Netflix_case_study (1)

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#

Netflix - Exploratory Data Analysis

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Introduction:

Netflix is one of the most popular media and video streaming platforms. They have over 8000 movies or tv shows available on their platform, as of mid-2021, they have over 200M Subscribers globally.

Objective:

Analyzing the data and generating insights helps Netflix decide which type of shows/movies to produce and how to grow the business.

```
[ ]: import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt
     import seaborn as sns
     from PIL import Image
     from wordcloud import WordCloud, STOPWORDS, ImageColorGenerator
     from matplotlib.colors import ListedColormap
     import calendar as cd
```

```
[ ]: data=pd.read_csv('/content/netflix.csv')
```

```
[ ]: # @title Initial reading of data
```

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

```
[ ]:   show_id     type                 title         director  \
     0      s1    Movie  Dick Johnson Is Dead  Kirsten Johnson
     1      s2  TV Show         Blood & Water              NaN
     2      s3  TV Show             Ganglands  Julien Leclercq
     3      s4  TV Show Jailbirds New Orleans              NaN
     4      s5  TV Show          Kota Factory              NaN

                                                     cast        country  \
     0                                              NaN  United States
     1  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban…   South Africa
     2  Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi…            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…
```

We have been given Netflix data to analyse using - The no of shows - Types of shows - No of directors - Different cast members - Countries they were produced in - When they were released and when they were added to netflix - What kind of rating has been issued to them with respect the viewing audience - How long is a movie in minutes or a TV Show in seasons - What genres does a show fall under and its description

[ ]:
```
data.shape
```

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

[ ]:
```
data.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
```

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

0.1 Pre-Processing observations

- Given Netflix data has 8807 rows and 12 columns
- Release_year column is of the type Integer
- 11 columns are of the data type object
- 3 of the columns have huge amount of null values that need to be imputed
- Other 3 columns with null values can be dropped due to negligable no of null values
- 4 of the columns('Director','listed_in','cast','country')have multiple values in them that need to be seperated using split and exploding based on commas
- Date_added column needs to be converted into date type from object type
- Type column lists if the given show is a Movie or a TV Show

```
[ ]: data_cleaned=data.copy()
```

```
[ ]: # @title Basic Analysis-Handling Null values

     data_cleaned['date_added']=pd.
      ↪to_datetime(data_cleaned['date_added'],format='mixed')
```

[ ]:

```
data_cleaned['director'].fillna('unknown_director',inplace=True)
data_cleaned['cast'].fillna('unknown_cast',inplace=True)
data_cleaned['country'].fillna('unknown_country',inplace=True)
```

[ ]:

```
data_cleaned['rating']=data_cleaned['rating'].replace('74 min','unknown_rating')
data_cleaned['rating']=data_cleaned['rating'].replace('84 min','unknown_rating')
data_cleaned['rating']=data_cleaned['rating'].replace('66 min','unknown_rating')
```

[ ]:

```
#2null values not dropping
data_cleaned.dropna(subset=['date_added','rating','duration'],inplace=True)
```

[ ]:

```
data_cleaned.isna().sum()
```

[ ]:

```
show_id         0
type            0
title           0
director        0
cast            0
country         0
date_added      0
release_year    0
rating          0
duration        0
listed_in       0
description     0
dtype: int64
```

[ ]:

```
data_cleaned.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 8790 entries, 0 to 8806
Data columns (total 12 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   show_id       8790 non-null   object
 1   type          8790 non-null   object
 2   title         8790 non-null   object
 3   director      8790 non-null   object
 4   cast          8790 non-null   object
 5   country       8790 non-null   object
 6   date_added    8790 non-null   datetime64[ns]
 7   release_year  8790 non-null   int64
 8   rating        8790 non-null   object
 9   duration      8790 non-null   object
 10  listed_in     8790 non-null   object
 11  description   8790 non-null   object
dtypes: datetime64[ns](1), int64(1), object(10)
```

```
memory usage: 892.7+ KB
```

```
[ ]: #@title Un-nesting Columns
```

```
[ ]: data_unnested=data_cleaned.copy()
```

```
[ ]: data_unnested['cast_exploded']=data_unnested['cast'].str.split(',')
```

```
[ ]: data_unnested['listed_in_exploded']=data_unnested['listed_in'].str.split(',')
```

```
[ ]: data_unnested['country_exploded']=data_unnested['country'].str.split(',')
```

```
[ ]: data_unnested['director_exploded']=data_unnested['director'].str.split(',')
```

```
[ ]: data_unnested=data_unnested.explode('cast_exploded')
```

```
[ ]: data_unnested=data_unnested.explode('listed_in_exploded')
```

```
[ ]: data_unnested=data_unnested.explode('director_exploded')
```

```
[ ]: data_unnested=data_unnested.explode('country_exploded')
```

```
[ ]: data_unnested.
       ↪drop(['cast','listed_in','director','country'],axis=1,inplace=True)
```

```
[ ]: data_unnested.rename(columns={'listed_in_exploded':'genre','country_exploded':
       ↪'country','director_exploded':'director','cast_exploded':
       ↪'actor'},inplace=True)
```

```
[ ]: data_unnested = data_unnested.apply(lambda x: x.str.strip() if x.dtype ==␣
       ↪"object" else x)
```

```
[ ]: data_unnested.head()
```

```
[ ]:   show_id     type                title date_added  release_year rating  \
     0      s1    Movie  Dick Johnson Is Dead 2021-09-25          2020  PG-13
     1      s2  TV Show         Blood & Water 2021-09-24          2021  TV-MA
     1      s2  TV Show         Blood & Water 2021-09-24          2021  TV-MA
     1      s2  TV Show         Blood & Water 2021-09-24          2021  TV-MA
     1      s2  TV Show         Blood & Water 2021-09-24          2021  TV-MA

         duration                                        description         actor  \
     0     90 min  As her father nears the end of his life, filmm…  unknown_cast
     1  2 Seasons  After crossing paths at a party, a Cape Town t…    Ama Qamata
     1  2 Seasons  After crossing paths at a party, a Cape Town t…    Ama Qamata
     1  2 Seasons  After crossing paths at a party, a Cape Town t…    Ama Qamata
     1  2 Seasons  After crossing paths at a party, a Cape Town t…   Khosi Ngema
```

```
                    genre        country           director
0           Documentaries  United States    Kirsten Johnson
1  International TV Shows   South Africa  unknown_director
1               TV Dramas   South Africa  unknown_director
1            TV Mysteries   South Africa  unknown_director
1  International TV Shows   South Africa  unknown_director
```

```
[ ]: data_unnested.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 201837 entries, 0 to 8806
Data columns (total 12 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   show_id       201837 non-null  object
 1   type          201837 non-null  object
 2   title         201837 non-null  object
 3   date_added    201837 non-null  datetime64[ns]
 4   release_year  201837 non-null  int64
 5   rating        201837 non-null  object
 6   duration      201837 non-null  object
 7   description   201837 non-null  object
 8   actor         201837 non-null  object
 9   genre         201837 non-null  object
 10  country       201837 non-null  object
 11  director      201837 non-null  object
dtypes: datetime64[ns](1), int64(1), object(10)
memory usage: 20.0+ MB
```

```
[ ]: data_unnested.shape
```

```
[ ]: (201837, 12)
```

```
[ ]: data_unnested.drop_duplicates(inplace=True)
```

```
[ ]: data_unnested.shape
```

```
[ ]: (201782, 12)
```

0.2 Pre Processing of data

-

0.3 Steps taken to process data for use are:

- Date_added has been converted to DateTime type
- Nulll values dropped in ‘Date_added’, ‘Rating’, ‘Duration’

  - Null values in the ‘Director”. ’Cast’, ‘Country’ have been replaced and set to Unknown
  - Leading and trailing spaces in Country has been removed to maintain uniformity of the data
  - Outlier values of Rating category have been set Unknown
  - After Unnesting the above mentioned columns to create a row of each respectrive values we get the final dataset ready to analyse and find insights has ‘201782’ rows with same 12 columns

```
[ ]: # @title 1. Find the counts of each categorical variable both using graphical␣
      ↪and nongraphical analysis.
```

```
[ ]: #@title a. For Non-graphical Analysis:
     data_unnested['show_id'].nunique()
```

```
[ ]: 8790
```

We have 8790 different shows on Netflix

```
[ ]: data_cleaned['type'].value_counts()
```

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

- No of Movies:- 6126
- No of shows:- 2664

```
[ ]: data_cleaned['title'].nunique()
```

```
[ ]: 8790
```

All the 8790 shows have been found to have a unique title

```
[ ]: data_unnested['director'].nunique()
```

```
[ ]: 4992
```

There are 4992 different directors having 1 or more of their shows released on Netflix

```
[ ]: data_unnested['actor'].nunique()
```

```
[ ]: 36393
```

A total of 36393 have acted in shows that are on the Netflix platform

```
[ ]: data_unnested['genre'].nunique()
```

```
[ ]: 42
```

Shows on Netflix can be categorized into 42 different Genres

```
[ ]: data_unnested['country'].nunique()
```

```
[ ]: 124
```

