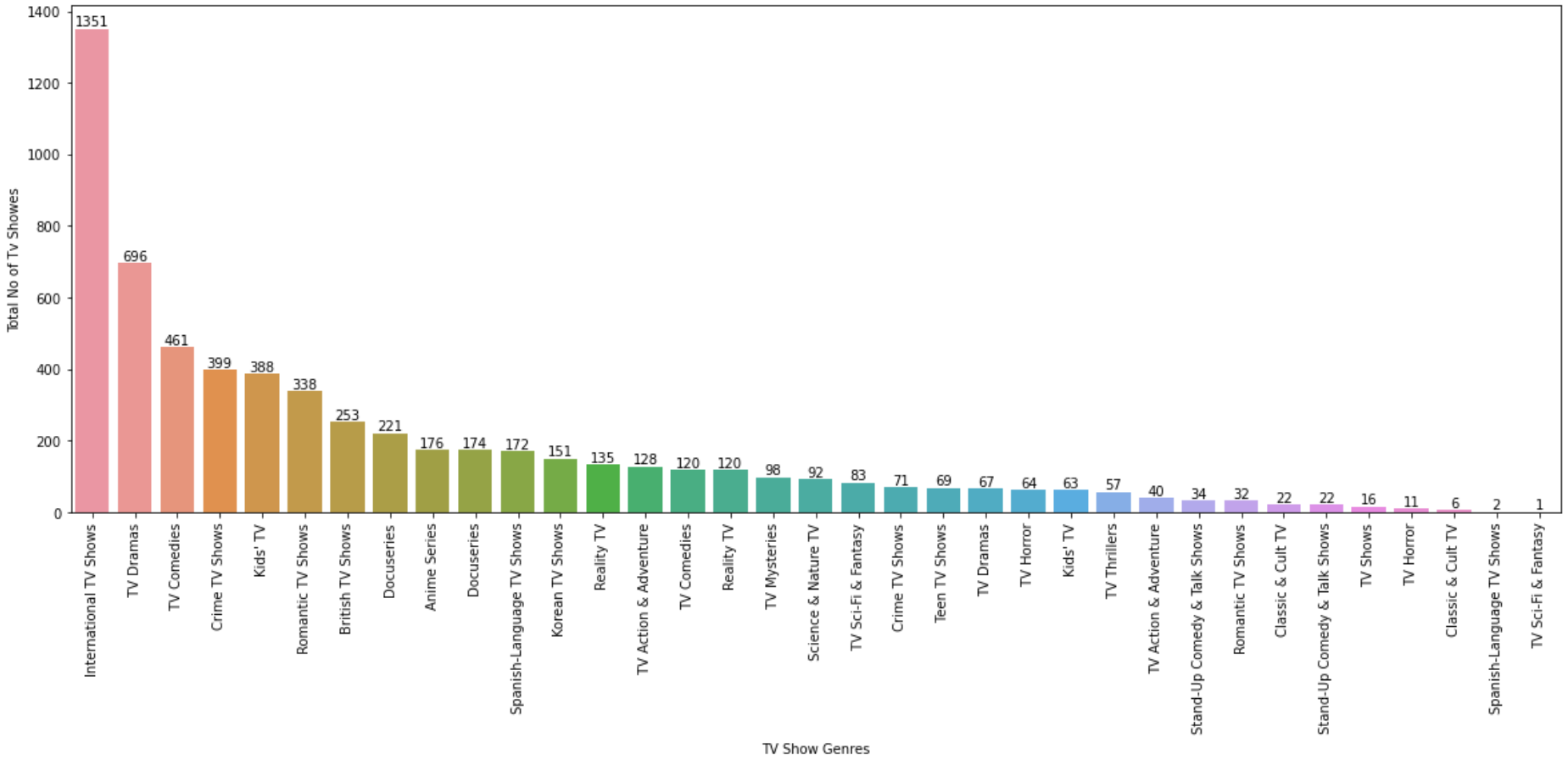
Conclusion

- **Their is a steady growth in both Movies & Tv show till 2014 after that Production of Movies is increase exponentially from 2014 to 2018.**
- **Following 4 years from 2019 to 2022, the Production of Movies decreased exponentially and in the year 2021 number of TV shows is more as compared to Movies.**
- **From the year 2018, there is a rapid decrease in the content on Netflix.**