The production of shows across the world has taken place in a whopping 124 countries bringing in diverse views from different demographics

```
[ ]: data_cleaned['date_added'].dt.year.value_counts()
```

```
[ ]: date_added
     2019    2016
     2020    1879
     2018    1648
     2021    1498
     2017    1185
     2016     426
     2015      82
     2014      24
     2011      13
     2013      11
     2012       3
     2009       2
     2008       2
     2010       1
     Name: count, dtype: int64
```

While Netflix started adding shows to its platforms in 2008, the number of shows added has exponentially risen in its first 10 years with the peak no of shows added coming between 2018-2020

```
[ ]: data['release_year'].value_counts()
```

```
[ ]: release_year
     2018    1147
     2017    1032
     2019    1030
     2020     953
     2016     902
             …
     1959       1
     1925       1
     1961       1
     1947       1
     1966       1
     Name: count, Length: 74, dtype: int64
```

Shows on Netflix go as for beyond as early 20th century bringing audience contnet from different stages of history to be devoured while shows from recent history has been staggering

[ ]:

```
data_cleaned['rating'].value_counts()
```

[ ]:

```
rating
TV-MA       3205
TV-14       2157
TV-PG        861
R            799
PG-13        490
TV-Y7        333
TV-Y         306
PG           287
TV-G         220
NR            79
G             41
TV-Y7-FV       6
NC-17          3
UR             3
Name: count, dtype: int64
```

Netflix caters to all set of audience having huge no of shows for viewers allowing them to select between shows set for their age and mental and emotional preference

[ ]:

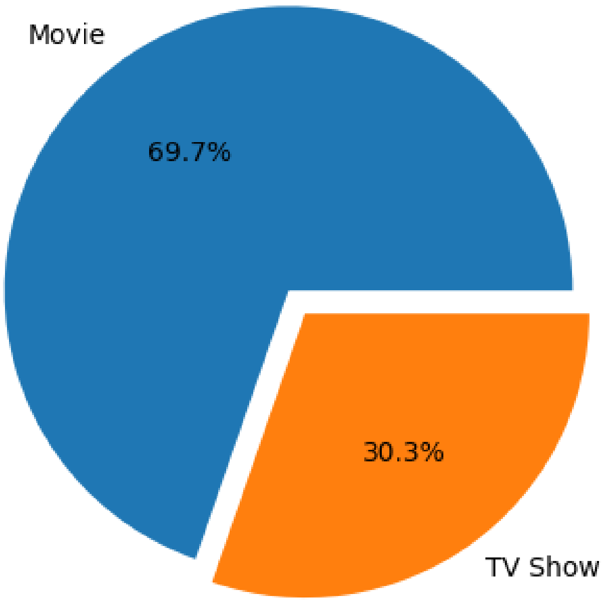
```
# @title b. For graphical analysis:
```

[ ]:

```
#@title TV Shows vs Movies
#plt.figure(figsize=(15,10))
#sns.countplot(x='type',data=data_cleaned,hue='type')
#plt.show()
```

[ ]:

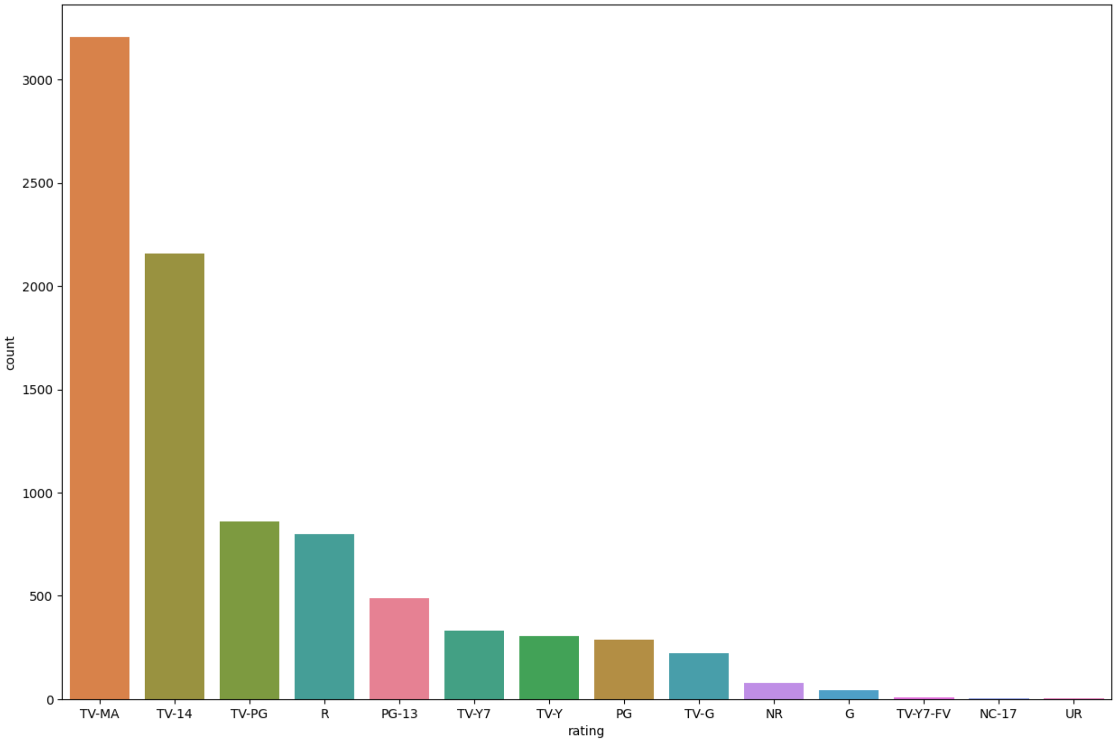
```
plt.pie(data_cleaned['type'].value_counts(),autopct='%1.1f%%',explode=(0.05,0.
  ↪05),labels=data_cleaned['type'].value_counts().index)
plt.show()
```



Almost 70% of the shows on the platform are movies while 30% of the titles are TV Shows

```
[ ]: #@title Rating Countplot
```

```
[ ]: plt.figure(figsize=(15,10))
     sns.
      ↪countplot(x='rating',data=data_cleaned,hue='rating',order=data_cleaned['rating'].
      ↪value_counts().index[:])
     plt.show()
```



Most titles on Netflix are for viewers who can be categorized as mature followed by audience above the age of 14. Also a good chunk of shows are advised to be watched under parental guidance for children closely followed by shows restricted for age under 17 without adult supervision

```
[ ]: #@title Titles by country
     country_data1=data_unnested[data_unnested['country']!='unknown_country']
```

```
[ ]: country_data1=country_data1.
       ↪drop_duplicates(subset=['show_id','country'],keep='first')
```

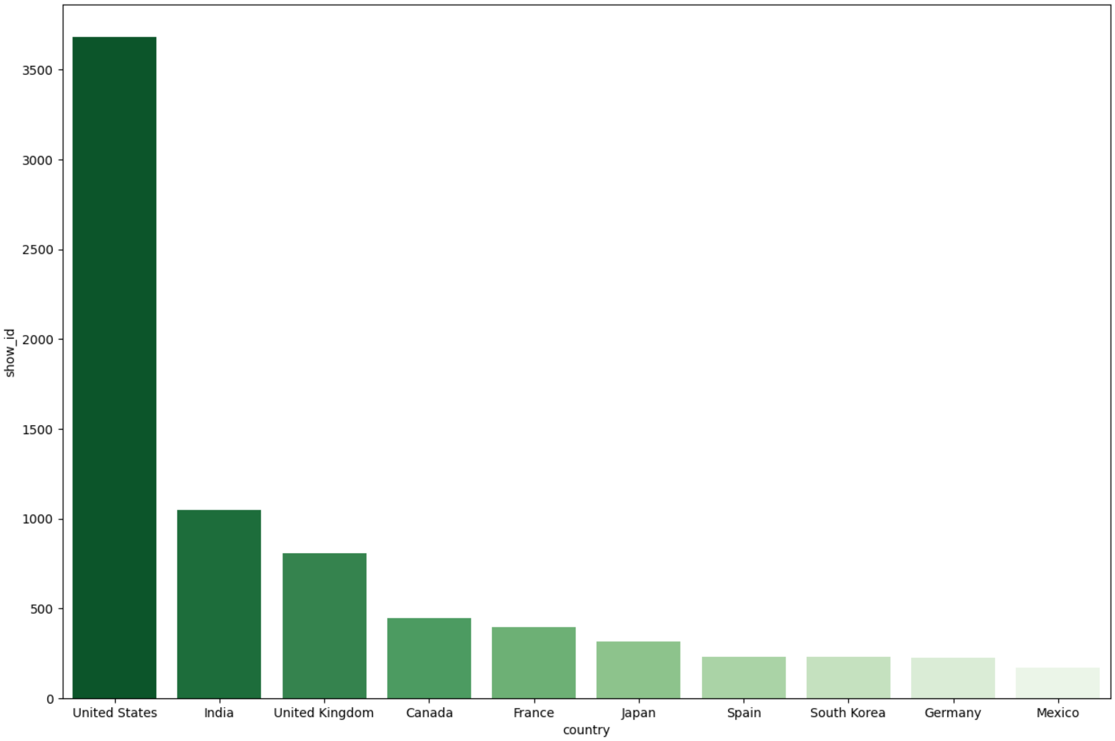
```
[ ]: bar_data=country_data1.groupby(['country'])['show_id'].count().
       ↪sort_values(ascending=False).head(10)
```

```
[ ]: plt.figure(figsize=(15,10))
     sns.barplot(x=bar_data.index,y=bar_data,palette='Greens_r')
     plt.show()
```

```
<ipython-input-453-b3e64bade9c6>:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same
effect.

  sns.barplot(x=bar_data.index,y=bar_data,palette='Greens_r')
```



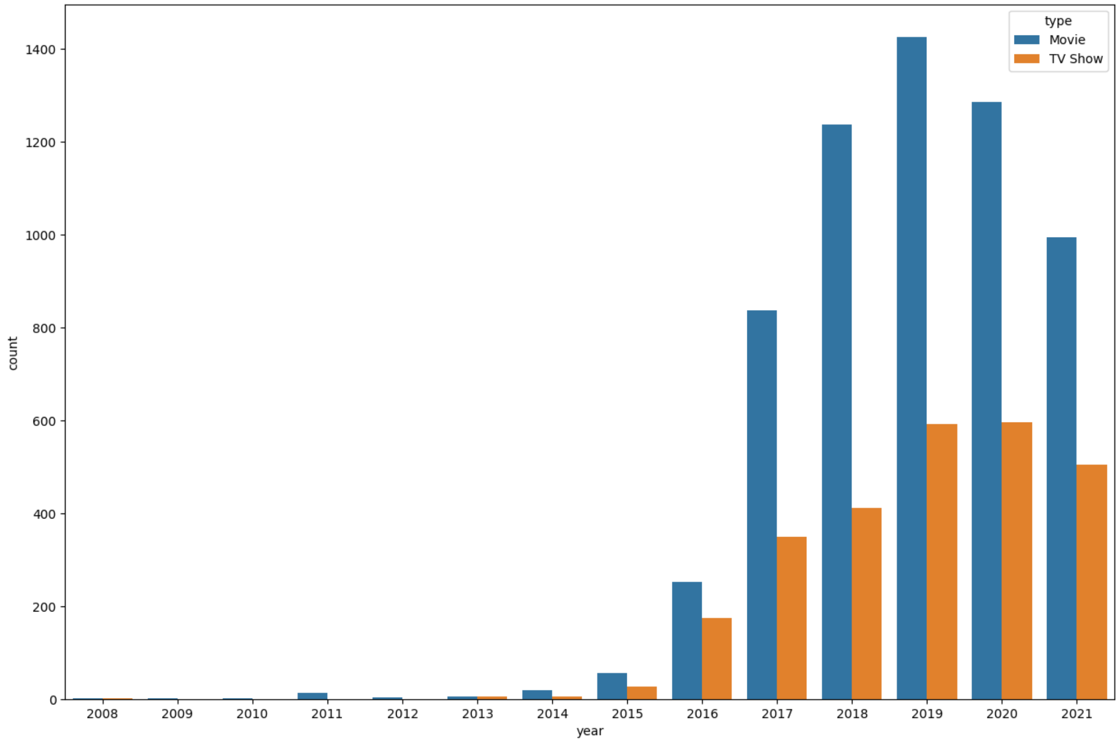
United States has a huge capture in the no of shows on Netflix while 6-10 of the Top 10 are fairly closer to each other than on the top

[ ]:
```
#@title Date added v Type
```

[ ]:
```
date_added_data1=data_cleaned.drop_duplicates(subset=['show_id'],keep='first')
```

[ ]:
```
date_added_data1['year']=date_added_data1['date_added'].dt.year
```

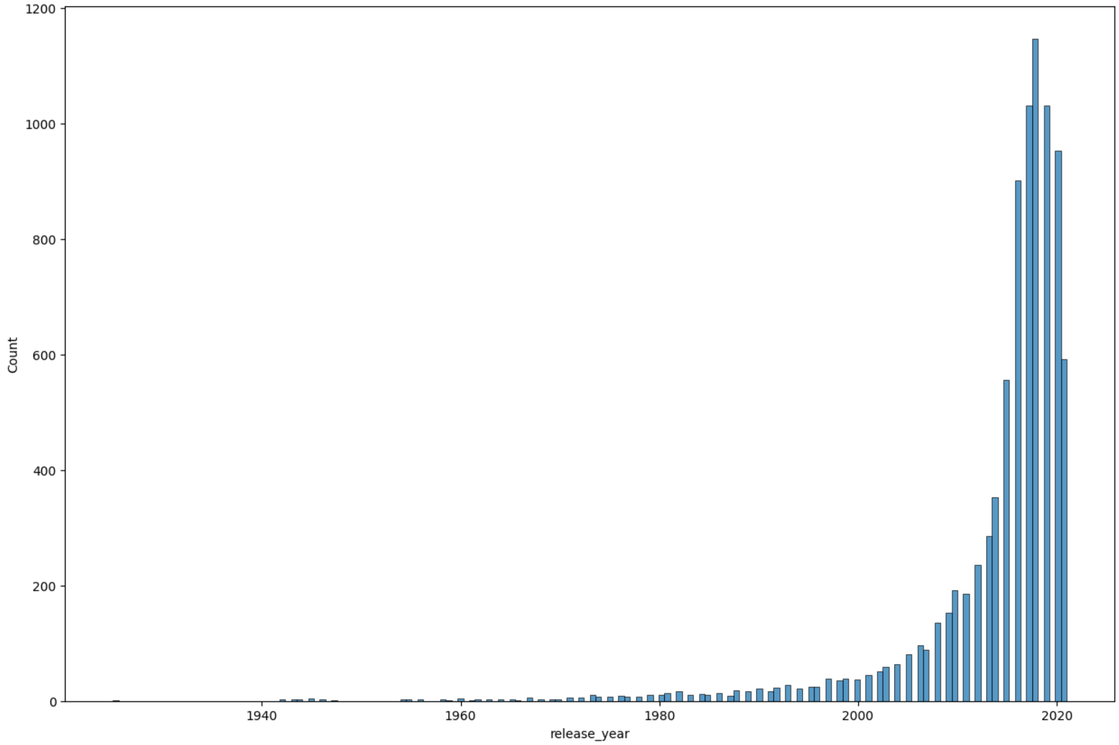
[ ]:
```
plt.figure(figsize=(15,10))
sns.countplot(x='year',data=date_added_data1,hue='type')
plt.show()
```



Netflix added most of the shows on its platform between 2018 and 2020 with 2019 seeing the highest of additions in both Movies and TV Show

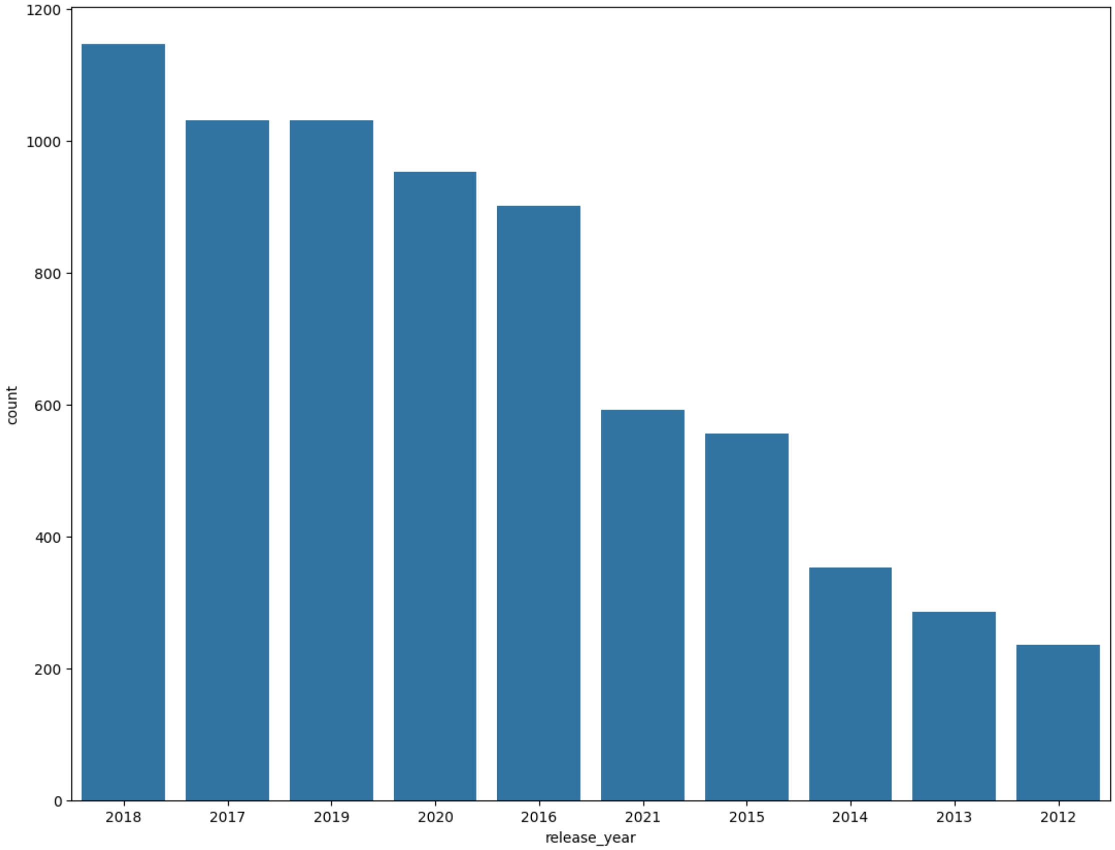
```
[ ]: #@title Release Year
     hist_data1=data_cleaned.drop_duplicates(subset=['show_id'],keep='first')
```

```
[ ]: plt.figure(figsize=(15,10))
     sns.histplot(data=hist_data1,x='release_year',fill=True)
     plt.show()
```