In [27]:
```
new_genre = df_genre.groupby(['type','listed_in'])['title'].count().reset_index()
movie_genre = new_genre[new_genre['type'] == 'Movie' ].sort_values(["title"],ascending=False)
movie_genre.rename(columns = {'title':'Total No of Movies','listed_in':'Movie Genres'}, inplace = True)
plt.figure(figsize = (20,7))
ax =sns.barplot(data=movie_genre, x="Movie Genres", y="Total No of Movies")
ax.bar_label(ax.containers[0])[0]
ax.set_xticklabels(ax.get_xticklabels(), rotation=90)[0]
# for tv shows
Tv_genre = new_genre[new_genre['type'] == 'TV Show' ].sort_values(["title"],ascending=False)
Tv_genre.rename(columns = {'title':'Total No of Tv Showes','listed_in':'TV Show Genres'}, inplace = True)
plt.figure(figsize = (20,7))
ax =sns.barplot(data=Tv_genre, x="TV Show Genres", y="Total No of Tv Showes")
ax.bar_label(ax.containers[0])[0]
ax.set_xticklabels(ax.get_xticklabels(), rotation=90)[0]
```

Out[27]:
```
Text(0, 0, 'International TV Shows')
```


Total No of Movies
0
500
1000
1500
2000
2500
2624
1600
1210
859
829
827
736
613
605
512
464
357
334
275
230
218
128
101
82
80
65
65
59
57
50
40
36
36
21
20
18
13
12
9
3
1
1
International Movies
Dramas
Comedies
Action & Adventure
Documentaries
Dramas
Independent Movies
Romantic Movies
Children & Family Movies
Thrillers
Comedies
Music & Musicals
Stand-Up Comedy
Horror Movies
Sci-Fi & Fantasy
Sports Movies
International Movies
LGBTQ Movies
Horror Movies
Classic Movies
Thrillers
Faith & Spirituality
Cult Movies
Movies
Anime Features
Documentaries
Children & Family Movies
Classic Movies
Anime Features
Independent Movies
Music & Musicals
Sci-Fi & Fantasy
Cult Movies
Stand-Up Comedy
Romantic Movies
LGBTQ Movies
Sports Movies
Movie Genres



Conclusion:

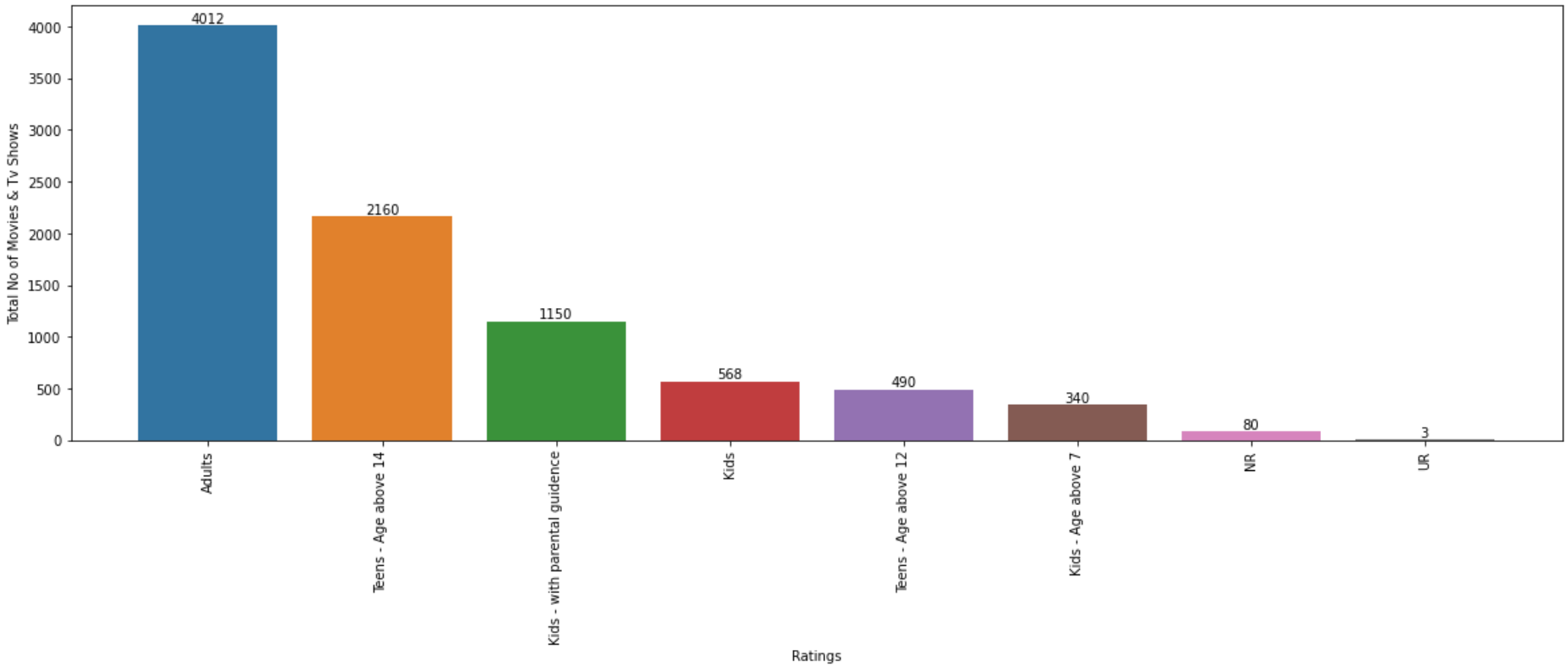
- **In both Movie and Tv Show the top three genres are International TV shows / Movies , Drama , Comedy.**