Majority of shows on Netflix are released after the year 2000 while the post 2010 shows take huge chunks of those

```
[ ]: #@title Top 10 release years
     plt.figure(figsize=(13,10))
     sns.
       ↪countplot(x='release_year',data=data_cleaned,order=data_cleaned['release_year'].
       ↪value_counts().index[0:10])
     plt.show()
```



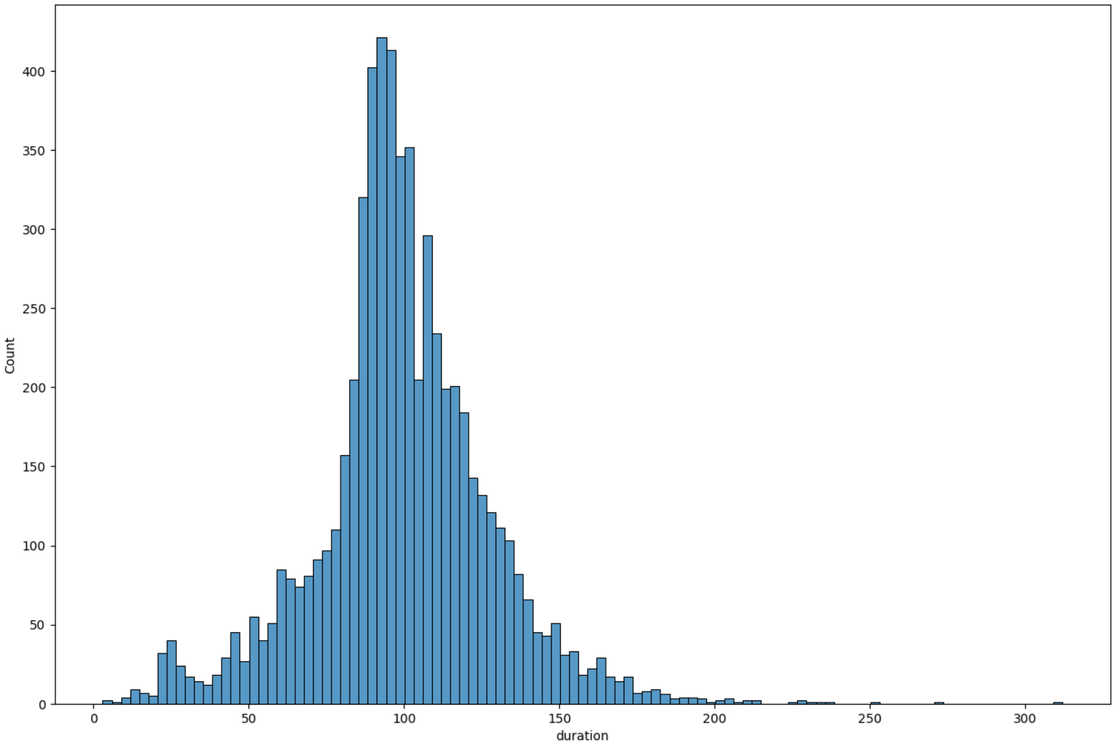
Shows released between 2015 and 2020 are the most common ones on Netflix

[ ]:
```
#@title Duration(Movies)
movie_duration=data_cleaned[data_cleaned['type']=='Movie']
```

[ ]:
```
movie_duration['duration']=movie_duration['duration'].str.replace(' min','')
```

[ ]:
```
movie_duration['duration']=movie_duration['duration'].astype(str).astype(float)
```

[ ]:
```
plt.figure(figsize=(15,10))
sns.histplot(data=movie_duration,x='duration',fill=True)
plt.show()
```



Most Movies on netflix are 90 min to 110 long

```
[ ]: #@title  Duration(TV Shows)
```

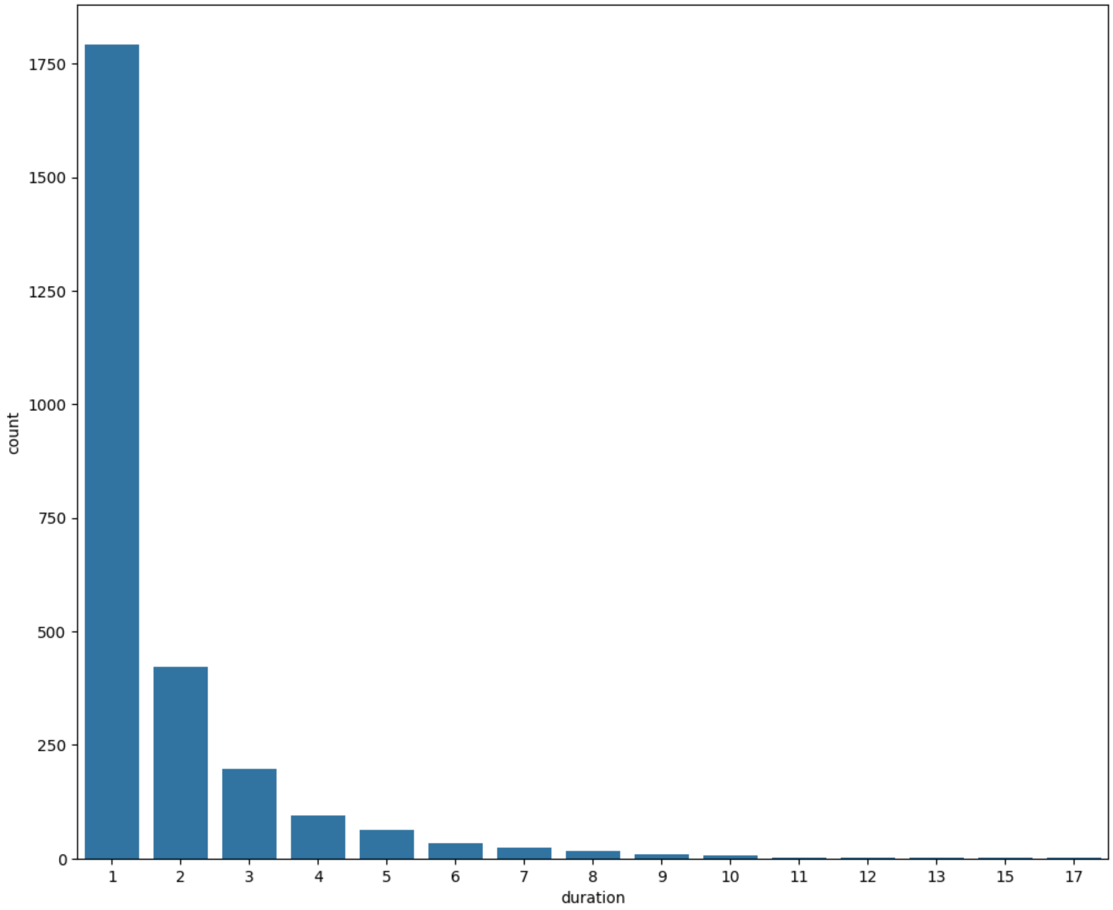
```
[ ]: tv_duration_data=data_unnested.drop_duplicates(subset=['show_id'],keep='first')
```

```
[ ]: tv_duration_data=tv_duration_data[(tv_duration_data['rating']!
      ↪='unknown_rating')& (duration_data_1['type']=='TV Show')]
```

```
[ ]: tv_duration_data['duration']=tv_duration_data['duration'].str.split(' ').str[0]
```

```
[ ]: tv_duration_data['duration']=tv_duration_data['duration'].astype(str).
      ↪astype(int)
```

```
[ ]: plt.figure(figsize=(12,10))
     sns.countplot(x='duration',data=tv_duration_data)
     plt.show()
```

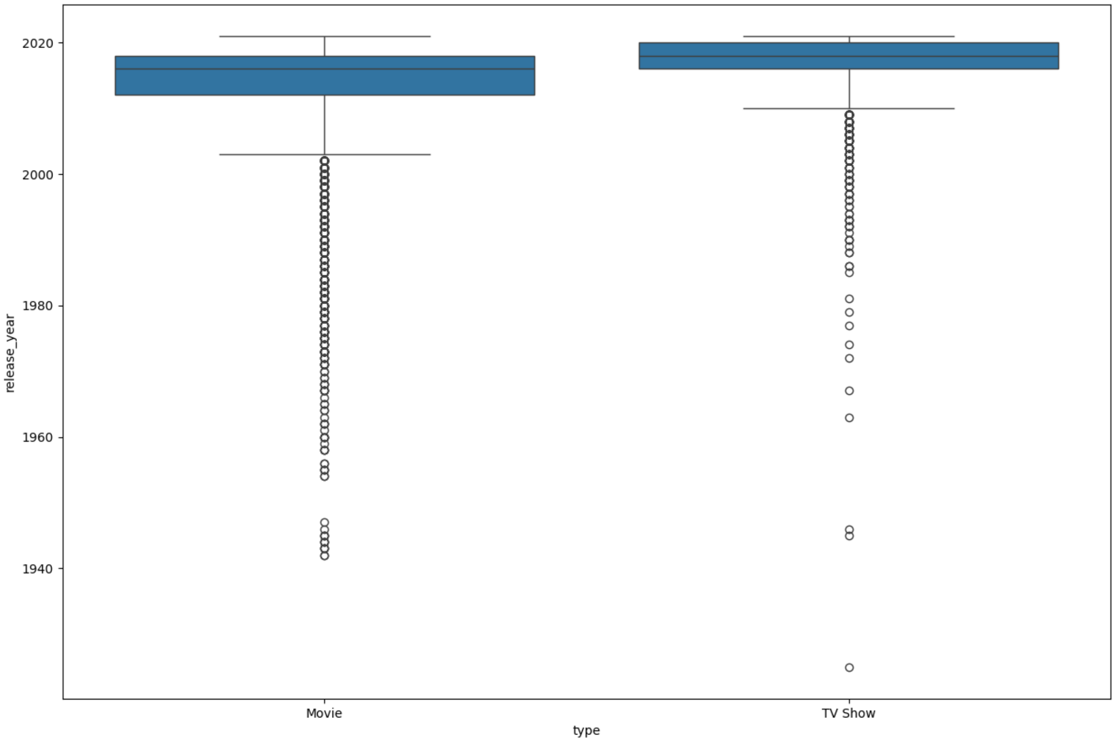


Most of the TV Shows on netflix are only a season long while no of shows with multiple seasons drop fairly steeps after 5 seasons

```
[ ]: #@title Movies vs TV Shows
```

```
[ ]: box_data1=data_cleaned.drop_duplicates(subset=['show_id'],keep='first')
```

```
[ ]: plt.figure(figsize=(15,10))
     sns.boxplot(x='type',y='release_year',data=box_data1)
     plt.show()
```



Most of the TV Shows on netflix are fairly recent with a higher median value when compared to the Movies on the platform,with Movies released having a fair few more outliers when compared to release of TV Shows

```
[ ]: #@title Heatmap
```

```
[ ]: heatmap_data1=data_unnested.drop_duplicates(subset=['show_id'],keep='first')
```

```
[ ]: # @title
     heatmap_data1['year_added']=heatmap_data1['date_added'].dt.year
     heatmap_data1['month_added']=heatmap_data1['date_added'].dt.month
```

```
[ ]: type_encoded=pd.get_dummies(heatmap_data1['type'],prefix='type')
```

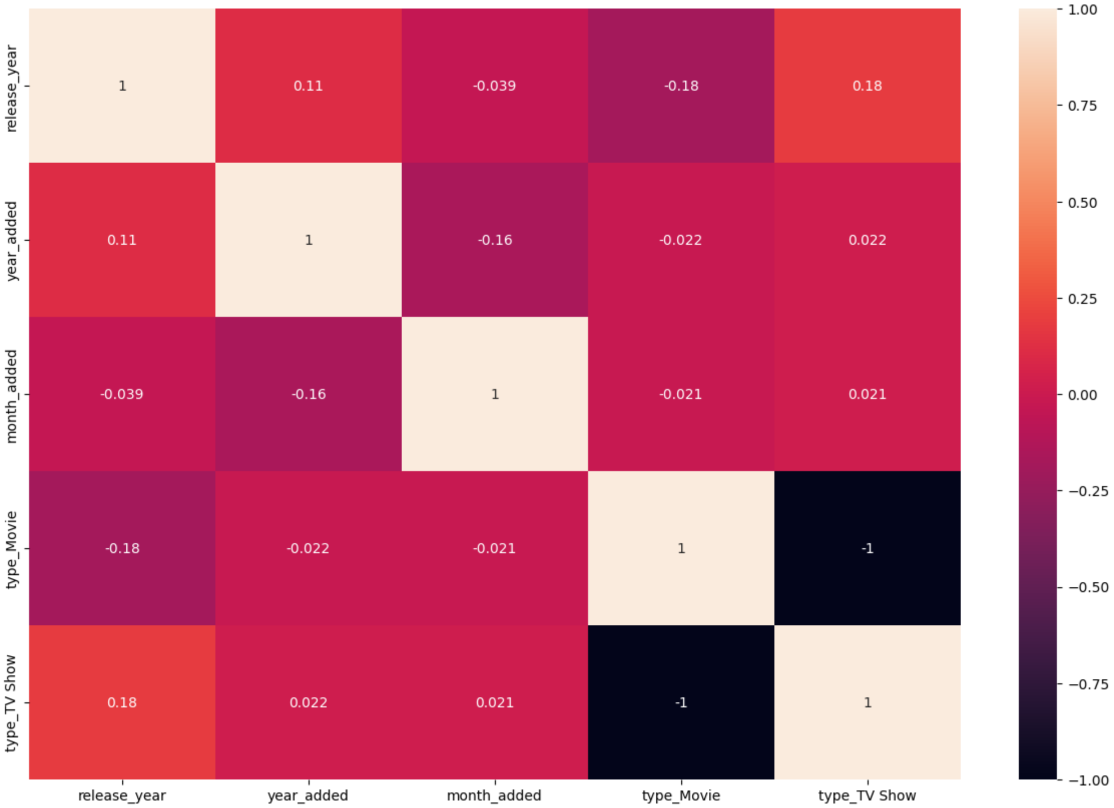
```
[ ]: heatmap_encoded=pd.concat([heatmap_data1,type_encoded],axis=1)
```

```
[ ]: correlation_data=heatmap_encoded[['release_year', 'year_added', 'month_added',␣
       ↪'type_Movie', 'type_TV Show']]
```

```
[ ]: heat_map_corr_matrix=correlation_data.corr()
```

```
[ ]: plt.figure(figsize=(15,10))
     sns.heatmap(heat_map_corr_matrix,annot=True)
```

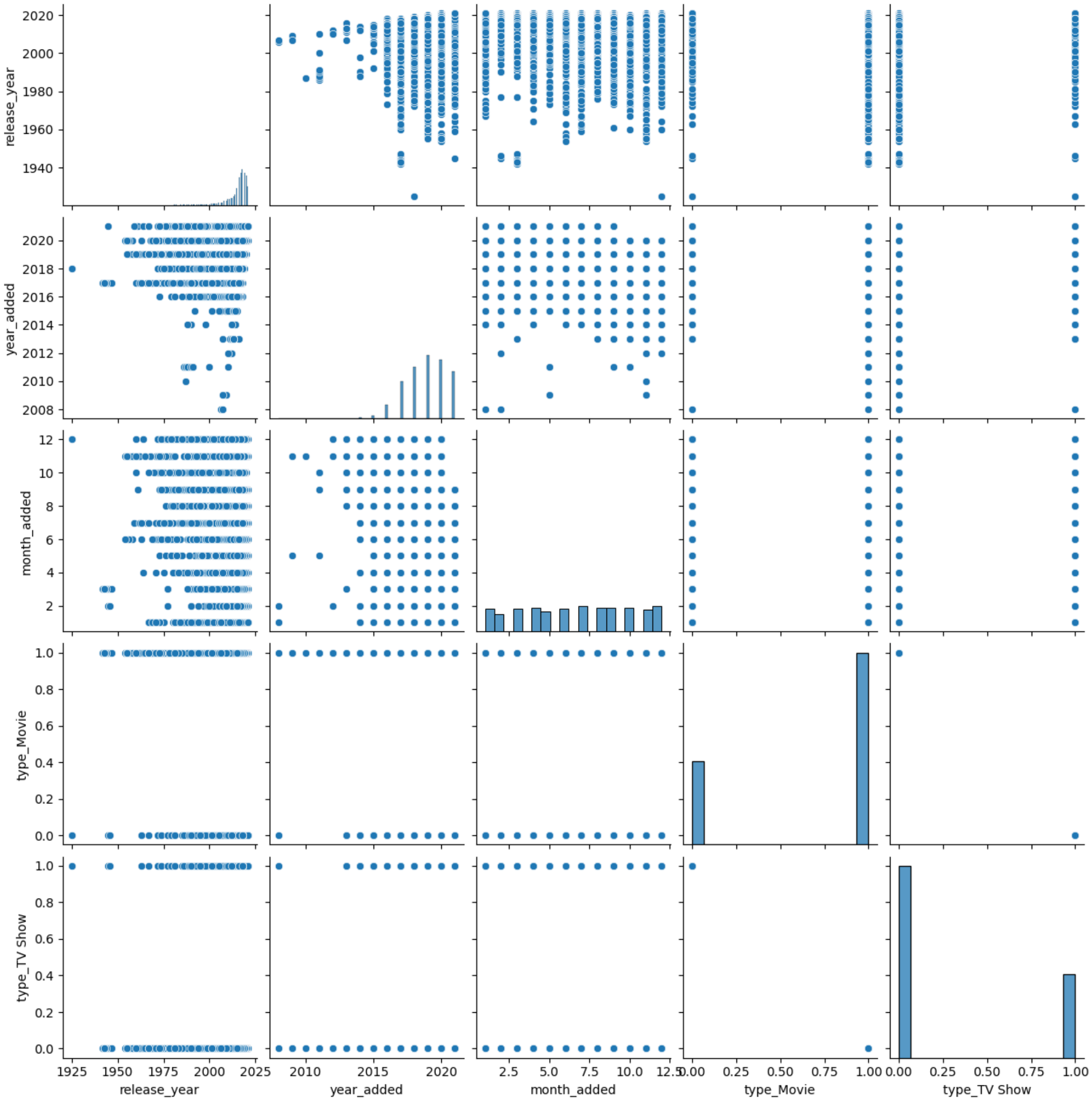
```
plt.show()
```



By the above heatmap we can infer that TV Shows have the highest correlation with release year movies have a negative correlation with every other numerical category in the data