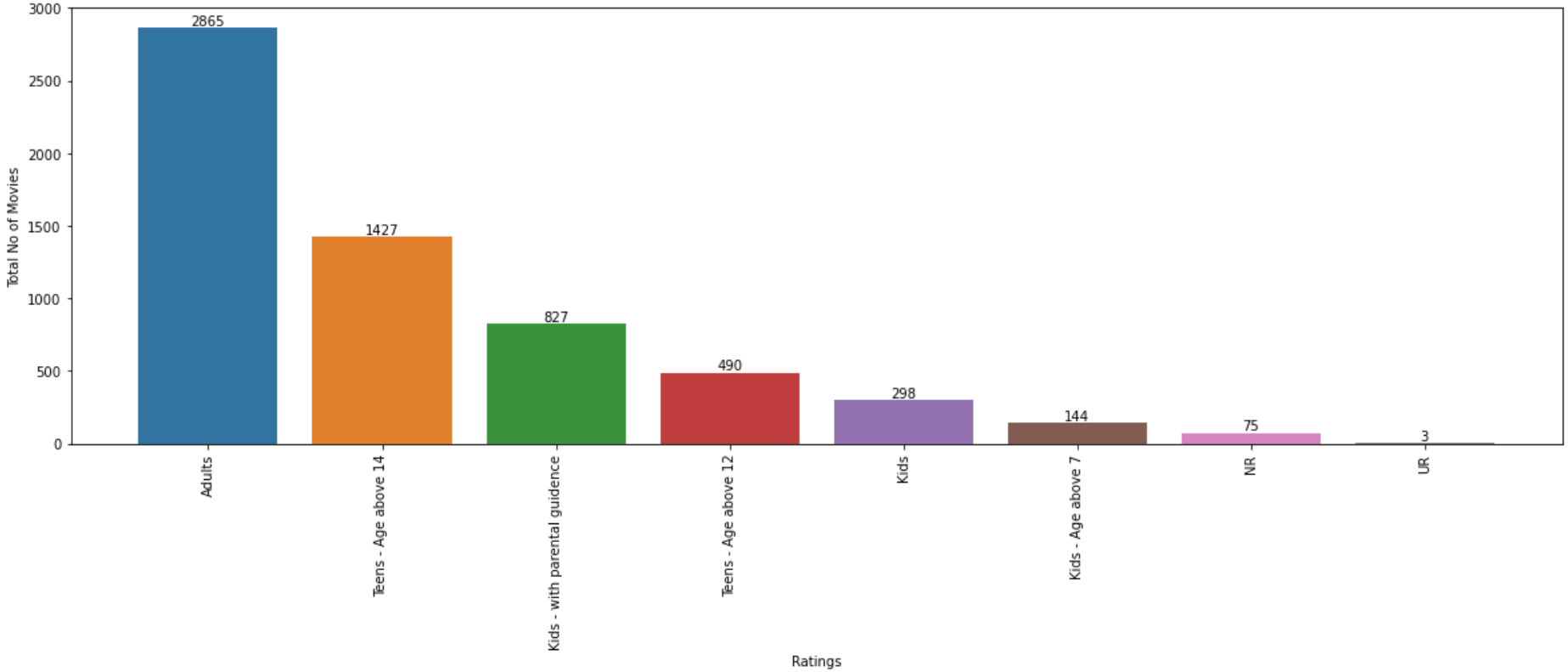
In [28]:
```
rating = df.groupby(['rating'])['title'].count().reset_index().sort_values(["title"],ascending=False)
rating.rename(columns = {'title':'Total No of Movies & Tv Shows','rating':'Ratings'}, inplace = True)
plt.figure(figsize = (20,6))
ax = sns.barplot(data =rating,x = 'Ratings',y ='Total No of Movies & Tv Shows')
ax.bar_label(ax.containers[0])[0]
ax.set_xticklabels(ax.get_xticklabels(), rotation=90)[0]
plt.plot()
```