[ ]:
```
#@title Pairplot
plt.figure(figsize=(15,10))
sns.pairplot(correlation_data)
plt.show()
```

```
<Figure size 1500x1000 with 0 Axes>
```



```
[ ]: #@title 2. Comparison of tv shows vs. movies.
```

```
[ ]: #@title a. Find the number of movies produced in each country and pick the top␣
      ↪10 countries.
     movie_data=data_unnested[(data_unnested['type']=='Movie')&(data_unnested['country']!
      ↪='unknown_country')]
```

```
[ ]: movie_data=movie_data.drop_duplicates(subset=['show_id','country'],keep='first')
```

```
[ ]: movie_data.groupby(['country'])['show_id'].count().sort_values(ascending=False).
      ↪head(10)
```

```
[ ]: country
     United States     2749
     India              962
     United Kingdom     534
     Canada             319
     France             303
     Germany            182
     Spain              171
     Japan              119
     China              114
     Mexico             111
     Name: show_id, dtype: int64
```

One-Third of the movies on Netflix have been produced in the United States while movies from India are well ahead of the rest of the pack

```
[ ]: #@title b. Find the number of Tv-Shows produced in each country and pick the␣
      ↪top 10 countries.
     tv_data=data_unnested[(data_unnested['type']=='TV␣
      ↪Show')&(data_unnested['country']!='unknown_country')]
```

```
[ ]: tv_data=tv_data.drop_duplicates(subset=['show_id','country'],keep='first')
```

```
[ ]: tv_data.groupby(['country'])['show_id'].count().sort_values(ascending=False).
      ↪head(10)
```

```
[ ]: country
     United States     932
     United Kingdom    271
     Japan             197
     South Korea       170
     Canada            126
     France             90
     India              84
     Taiwan             70
     Australia          64
     Spain              61
     Name: show_id, dtype: int64
```

Shows from United States are in a staggering amount in comparision with the other countries and only 5 of the countries have shows in excess of 100 on the platform

```
[ ]: # @title 3.Best time to launch a show
```

```
[ ]: new_data=data_unnested.drop_duplicates(subset=['show_id'],keep='first')
[ ]: new_data['year']=new_data['date_added'].dt.year
     new_data['month']=new_data['date_added'].dt.month
     new_data['day']=new_data['date_added'].dt.day
```

```
[ ]: month_mappings={1:'January',2:'February',3:'March',4:'April',5:'May',6:'June',7:
       ↪'July',8:'August',9:'September',10:'October',11:'November',12:'December'}
```

```
[ ]: new_data['month']=new_data['month'].replace(month_mappings)
```

```
[ ]: #@title a.Find which is the best week to release the Tv-show or the movie. Do␣
       ↪the analysis separately for Tv-shows and Movies
     bin_labels=['week1','week2','week3','week4','week5']
     bin_values=[1,7,14,21,28,32]
     new_data['week']=pd.cut(new_data['day'],bins=bin_values,labels=bin_labels)
```

```
[ ]: new_data_tv_1=new_data[(new_data['type']=='TV Show')]
     new_data_movie_1=new_data[(new_data['type']=='Movie')]
```

```
[ ]: new_data_tv_1.groupby(['week','type'])['show_id'].count().
       ↪sort_values(ascending=False)
```

```
[ ]: week   type
     week3  TV Show    655
     week2  TV Show    444
     week4  TV Show    430
     week1  TV Show    392
     week5  TV Show    223
     Name: show_id, dtype: int64
```

3rd week of the month that is after half of the month has been the most succesful one to launch a TV show on Netflix and start and end of the month are the least successful ones to launch a TV Show

```
[ ]: new_data_movie_1.groupby(['week','type'])['show_id'].count().
       ↪sort_values(ascending=False)
```

```
[ ]: week   type
     week3  Movie    1391
     week4  Movie     930
     week1  Movie     893
     week2  Movie     821
     week5  Movie     402
     Name: show_id, dtype: int64
```

Like TV Shows it is best to launch Movie between 14th and 21st day of the month

```
[ ]: #@title b.Find which is the best month to release the Tv-show or the movie. Do␣
      ↪the analysis separately for Tv-shows and Movies
     new_data_tv_1.groupby(['month','type'])['show_id'].count().
      ↪sort_values(ascending=False)
```

```
[ ]: month      type
     December   TV Show    265
     July       TV Show    262
     September  TV Show    251
     August     TV Show    236
     June       TV Show    236
     October    TV Show    215
     April      TV Show    214
     March      TV Show    213
     November   TV Show    207
     May        TV Show    193
     January    TV Show    192
     February   TV Show    180
     Name: show_id, dtype: int64
```

While there is not much of clear distribution at the top in best month to launch a TV Show it is found that releases are done more in the 2nd half of the year as 5 of the 6 top months are post June with January and Febraury being the least favourable months for release of a TV Show

```
[ ]: new_data_movie_1.groupby(['month','type'])['show_id'].count().
      ↪sort_values(ascending=False)
```

```
[ ]: month      type
     July       Movie    565
     April      Movie    549
     December   Movie    547
     January    Movie    545
     October    Movie    545
     March      Movie    528
     August     Movie    518
     September  Movie    518
     November   Movie    498
     June       Movie    492
     May        Movie    439
     February   Movie    382
     Name: show_id, dtype: int64
```

July is the most preferable month to launch a Movie while Febraury(like TV show) is found to be the last in the pecking order

```
[ ]: # @title 4. Analysis of actors/directors of different types of shows/movies.
[ ]: #@title a. Identify the top 10 actors who have appeared in most movies or TV␣
      ↪shows.

     actor_data=data_unnested[(data_unnested['actor']!='unknown_cast')]
```

```
[ ]: actor_data=actor_data.drop_duplicates(subset=['show_id','actor'],keep='first')
```

```
[ ]: actor_data.groupby(['actor'])['show_id'].count().sort_values(ascending=False).
      ↪head(10)
```

```
[ ]: actor
     Anupam Kher          43
     Shah Rukh Khan       35
     Julie Tejwani        33
     Takahiro Sakurai     32
     Naseeruddin Shah     32
     Rupa Bhimani         31
     Akshay Kumar         30
     Om Puri              30
     Yuki Kaji            29
     Amitabh Bachchan     28
     Name: show_id, dtype: int64
```

Majority of actors with most titles on the platform are from India with ‘Anupam Kher’ having a whopping 43 shows of his on the platform and ‘Shah Rukh Khan’ having 35 shows on platform. The legendary ‘Amitabh Bachchan’ sits at the 10th position with 28 of his titles on the platform.

```
[ ]: #@title b. Identify the top 10 directors who have appeared in most movies or TV␣
      ↪shows.

     director_data=data_unnested[(data_unnested['director']!='unknown_director')]
```

```
[ ]: director_data=director_data.
      ↪drop_duplicates(subset=['show_id','director'],keep='first')
```

```
[ ]: director_data.groupby(['director','type'])['show_id'].count().
      ↪sort_values(ascending=False).head(10)
```

```
[ ]: director             type
     Rajiv Chilaka        Movie    22
     Jan Suter            Movie    21
     Raúl Campos          Movie    19
     Suhas Kadav          Movie    16
     Jay Karas            Movie    15
     Marcus Raboy         Movie    15
     Cathy Garcia-Molina  Movie    13
     Martin Scorsese      Movie    12
```

```
Jay Chapman          Movie    12
Youssef Chahine      Movie    12
Name: show_id, dtype: int64
```

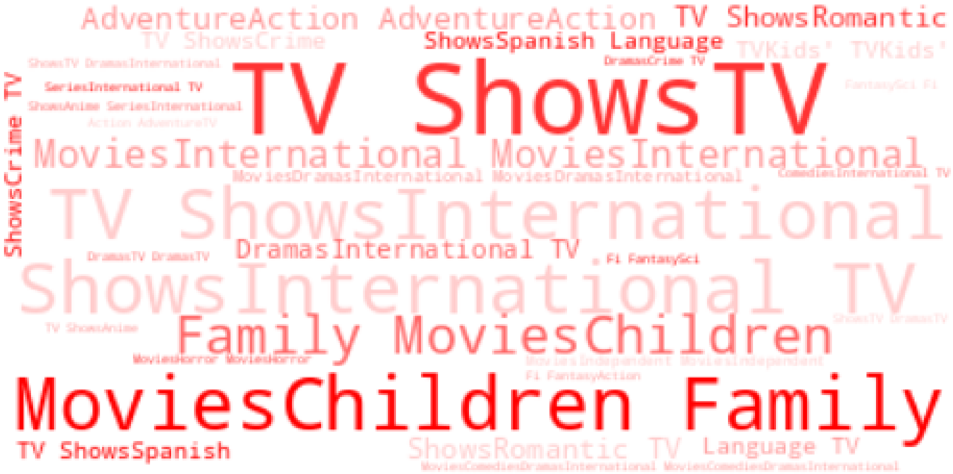
The directors list is again topped by an Indian in ‘Rajiv Chilaka’ while award winning director ‘Martin Scorsese’ has 12 of his titles on Netflix.