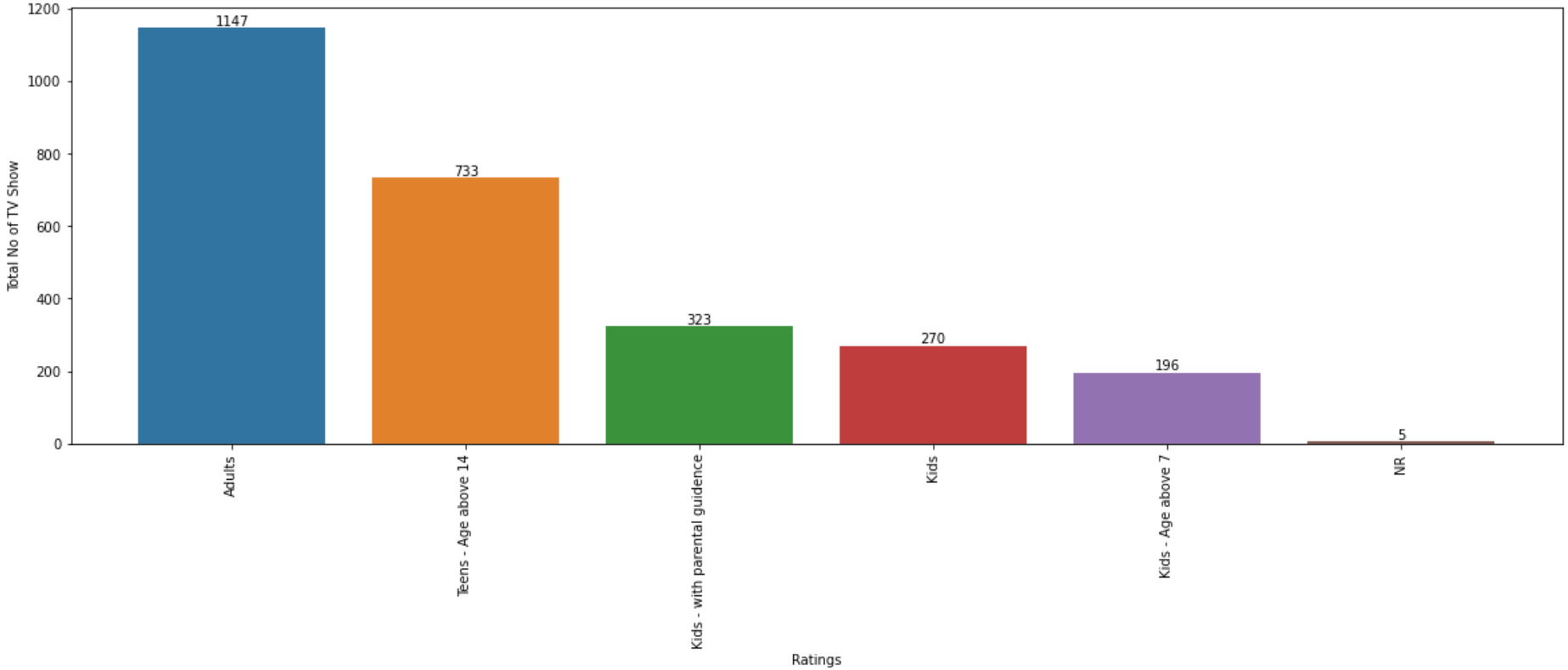
```
# On basies of type of content
#for Movies
rating_all =df.groupby(['type','rating'])['title'].count().reset_index().sort_values(["title"],ascending=False)
rating_all.rename(columns = {'rating':'Ratings'}, inplace = True)
rating_movies =rating_all[rating_all['type'] == "Movie"]
rating_movies.rename(columns = {'title':'Total No of Movies','rating':'Ratings'}, inplace = True)
plt.figure(figsize = (20,6))
bx = sns.barplot(data =rating_movies,x = 'Ratings',y ='Total No of Movies')
bx.bar_label(bx.containers[0])[0]
bx.set_xticklabels(bx.get_xticklabels(), rotation=90)[0]
plt.plot()

# On basies of type of content
#for Tv Show
rating_tv =rating_all[rating_all['type'] == "TV Show"]
rating_tv.rename(columns = {'title':'Total No of TV Show','rating':'Ratings'}, inplace = True)
plt.figure(figsize = (20,6))
cx = sns.barplot(data =rating_tv,x = 'Ratings',y ='Total No of TV Show')
cx.bar_label(cx.containers[0])[0]
cx.set_xticklabels(cx.get_xticklabels(), rotation=90)[0]
plt.plot()

#pie chart

y = rating['Ratings'].tolist()
x = rating['Total No of Movies & Tv Shows'].tolist()
plt.figure(figsize=(10,10))
palette_color = sns.color_palette('bright')
plt.pie(x, labels=y,colors=palette_color, autopct='%.0f%%')[0]
plt.plot()
```

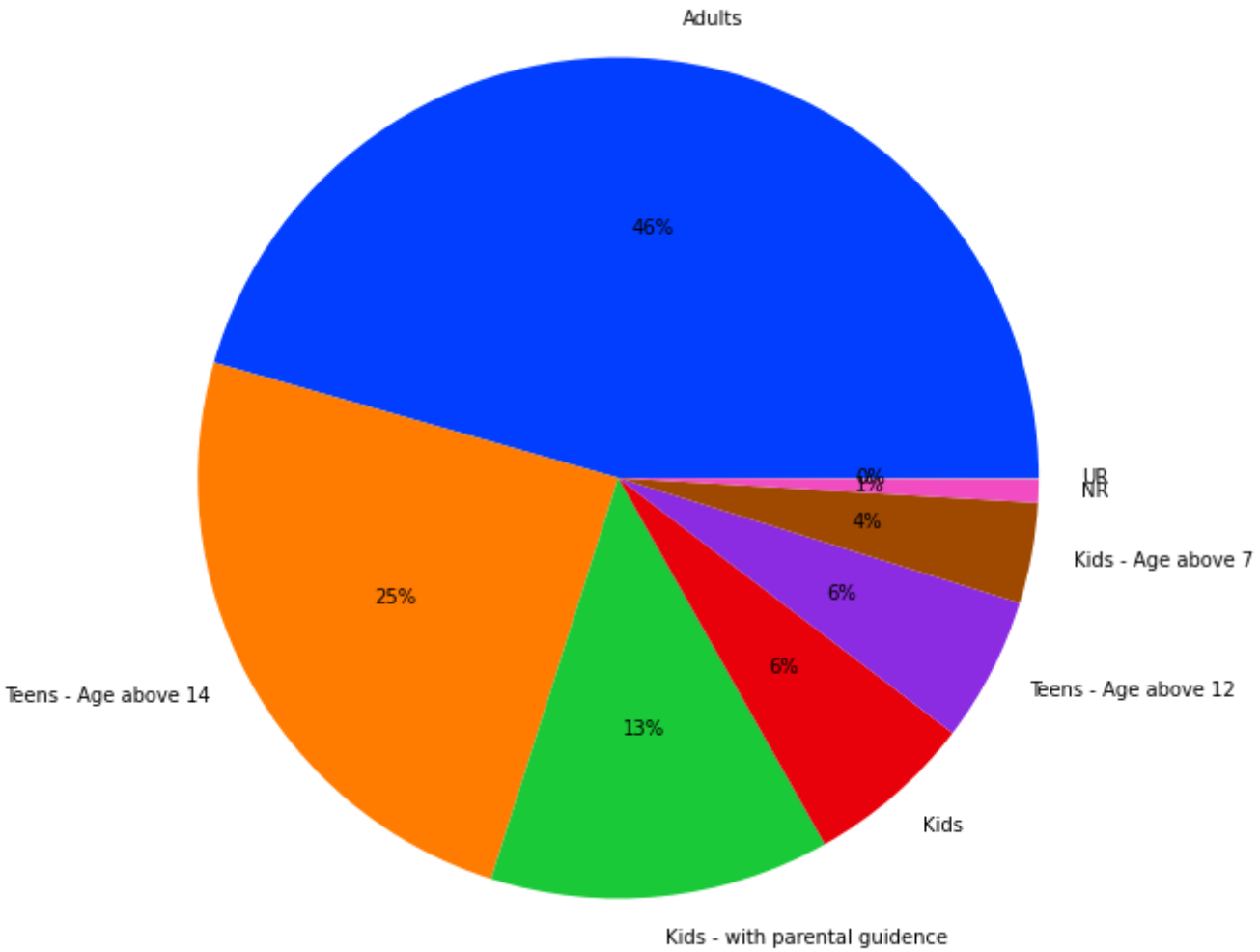
Out[28]:

```
[]
```


4012
2160
1150
568
490
340
80
3
Total No of Movies & Tv Shows
Adults
Teens - Age above 14
Kids - with parental guidence
Kids
Teens - Age above 12
Kids - Age above 7
NR
UR
Ratings


3000
2500
2000
1500
1000
500
0
Total No of Movies
2865
1427
827
490
298
144
75
3
Adults
Teens - Age above 14
Kids - with parental guidence
Teens - Age above 12
Kids
Kids - Age above 7
NR
UR
Ratings


1200
1000
800
600
400
200
0
Total No of TV Show
1147
733
323
270
196
5
Adults
Teens - Age above 14
Kids - with parental guidence
Kids
Kids - Age above 7
NR
Ratings



Conclusion:

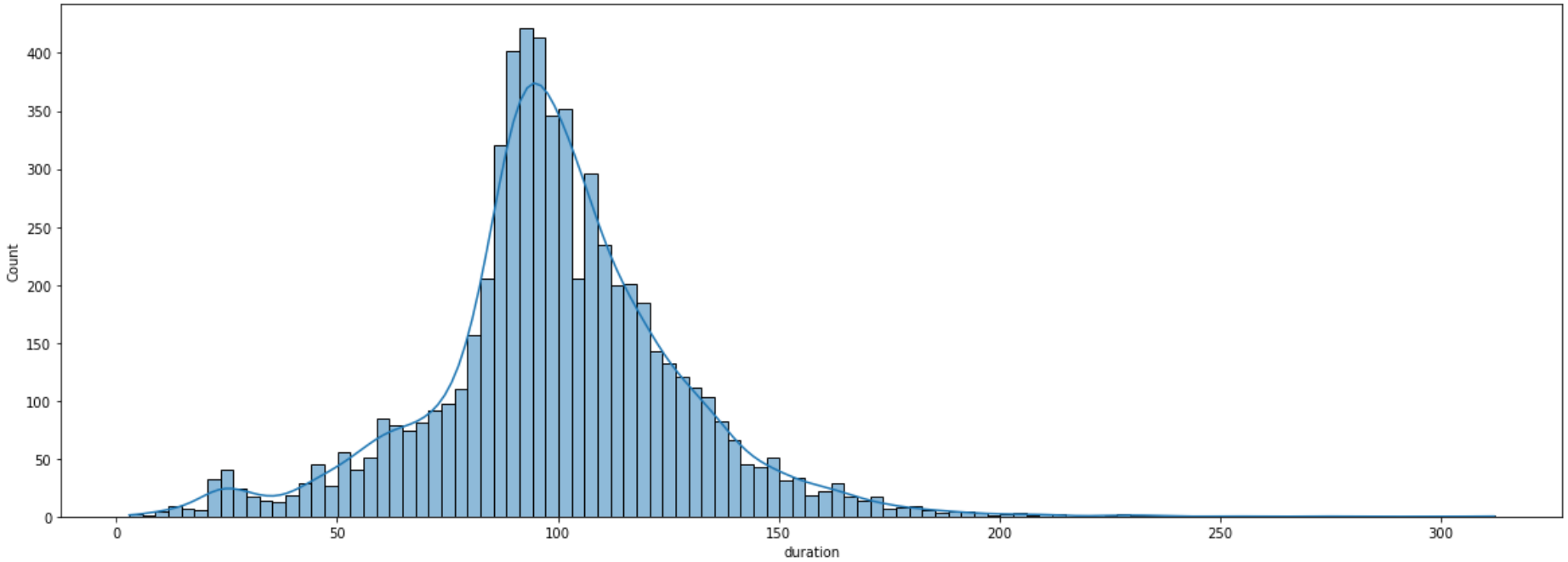
- **Most of Netflix content is Adult/Mature as we can see above 46% content is of Adult rating.**
- **In both Movies and Tv show most of the content is Adult rating.**

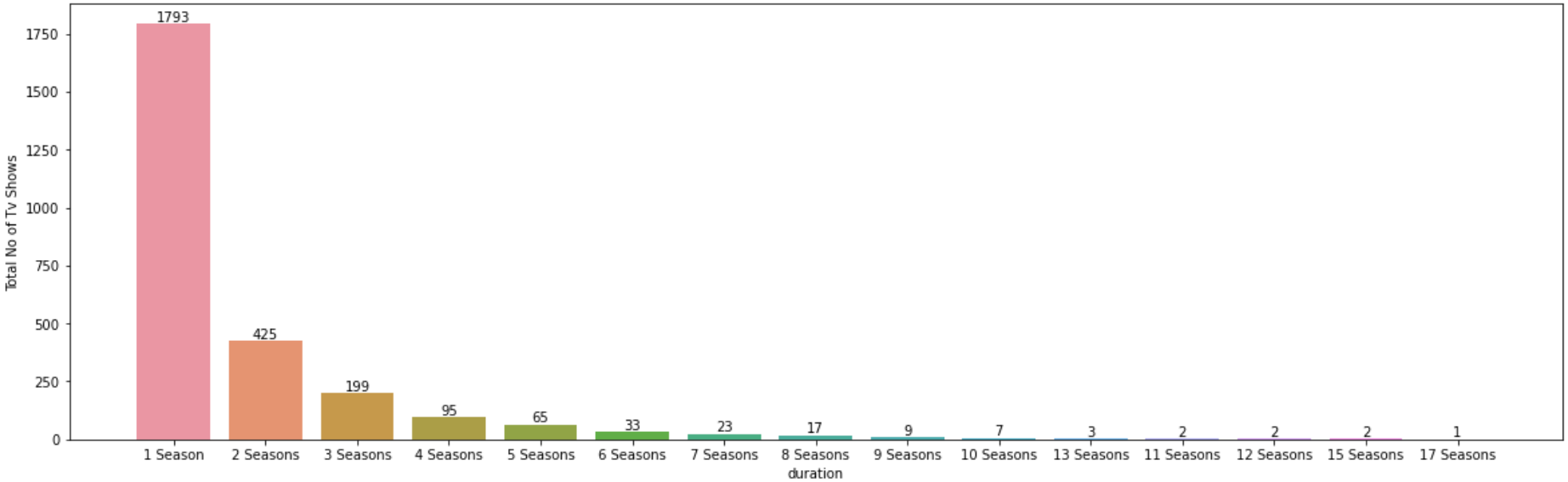
- **Their is no (PG-13'/'Teens - Age above 12) Tv show on Netflix.**
- **More than 70% of Netflix content is divied in two type of rating Adult and Teens-Age aboce 14**

In [29]:
```
# We need to fill the duration by using mean function
new_dataframe = pd.DataFrame()
Movie_dataframe = df[df['type'] == 'Movie']
Tv_dataframe = df[df['type'] == 'TV Show']
temp_data = Movie_dataframe.dropna()
# #finding mean
lis1 = temp_data['duration'].to_list()
lis2 = []
for i in lis1:
    a =i
    b = a.split(' ')[0]
    lis2.append(int(b))
temp_data['duration'] = lis2
mean_time= int(temp_data['duration'].mean())
# repalcing null values with mean
df['duration'].replace(np.nan, mean_time,inplace  = True)
```

In [30]:
```
movie_data_new  = temp_data.iloc[:,[2,9]]
plt.figure(figsize=(20,7))
ax = sns.histplot(data = movie_data_new, x = "duration", kde = True)
# ax.his_label(ax.containers[0])[0]

Tv_dataframe1 = Tv_dataframe.groupby(['duration'])['title'].count().reset_index().sort_values(["title"],ascending=False)
Tv_dataframe1.rename(columns = {'title':'Total No of Tv Shows'}, inplace = True)
plt.figure(figsize = (20,6))
ax = sns.barplot(data =Tv_dataframe1,x = 'duration',y ='Total No of Tv Shows')
ax.bar_label(ax.containers[0])[0]
# ax.set_xticklabels(ax.get_xticklabels(), rotation=90)[0]
plt.plot()
```

Out[30]:
```
[]
```


Count
duration
0
50
100
150
200
250
300
350
400


Total No of Tv Shows
duration
1793
425
199
95
65
33
23
17
9
7
3
2
2
2
1
1 Season
2 Seasons
3 Seasons
4 Seasons
5 Seasons
6 Seasons
7 Seasons
8 Seasons
9 Seasons
10 Seasons
13 Seasons
11 Seasons
12 Seasons
15 Seasons
17 Seasons

Conclusion:

- **The duration for most movies on netflix falls between 80-120 mins with very few movies more than 150 mins.**
- **Most shows on Netflix has only season1.**