[ ]:
```
#@title 5. Which genre movies are more popular or produced more
```

[ ]:
```
text =''.join(data_unnested['genre'].astype(str))

custom_map=ListedColormap(["#FF0000", "#FF3333", "#FF6666", "#FF9999",␣
 ↪"#FFCCCC"])
wordcloud = WordCloud(colormap=custom_map,background_color='White').
 ↪generate(text)

plt.imshow(wordcloud, interpolation='bilinear')
plt.axis("off")
plt.show()
```



It can be inferred that people using Netflix tend to watch more shows from Genres like - Family - International - Children - Dramas - Adventure and Action Also a good chunk of people watch ‘Romantic’ and ‘Crime’ centric shows

[ ]:
```
#@title 6.Time between  release and adding to Netflix
```

[ ]:
```
def time(x):
  return x['date_added'].year-x['release_year']
```

[ ]:
```
ten_year_data=data_cleaned[(data_cleaned['release_year']>=2012)]
```

```
[ ]: ten_year_data=ten_year_data.drop_duplicates(subset=['show_id'],keep='first')
```

```
[ ]: ten_year_data['year_diff']=ten_year_data.apply(time,axis=1)
```

```
[ ]: ten_year_data.head()
```

```
[ ]:   show_id     type                  title          director  \
     0      s1    Movie   Dick Johnson Is Dead   Kirsten Johnson
     1      s2  TV Show          Blood & Water  unknown_director
     2      s3  TV Show              Ganglands   Julien Leclercq
     3      s4  TV Show  Jailbirds New Orleans  unknown_director
     4      s5  TV Show           Kota Factory  unknown_director

                                                     cast          country  \
     0                                       unknown_cast    United States
     1  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban…     South Africa
     2  Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi…  unknown_country
     3                                       unknown_cast  unknown_country
     4  Mayur More, Jitendra Kumar, Ranjan Raj, Alam K…            India

       date_added  release_year rating   duration  \
     0 2021-09-25          2020  PG-13     90 min
     1 2021-09-24          2021  TV-MA  2 Seasons
     2 2021-09-24          2021  TV-MA   1 Season
     3 2021-09-24          2021  TV-MA   1 Season
     4 2021-09-24          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  year_diff
     0  As her father nears the end of his life, filmm…          1
     1  After crossing paths at a party, a Cape Town t…          0
     2  To protect his family from a powerful drug lor…          0
     3  Feuds, flirtations and toilet talk go down amo…          0
     4  In a city of coaching centers known to train I…          0
```

```
[ ]: ten_year_diff_data=ten_year_data.groupby(['type'])['year_diff'].mean().
      ↪sort_values(ascending=False)
     ten_year_diff_data
```

```
[ ]: type
     Movie      1.626738
```

```
TV Show    1.052369
Name: year_diff, dtype: float64
```

From 2011 TV Shows are being added on Netflix on an average of 1 year of their release date while movies have atken a little over an year and a half on average to be released on the platform. This has given the viewer flexibilty and control to watch the content as early as possible while the show is still fresh and relevent

[ ]:
```
#@title 7. Type vs Rating
type_data_1=data_unnested.drop_duplicates(subset=['show_id'],keep='first')
```

[ ]:
```
type_data_1=type_data_1[type_data_1['rating']!='unknown_rating']
```

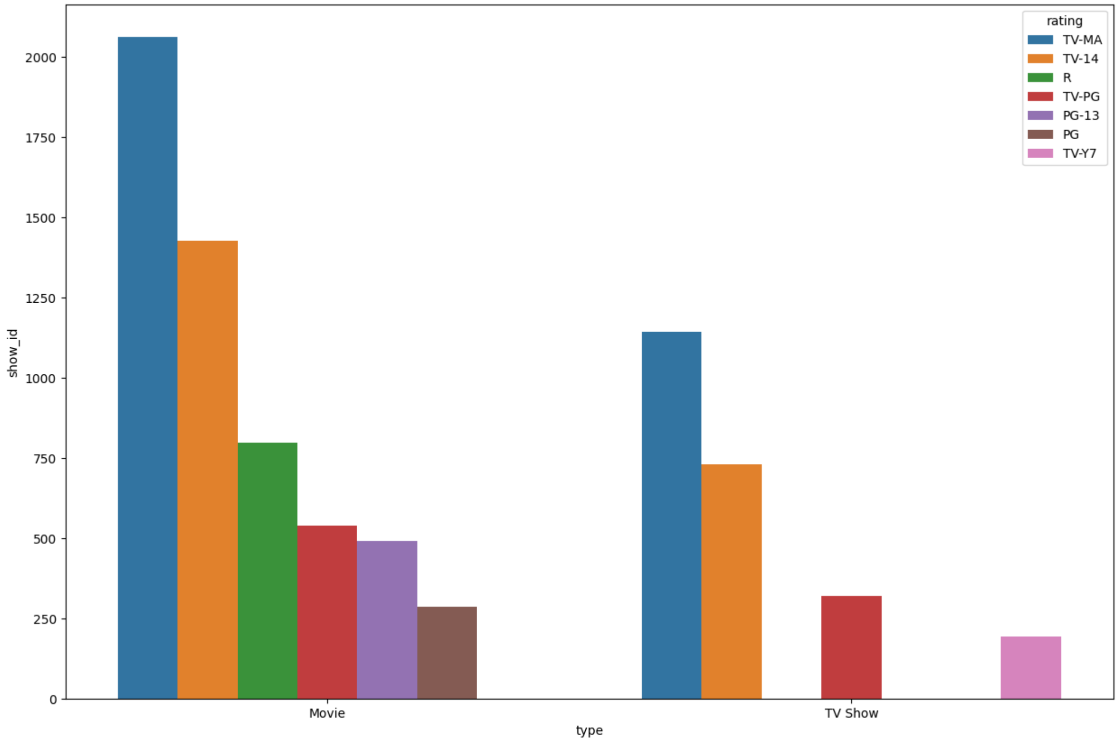
[ ]:
```
type_data_1=type_data_1.groupby(['type','rating'])['show_id'].count().
 ↪sort_values(ascending=False).head(10).reset_index()
```

[ ]:
```
type_data_1.index=type_data_1.index+1
```

[ ]:
```
type_data_1
```

[ ]:
```
       type rating  show_id
1     Movie  TV-MA     2062
2     Movie  TV-14     1427
3   TV Show  TV-MA     1143
4     Movie      R      797
5   TV Show  TV-14      730
6     Movie  TV-PG      540
7     Movie  PG-13      490
8   TV Show  TV-PG      321
9     Movie     PG      287
10  TV Show  TV-Y7      194
```

[ ]:
```
plt.figure(figsize=(15,10))
sns.barplot(x='type',y='show_id',hue='rating',data=type_data_1)
plt.show()
```



Shows for mature and above 14 audience are pre dominant in both Movies and shows while a fair chunk of 'Parental guided' rated shows are listed in both of them. It can be noted that none of the TV Shows are 'R' rated

```
[ ]: #@title 8. Genre vs Rating
```

```
[ ]: genre_data_2=data_unnested.
       ↪drop_duplicates(subset=['show_id','genre'],keep='first')
```

```
[ ]: genre_data_2=genre_data_2[genre_data_2['rating']!='unknown_rating']
```

```
[ ]: genre_data_2=genre_data_2.groupby(['genre','rating'])['show_id'].count().
       ↪sort_values(ascending=False).head(10).reset_index()
```

```
[ ]: genre_data_2.index=genre_data_2.index+1
```

```
[ ]: genre_data_2
```

```
[ ]:                        genre rating  show_id
     1      International Movies  TV-MA     1130
     2      International Movies  TV-14     1065
     3                    Dramas  TV-MA      830
     4    International TV Shows  TV-MA      714
     5                    Dramas  TV-14      693
```

```
6   International TV Shows  TV-14      471
7                 Comedies  TV-14      465
8                TV Dramas  TV-MA      433
9                 Comedies  TV-MA      431
10                  Dramas      R      375
```

Highest no of shows on Netflix fall under category of International Movies rated for mature audience followed by International Movies for audience above the age of 14. It can be inferred that most shows on Netflix are catered for matured audience and of age above 14 and most of those follow under the International Movies and Drama Genre

```
[ ]: #@title 9. Rating vs Duration(TV Shows)
```

```
[ ]: duration_data_1=data_unnested.drop_duplicates(subset=['show_id'],keep='first')
```

```
[ ]: duration_data_1=duration_data_1[(duration_data_1['rating']!='unknown_rating')&␣
      ↪(duration_data_1['type']=='TV Show')]
```

```
[ ]: duration_data_1['duration']=duration_data_1['duration'].str.split(' ').str[0]
```

```
[ ]: duration_data_1['duration']=duration_data_1['duration'].astype(str).astype(int)
```

```
[ ]: bin_labels_new=['Short','Medium','Long']
     bin_values_new=[0,3,6,25]
     duration_data_1['duration_buckets']=pd.
      ↪cut(duration_data_1['duration'],bins=bin_values_new,labels=bin_labels_new)
```

```
[ ]: duration_data_1.groupby(['duration_buckets'])['show_id'].count().
      ↪sort_values(ascending=False).head(10).reset_index()
```

```
[ ]:   duration_buckets  show_id
     0            Short     2410
     1           Medium      191
     2             Long       63
```

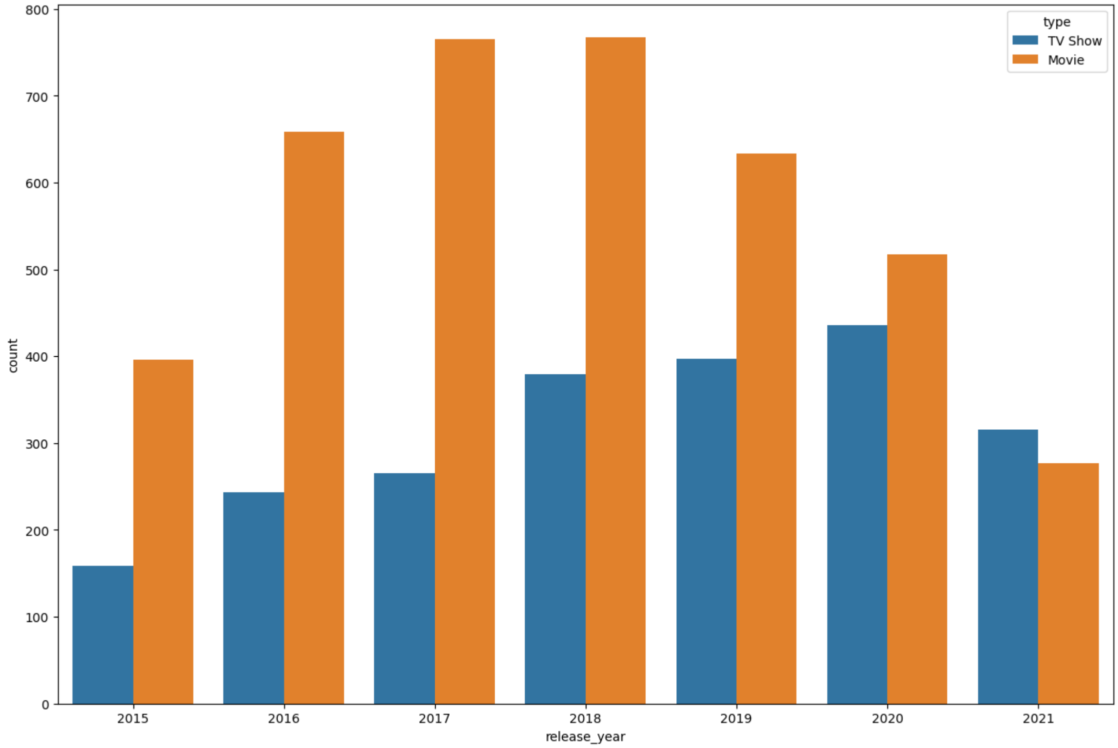
Most TV shows on the platform are 2 season long or less while only 63 of them have run longer than 5 seasons

```
[ ]: #@title 10. Movies and TV Shows last 5 years
```

```
[ ]: last_7_year_data=data_cleaned[(data_cleaned['release_year']>=2015)]
```

```
[ ]: last_7_year_data=last_7_year_data.
      ↪drop_duplicates(subset=['show_id'],keep='first')
```

```
[ ]: plt.figure(figsize=(15,10))
     sns.countplot(x='release_year',data=last_7_year_data,hue='type')
     plt.show()
```



The shift of trend from Movies to TV shows is clearly visible in the above graph as we can see a steady increase in TV Shows added released more recently from year to year while latest Movies added on the platform has declined significantly after 2018

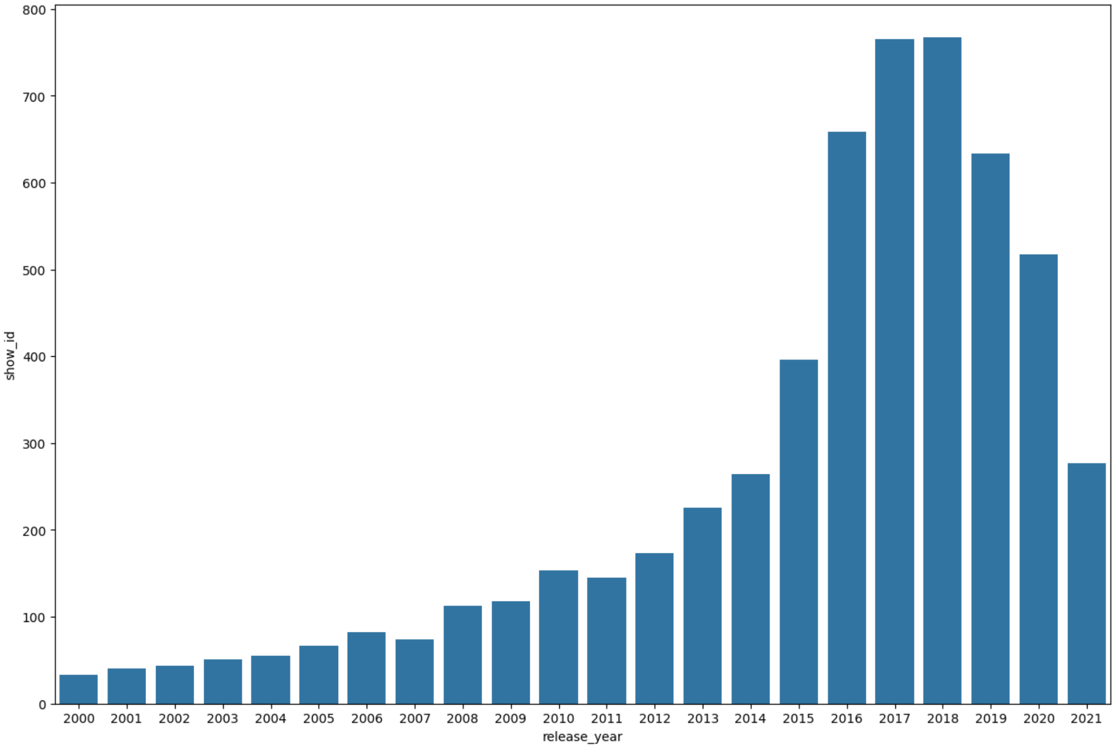
[ ]:
```
#@title 11. Movies released after 2000
movie_data_25=data_cleaned[(data_cleaned['release_year']>=2000)]
```

[ ]:
```
movie_data_25=movie_data_25.drop_duplicates(subset=['show_id'],keep='first')
```

[ ]:
```
movie_data_25=movie_data_25[movie_data_25['type']=='Movie']
```

[ ]:
```
movie_plot_data=movie_data_25.groupby(['release_year'])['show_id'].count().
  ↪sort_values(ascending=False)
```

[ ]:
```
plt.figure(figsize=(15,10))
sns.barplot(x=movie_plot_data.index,y=movie_plot_data)
plt.show()
```



While movies on the platform released till 2018 have seen steady increase in addition to Netflix the numbers have dropped post 2018

#

Recommendations:

- Increase More shows produced in countries other than United States as there is a huge discrepency in No of shows from US and other countries
- Increase more shows of rating TV-Y7 & TV-Y considering the fact that family is one of the top genres
- Add more recently released movies as the no of addition of recently released movies has gone down significantly
- Focus more on movies under 2 hrs as they tend to be watched more
- Increase duration of shows as there are too many shows with 2 or less seasons
- While the no of movies from India are quite high, there are very less shows of Indian production , this can be increased to engage more users who are already watching the huge set of Indian movies available
- Since the no of Movies and TV Shows released in Jan and Feb are quite low, shows targetting that particular season can be released to engage more users
- Apart from the more popular genres listed above, shows from genres like ‘Crime’,‘Romance’,‘Spanish Language’ are on the rise and Netflix can add more shows of these genres to increase relevance and user interaction
- The average time between release of a show and adding it to netflix should be further reduced so that customers can watch these as soon as possible

- No of TV Shows from before 2010 can be added more to the catalogue as they are in a lesser no

[ ]: