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What is Netflix?

Netflix, Inc. is an American subscription streaming service and production company. It offers a library of films and television series through distribution deals as well as its own productions, known as Netflix Originals. As of March 31, 2023, with an estimated 232.5 million paid memberships in more than 190 countries, it is the most-subscribed video on demand streaming service.

Founded by Reed Hastings and Marc Randolph in Scotts Valley, California, Netflix initially operated as a DVD sales and rental business. However, within a year, it shifted its focus exclusively to DVD rentals. In 2007, the company introduced streaming media and video on demand services, marking a significant step in its evolution.

🎯 Business Problem

Analyzing 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

📚 About Data

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. 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.

The dataset consists of a list of all the TV shows/movies available on Netflix:

- Show_id: Unique ID for every Movie / Tv Show
- Type: Identifier - A Movie or TV Show
- Title: Title of the Movie / Tv Show
- Director: Director of the Movie
- Cast: Actors involved in the movie/show
- Country: Country where the movie/show was produced
- Date_added: Date it was added on Netflix
- Release_year: Actual Release year of the movie/show
- Rating: TV Rating of the movie/show
- Duration: Total Duration - in minutes or number of seasons
- Listed_in: Genre
- Description: The summary description

1. Importing Libraries, Loading the data and Basic Observations

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

```
path = "/content/drive/MyDrive/Data sets/Netflix_dataset.csv"
```

```
df = pd.read_csv(path)
```

```
df.head()
```

	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...

Next steps: Generate code with df View recommended plots New interactive sheet

Showcased here are the first 5 rows of datset. The actual size of data set is given below

```
df.shape
```

```
(8807, 12)
```

```
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
```

From the above analysis, it is clear that, data has total of 12 features with lots of mixed alpha numeric data. Also we can see missing data in 5 of the total columns.

```
df.nunique()
```

	0
show_id	8807
type	2
title	8807
director	4528
cast	7692
country	748
date_added	1767
release_year	74
rating	17
duration	220
listed_in	514
description	8775

dtype: int64

It is seen that show_id column has all unique values, Title column has all unique values i.e. total 8807 which equates with total rows in the dataset. Hence It can be concluded that ,

Total 8807 movies/TV shows data is provided in the dataset.

Statistical analysis

```
df.describe()
```

	release_year
count	8807.000000
mean	2014.180198
std	8.819312
min	1925.000000
25%	2013.000000
50%	2017.000000
75%	2019.000000
max	2021.000000

- Only single column having numerical values. It gives idea of release year of the content ranges between what timeframe. Rest all the columns are having categorical data.

```
df.describe(include = object)
```

	show_id	type	title	director	cast	country	date_added	rating	duration	listed_in	description
count	8807	8807	8807	6173	7982	7976	8797	8803	8804	8807	8807
unique	8807	2	8807	4528	7692	748	1767	17	220	514	8775
top	s8807	Movie	Zubaan	Rajiv Chilaka	David Attenborough	United States	January 1, 2020	TV-MA	1 Season	Dramas, International	Paranormal activity at a lush, abandoned

🔍 Insights

1. Type of content - Among the 8807 items available on Netflix, 6131 of them are movies, accounting for nearly `70%` of the total content. The remaining `30%` consists of TV series.

2. Director - `Rajiv Chilaka` holds the top position on the director list, with `19 credits` to his name. He specializes in creating animated movies for children.

3. Cast - `David Attenborough` leads the actor list with 19 appearances in various films and shows on Netflix.

4. Country - The `USA` ranks at the top as the country with the highest production contribution to Netflix, accounting for `35%` of the total content.

5. Date Added - `January 1, 2020`, stands out as the peak date for content uploads on Netflix. On that day alone, approximately `109` different shows and movies were added to the platform.

6. Ratings - There are 17 different types of ratings present on Netflix. The `"TV-MA"` (Mature Audience Only) rating dominates the charts, covering almost `36%` of the total shows and movies on the platform with this rating.

2. Data Cleaning

Overall null values in each column of the dataset

```
df.isna().sum()
```

	0
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

- 3 missing values are found in duration column

```
df[df['duration'].isna()]
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description
5541	s5542	Movie	Louis C.K. 2017	Louis C.K.	Louis C.K.	United States	April 4, 2017	2017	74 min	NaN	Movies	Louis C.K. muses on religion, eternal love, gi...
												Emmy-winning

```
ind = df[df['duration'].isna()].index
df.loc[ind] = df.loc[ind].fillna(method = 'ffill', axis = 1)
```

```
# Replace the wrong entries done in the ratng column

df.loc[ind, 'rating'] = 'Not Available'
```

```
df.loc[ind]
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description
5541	s5542	Movie	Louis C.K. 2017	Louis C.K.	Louis C.K.	United States	April 4, 2017	2017	Not Available	74 min	Movies	Louis C.K. muses on religion, eternal love, gi...
												Emmy-winning

- Fill the null values in rating column

```
df[df.rating.isna()]
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description
5989	s5990	Movie	13TH: A Conversation with Oprah Winfrey & Ava ...	NaN	Oprah Winfrey, Ava DuVernay	NaN	January 26, 2017	2017	NaN	37 min	Movies	Oprah Winfrey sits down with director Ava DuVe...
6827	s6828	TV Show	Gargantia on the Verdurous Planet	NaN	Kaito Ishikawa, Hisako Kanemoto, Ai Kayano	Japan	December 1, 2016	2013	NaN	1 Season	Anime Series, International TV Shows	After falling through a wormhole, a space-dwel

```
indices = df[df.rating.isna()].index
indices
```

```
Index([5989, 6827, 7312, 7537], dtype='int64')
```

```
df.loc[indices, 'rating'] = 'Not Available'
df.loc[indices]
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	descriptic
5989	s5990	Movie	13TH: A Conversation with Oprah Winfrey & Ava ...	NaN	Oprah Winfrey, Ava DuVernay	NaN	January 26, 2017	2017	Not Available	37 min	Movies	Opra Winfrey si down wi director Av DuVe
6827	s6828	TV Show	Gargantia on the Verdurous Planet	NaN	Kaito Ishikawa, Hisako Kanemoto, Ai Kayano	Japan	December 1, 2016	2013	Not Available	1 Season	Anime Series, International TV Shows	After fallir through wormhole, space dwel

```
df.rating.unique()
```

```
array(['PG-13', 'TV-MA', 'PG', 'TV-14', 'TV-PG', 'TV-Y', 'TV-Y7', 'R',
       'TV-G', 'G', 'NC-17', 'Not Available', 'NR', 'TV-Y7-FV', 'UR'],
      dtype=object)
```

In rating column, NR (Not Rated) is same as the UR (Unrated). Let's change UR to NR

```
df.loc[df['rating'] == "UR", 'rating'] = 'NR'
df.rating.value_counts()
```

rating	count
TV-MA	3207
TV-14	2160
TV-PG	863
R	799
PG-13	490
TV-Y7	334
TV-Y	307
PG	287
TV-G	220
NR	83
G	41
Not Available	7
TV-Y7-FV	6
NC-17	3

dtype: int64

- Dropping Null values from date_added column

```
df.drop(df.loc[df['date_added'].isna()].index, axis = 0, inplace = True)
```

```
df['date_added'].value_counts()
```

date_added	count
January 1, 2020	109
November 1, 2019	89
March 1, 2018	75
December 31, 2019	74
October 1, 2018	71
...	...
February 2, 2017	1
September 11, 2019	1
May 17, 2015	1
June 5, 2018	1
October 14, 2017	1

1767 rows × 1 columns

dtype: int64

- For 'date_added' column, all values conform to date format, So we can convert its data type from object to datetime

```
df['date_added'] = pd.to_datetime(df['date_added'].str.strip(), format='%B %d, %Y', errors='coerce')
df['date_added']
```

	date_added
0	2021-09-25
1	2021-09-24
2	2021-09-24
3	2021-09-24
4	2021-09-24
...	...
8802	2019-11-20
8803	2019-07-01
8804	2019-11-01
8805	2020-01-11
8806	2019-03-02

8797 rows × 1 columns

dtype: datetime64[ns]

1. str.strip(): We've added .str.strip() to the 'date_added' column before passing it to pd.to_datetime. This will remove any leading or trailing whitespaces from the date strings, addressing the issue of extra spaces.
2. format='%B %d, %Y': We explicitly specify the expected date format ('%B %d, %Y') within pd.to_datetime to ensure consistent parsing.
3. errors='coerce': This argument tells pd.to_datetime to handle any parsing errors by setting invalid dates to NaT (Not a Time) instead of raising an exception.

- Now adding a new column 'year_added' by extracting the year from 'date_added' column

```
df['year_added'] = df['date_added'].dt.year
```

- Similarly adding another column "month_added" by extracting the month from 'date_added' column

```
df['month_added'] = df['date_added'].dt.month
```

```
df[['date_added', 'year_added', 'month_added']].info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 8797 entries, 0 to 8806
Data columns (total 3 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   date_added   8797 non-null   datetime64[ns]
 1   year_added   8797 non-null   int32
 2   month_added  8797 non-null   int32
dtypes: datetime64[ns](1), int32(2)
memory usage: 206.2 KB
```

```
# total null values in each column

df.isna().sum()
```

	0
show_id	0
type	0
title	0
director	2624
cast	825
country	830
date_added	0
release_year	0
rating	0
duration	0
listed_in	0
description	0
year_added	0
month_added	0

dtype: int64

```
# Percentage Null values in each column

round((df.isna().sum()/df.shape[0])*100)
```

	0
show_id	0.0
type	0.0
title	0.0
director	30.0
cast	9.0
country	9.0
date_added	0.0
release_year	0.0
rating	0.0
duration	0.0
listed_in	0.0
description	0.0
year_added	0.0
month_added	0.0

dtype: float64

It seems that, despite cleaning the data, we still have null values in three columns, and these are significantly higher in number. The missing data is distributed as follows:

- Country: Missing for 9% of the content.
- Director Name: Missing for 30% of the content.
- Cast: Missing for 9% of the content.

Recommendations for Handling Missing Data

1. Country (9%) Imputation: To address missing country values, consider the following imputation methods:
   - Mode Imputation: Replace missing values with the most frequent country.
   - Geographical Grouping: If other columns (such as genre or language) are available, use them to infer the most likely country.
   - External Data: If accessible, you can enrich the data by using an external dataset or API to fill in the missing country values.
   - Removal: If the number of missing values is relatively low (9%), you could consider dropping the rows with missing country information, especially if they are not crucial to your analysis.
2. Director Name (30%) Imputation: Given that 30% of the director names are missing, the following strategies might be useful:
   - Mode Imputation: Replace missing values with the most frequent director name in the dataset.
   - Data Enrichment: If possible, retrieve the missing director information from external sources, such as a movie database like IMDb.
   - Predictive Modeling: If other features (such as genre, release year, etc.) are available, you could train a model to predict the missing director names.
   - Grouping: In cases where a director is missing, consider grouping by other attributes (e.g., genre or release year) to infer the most likely director.
   - Removal: If the director name is essential for your analysis and other methods are not viable, you may need to remove rows with missing director names. However, this should only be done if it doesn't significantly impact your dataset size or analysis quality.
3. Cast (9%) Imputation: For missing cast values, consider:
   - Mode Imputation: Replace missing values with the most frequent cast members.
   - Data Enrichment: Similar to the country and director columns, if you have access to external sources (e.g., IMDb), you could use them to fill in missing cast data.
   - Replacement with "Unknown": If reliable imputation methods are not available, replacing missing cast values with the term "Unknown" might be an appropriate solution.
   - Removal: If cast data is critical to your analysis and other strategies are not effective, consider removing rows with missing cast information.

General Considerations

- Data Distribution: Before deciding whether to impute or remove missing values, carefully assess how these changes might impact the overall distribution of your data and its suitability for analysis.
- Validation: If using imputation or data enrichment, validate the results to ensure they don’t introduce bias or inaccuracies.
- Contextual Decisions: The importance of missing data should be evaluated based on the specific goals of your project. If the missing values have a minimal effect on your analysis, removal or imputation might not significantly alter the results.

3. Data Exploration and Non-Graphical Analysis

```
df['type'].unique()
```

```
array(['Movie', 'TV Show'], dtype=object)
```

```
movies = df.loc[df['type'] == "Movie"]
tv_shows = df.loc[df['type'] == "TV Show"]
```

```
movies.duration.value_counts()
```

duration	count
90 min	152
97 min	146
94 min	146
93 min	146
91 min	144
...	...
228 min	1
18 min	1
205 min	1
201 min	1
191 min	1

205 rows × 1 columns

dtype: int64

```
tv_shows.duration.value_counts()
```

duration	count
1 Season	1793
2 Seasons	421
3 Seasons	198
4 Seasons	94
5 Seasons	64
6 Seasons	33
7 Seasons	23
8 Seasons	17
9 Seasons	9
10 Seasons	6
13 Seasons	2
12 Seasons	2
15 Seasons	2
17 Seasons	1
11 Seasons	1

dtype: int64

- Since movies and TV shows have different formats for duration, we can represent the duration of movies in minutes and the duration of TV shows in seasons

```
movies['duration'] = movies['duration'].str[:-3]
movies['duration'] = movies['duration'].astype('float')
```

```
tv_shows['duration'] = tv_shows.duration.str[:-7].apply(lambda x : x.strip())
tv_shows['duration'] = tv_shows['duration'].astype('float')
```

```
tv_shows.rename({'duration': 'duration_in_seasons'} ,axis = 1 , inplace = True)
movies.rename({'duration': 'duration_in_minutes'} ,axis = 1 , inplace = True)
```

```
tv_shows.duration_in_seasons
```

```
      duration_in_seasons
   1                  2.0
   2                  1.0
   3                  1.0
   4                  2.0
   5                  1.0
 ...                  ...
8795                  2.0
8796                  2.0
8797                  3.0
8800                  1.0
8803                  2.0

2666 rows × 1 columns

dtype: float64
```

```
movies.duration_in_minutes
```

```
      duration_in_minutes
   0                 90.0
   6                 91.0
   7                125.0
   9                104.0
  12                127.0
 ...                  ...
8801                 96.0
8802                158.0
8804                 88.0
8805                 88.0
8806                111.0

6131 rows × 1 columns

dtype: float64
```

When was first movie added on netflix and when is the most recent movie added on netflix as per data i.e. dataset duration

```
timeperiod = pd.Series((df['date_added'].min().strftime('%B %Y') , df['date_added'].max().strftime('%B %Y')))
timeperiod.index = ['first' , 'Most Recent']
timeperiod
```

```
                          0
      first    January 2008
Most Recent  September 2021

dtype: object
```

```
df.release_year.min() , df.release_year.max()
```

```
(1925, 2021)
```

```
df.loc[(df.release_year == df.release_year.min()) | (df.release_year == df.release_year.max())].sort_values('release_year')
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	descripti
4250	s4251	TV Show	Pioneers: First Women Filmmakers*	NaN	NaN	NaN	2018-12-30	1925	TV-14	1 Season	TV Shows	Tl collecti restores fil from wom who
966	s967	Movie	Get the Grift	Pedro Antonio	Marcus Majella, Samantha Schmütz, Caito Mainie...	Brazil	2021-04-28	2021	TV-MA	95 min	Comedies, International Movies	Afte botch scam, Cló bumps ir Lohane
967	s968	TV Show	Headspace Guide to Sleep	NaN	Evelyn Lewis Prieto	NaN	2021-04-28	2021	TV-G	1 Season	Docuseries, Science & Nature TV	Learn how sleep bet w Headspa Each
968	s969	TV Show	Sexify	NaN	Aleksandra Skraba, Maria Sobocińska, Sandra Dr...	Poland	2021-04-28	2021	TV-MA	1 Season	International TV Shows, TV Comedies, TV Dramas	To build innovati sex app a win a tech
972	s973	TV Show	Fatma	NaN	Burcu Biricik, Uğur Yücel, Mehmet Yılmaz Ak, H...	Turkey	2021-04-27	2021	TV-MA	1 Season	International TV Shows, TV Dramas, TV Thrillers	Reeling fr tragedy nondescr house clea

What are the different ratings available on Netflix in each type of content? Check the number of content released in each type.

```
df.groupby(['type' , 'rating'])['show_id'].count()
```

type	rating	show_id
Movie	**G**	41
	NC-17	3
	NR	78
	Not Available	5
	PG	287
	PG-13	490
	R	797
	TV-14	1427
	TV-G	126
	TV-MA	2062
	TV-PG	540
	TV-Y	131
	TV-Y7	139
	TV-Y7-FV	5
TV Show	**NR**	4
	Not Available	2
	R	2
	TV-14	730
	TV-G	94
	TV-MA	1143
	TV-PG	321
	TV-Y	175
	TV-Y7	194
	TV-Y7-FV	1

Working on the columns having maximum null values and the columns having comma separated multiple values for each record

- Country column

```
df['country'].value_counts()
```

country	count
United States	2812
India	972
United Kingdom	418
Japan	244
South Korea	199
...	...
Mexico, United States, Spain, Colombia	1
Canada, Norway	1
Finland, Germany, Belgium	1
Argentina, United States, Mexico	1
United Kingdom, United States, Germany, Denmark, Belgium, Japan	1

748 rows × 1 columns

dtype: int64

We observe that many movies are produced in more than one country, resulting in the country column containing comma-separated values. This makes it challenging to analyze how many movies were produced in each country. To address this, we can use the explode function in pandas to split the country column into separate rows.

Additionally, we are creating a separate table for the countries to avoid duplicating records in the original table after the exploding.

```
country_tb = df[['show_id' , 'type' , 'country']]
country_tb.dropna(inplace = True)
country_tb['country'] = country_tb['country'].apply(lambda x : x.split(','))
country_tb = country_tb.explode('country')
country_tb
```

	show_id	type	country
0	s1	Movie	United States
1	s2	TV Show	South Africa
4	s5	TV Show	India
7	s8	Movie	United States
7	s8	Movie	Ghana
...	...	...	...
8801	s8802	Movie	Jordan
8802	s8803	Movie	United States
8804	s8805	Movie	United States
8805	s8806	Movie	United States
8806	s8807	Movie	India

10010 rows × 3 columns

Next steps: Generate code with country_tb View recommended plots New interactive sheet

```
# some duplicate values are found, which have unnecessary spaces. some empty strings found
country_tb['country'] = country_tb['country'].str.strip()
```

```
country_tb.loc[country_tb['country'] == '']
```

	show_id	type	country
193	s194	TV Show	
365	s366	Movie	
1192	s1193	Movie	
2224	s2225	Movie	
4653	s4654	Movie	
5925	s5926	Movie	
7007	s7008	Movie	

```
country_tb = country_tb.loc[country_tb['country'] != '']
```

```
country_tb['country'].nunique()
```

```
122
```

- Netflix has movies from the total 122 countries.

Total movies and tv shows in each country

```
x = country_tb.groupby(['country' , 'type'])['show_id'].count().reset_index()
x.pivot(index = ['country'] , columns = 'type' , values = 'show_id').sort_values('Movie',ascending = False)
```

type	Movie	TV Show
country		
United States	2752.0	932.0
India	962.0	84.0
United Kingdom	534.0	271.0
Canada	319.0	126.0
France	303.0	90.0
...	...	...
Azerbaijan	NaN	1.0
Belarus	NaN	1.0
Cuba	NaN	1.0
Cyprus	NaN	1.0
Puerto Rico	NaN	1.0

122 rows × 2 columns

Director column

```
df['director'].value_counts()
```

director	count
Rajiv Chilaka	19
Raúl Campos, Jan Suter	18
Suhas Kadav	16
Marcus Raboy	16
Jay Karas	14
...	...
James Brown	1
Ivona Juka	1
Mu Chu	1
Chandra Prakash Dwivedi	1
Majid Al Ansari	1

4528 rows × 1 columns

dtype: int64

There are some movies which are directed by multiple directors. Hence multiple names of directors are given in comma separated format. We will explode the director column as well. It will create many duplicate records in originaltable hence we created separate table for directors.

```
dir_tb = df[['show_id' , 'type' , 'director']]
dir_tb.dropna(inplace = True)
dir_tb['director'] = dir_tb['director'].apply(lambda x : x.split(','))
dir_tb
```

	show_id	type	director
0	s1	Movie	[Kirsten Johnson]
2	s3	TV Show	[Julien Leclercq]
5	s6	TV Show	[Mike Flanagan]
6	s7	Movie	[Robert Cullen, José Luis Ucha]
7	s8	Movie	[Haile Gerima]
...	...	...	...
8801	s8802	Movie	[Majid Al Ansari]
8802	s8803	Movie	[David Fincher]
8804	s8805	Movie	[Ruben Fleischer]
8805	s8806	Movie	[Peter Hewitt]
8806	s8807	Movie	[Mozez Singh]

6173 rows × 3 columns

Next steps: Generate code with dir_tb View recommended plots New interactive sheet

```
dir_tb = dir_tb.explode('director')
```

```
dir_tb['director'] = dir_tb['director'].str.strip()
```

```
# checking if empty stirngs are there in director column
dir_tb.director.apply(lambda x : True if len(x) == 0 else False).value_counts()
```

director	count
False	6978

dtype: int64

```
dir_tb
```

	show_id	type	director
0	s1	Movie	Kirsten Johnson
2	s3	TV Show	Julien Leclercq
5	s6	TV Show	Mike Flanagan
6	s7	Movie	Robert Cullen
6	s7	Movie	José Luis Ucha
...	...	...	...
8801	s8802	Movie	Majid Al Ansari
8802	s8803	Movie	David Fincher
8804	s8805	Movie	Ruben Fleischer
8805	s8806	Movie	Peter Hewitt
8806	s8807	Movie	Mozez Singh

6978 rows × 3 columns

Next steps: Generate code with dir_tb View recommended plots New interactive sheet

```
dir_tb['director'].nunique()
```

```
4993
```

- There are total 4993 unique directors in the dataset.

Total movies and tv shows directed by each director

```
x = dir_tb.groupby(['director' , 'type'])['show_id'].count().reset_index()
x.pivot(index= ['director'] , columns = 'type' , values = 'show_id').sort_values('Movie' ,ascending = False)
```

type	Movie	TV Show
director		
Rajiv Chilaka	22.0	NaN
Jan Suter	21.0	NaN
Raúl Campos	19.0	NaN
Suhas Kadav	16.0	NaN
Marcus Raboy	15.0	1.0
...	...	...
Vijay S. Bhanushali	NaN	1.0
Wouter Bouvijn	NaN	1.0
YC Tom Lee	NaN	1.0
Yasuhiro Irie	NaN	1.0
Yim Pilsung	NaN	1.0

4993 rows × 2 columns

Analysing 'listed_in' column to understand more about genres

```
genre_tb = df[['show_id' , 'type', 'listed_in']]
```

```
genre_tb['listed_in'] = genre_tb['listed_in'].apply(lambda x : x.split(','))
genre_tb = genre_tb.explode('listed_in')
genre_tb['listed_in'] = genre_tb['listed_in'].str.strip()
```

```
genre_tb
```

	show_id	type	listed_in
0	s1	Movie	Documentaries
1	s2	TV Show	International TV Shows
1	s2	TV Show	TV Dramas
1	s2	TV Show	TV Mysteries
2	s3	TV Show	Crime TV Shows
...	...	...	...
8805	s8806	Movie	Children & Family Movies
8805	s8806	Movie	Comedies
8806	s8807	Movie	Dramas
8806	s8807	Movie	International Movies
8806	s8807	Movie	Music & Musicals

19303 rows × 3 columns

Next steps: Generate code with genre_tb View recommended plots New interactive sheet

```
genre_tb.listed_in.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)
```

- Total 42 genres present in dataset

```
df.merge(genre_tb , on = 'show_id' ).groupby(['type_y'])['listed_in_y'].nunique()
```

	listed_in_y
type_y	
Movie	20
TV Show	22

dtype: int64

- Movies have 20 genres and TV shows have 22 genres.

```
# total movies/TV shows in each genre
x = genre_tb.groupby(['listed_in' , 'type'])['show_id'].count().reset_index()
x.pivot(index = 'listed_in' , columns = 'type' , values = 'show_id').sort_index()
```

type	Movie	TV Show
listed_in		
Action & Adventure	859.0	NaN
Anime Features	71.0	NaN
Anime Series	NaN	175.0
British TV Shows	NaN	252.0
Children & Family Movies	641.0	NaN
Classic & Cult TV	NaN	26.0
Classic Movies	116.0	NaN
Comedies	1674.0	NaN
Crime TV Shows	NaN	469.0
Cult Movies	71.0	NaN
Documentaries	869.0	NaN
Docuseries	NaN	394.0
Dramas	2427.0	NaN
Faith & Spirituality	65.0	NaN
Horror Movies	357.0	NaN
Independent Movies	756.0	NaN
International Movies	2752.0	NaN
International TV Shows	NaN	1350.0
Kids' TV	NaN	449.0
Korean TV Shows	NaN	151.0
LGBTQ Movies	102.0	NaN
Movies	57.0	NaN
Music & Musicals	375.0	NaN
Reality TV	NaN	255.0
Romantic Movies	616.0	NaN
Romantic TV Shows	NaN	370.0
Sci-Fi & Fantasy	243.0	NaN
Science & Nature TV	NaN	92.0
Spanish-Language TV Shows	NaN	173.0
Sports Movies	219.0	NaN
Stand-Up Comedy	343.0	NaN
Stand-Up Comedy & Talk Shows	NaN	56.0
TV Action & Adventure	NaN	167.0
TV Comedies	NaN	574.0
TV Dramas	NaN	762.0
TV Horror	NaN	75.0
TV Mysteries	NaN	98.0
TV Sci-Fi & Fantasy	NaN	83.0
TV Shows	NaN	16.0
TV Thrillers	NaN	57.0
Teen TV Shows	NaN	69.0
Thrillers	577.0	NaN

Exploring the 'cast' column

```
cast_tb = df[['show_id' , 'type' ,'cast']]
cast_tb.dropna(inplace = True)
cast_tb['cast'] = cast_tb['cast'].apply(lambda x : x.split(','))
cast_tb = cast_tb.explode('cast')
cast_tb
```

	show_id	type	cast
1	s2	TV Show	Ama Qamata
1	s2	TV Show	Khosi Ngema
1	s2	TV Show	Gail Mabalane
1	s2	TV Show	Thabang Molaba
1	s2	TV Show	Dillon Windvogel
...	...	...	...
8806	s8807	Movie	Manish Chaudhary
8806	s8807	Movie	Meghna Malik
8806	s8807	Movie	Malkeet Rauni
8806	s8807	Movie	Anita Shabdish
8806	s8807	Movie	Chittaranjan Tripathy

64057 rows × 3 columns

Next steps: Generate code with cast_tb View recommended plots New interactive sheet

```
cast_tb['cast'] = cast_tb['cast'].str.strip()
```

```
# checking for empty strings
cast_tb[cast_tb['cast'] == '']
```

show_id	type	cast

```
# Total actors on the Netflix
cast_tb.cast.nunique()
```

```
36403
```

```
# Total movies/TV shows by each actor
x = cast_tb.groupby(['cast' , 'type'])['show_id'].count().reset_index()
x.pivot(index = 'cast' , columns = 'type' , values = 'show_id').sort_values('TV Show' , ascending = False)
```

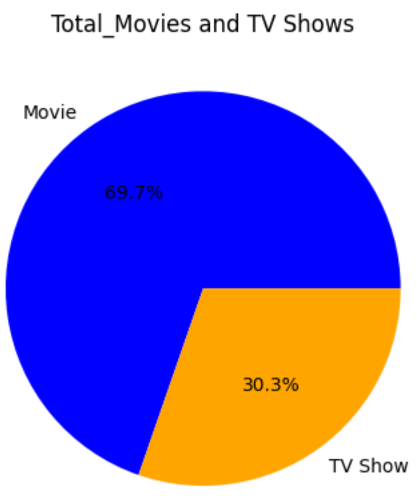
type	Movie	TV Show
cast		
Takahiro Sakurai	7.0	25.0
Yuki Kaji	10.0	19.0
Junichi Suwabe	4.0	17.0
Daisuke Ono	5.0	17.0
Ai Kayano	2.0	17.0
...	...	...
Şerif Sezer	1.0	NaN
Şevket Çoruh	1.0	NaN
Şinasi Yurtsever	3.0	NaN
Şükran Ovalı	1.0	NaN
Şopé Dìrísù	1.0	NaN

36403 rows × 2 columns

4. Visual Analysis- Univariate and Bivariate

- 4.1 Distribution of content across different types

```
types = df.type.value_counts()
plt.pie(types,  labels=types.index, autopct='%1.1f%%' , colors = ['blue' , 'orange'])
plt.title('Total_Movies and TV Shows')
plt.show()
```

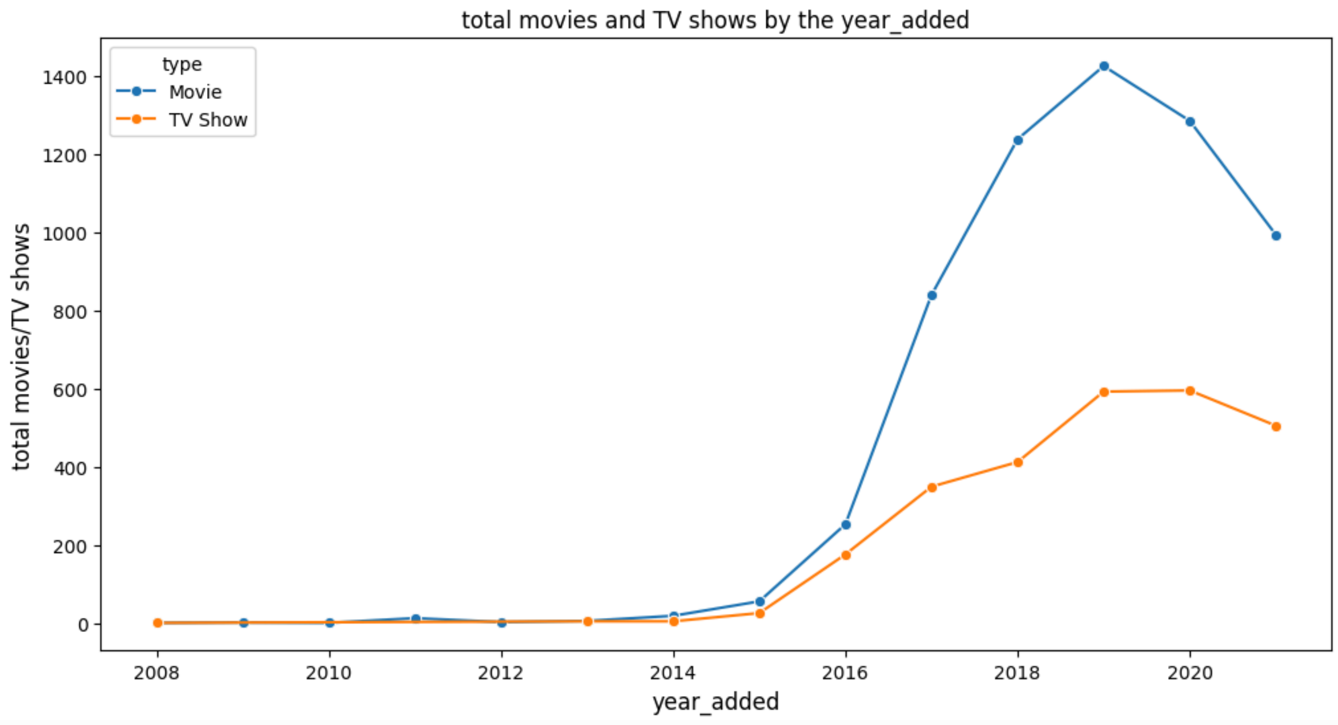


It is observed that , around 70% content is Movies and around 30% content is TV shows.

- 4.2 Distribution of 'date_added' column

  How has the number of movies/TV shows added on Netflix per year changed over the time?

```
d = df.groupby(['year_added' ,'type' ])['show_id'].count().reset_index()
d.rename({'show_id' : 'total movies/TV shows'}, axis = 1 , inplace = True)


plt.figure(figsize = (12,6))
sns.lineplot(data = d , x = 'year_added' , y = 'total movies/TV shows' , hue = 'type', marker = 'o'  , ms = 6)
plt.xlabel('year_added' , fontsize = 12)
plt.ylabel('total movies/TV shows' , fontsize = 12)
plt.title('total movies and TV shows by the year_added' , fontsize = 12)
plt.show()
```



Observations :

- The amount of content added to Netflix surged significantly after 2015.
- 2019 saw the highest number of movies and TV shows being added.
- However, in 2020 and 2021, there was a noticeable drop in content added to Netflix, likely due to the pandemic.

- Despite this, the decline in TV shows was not as severe as that of movies. In recent years, there has been a greater focus on TV shows than on movies.

- 4.3 Distribution of 'Release_year' column

How has the number of movies released per year changed over the last 20-30 years?

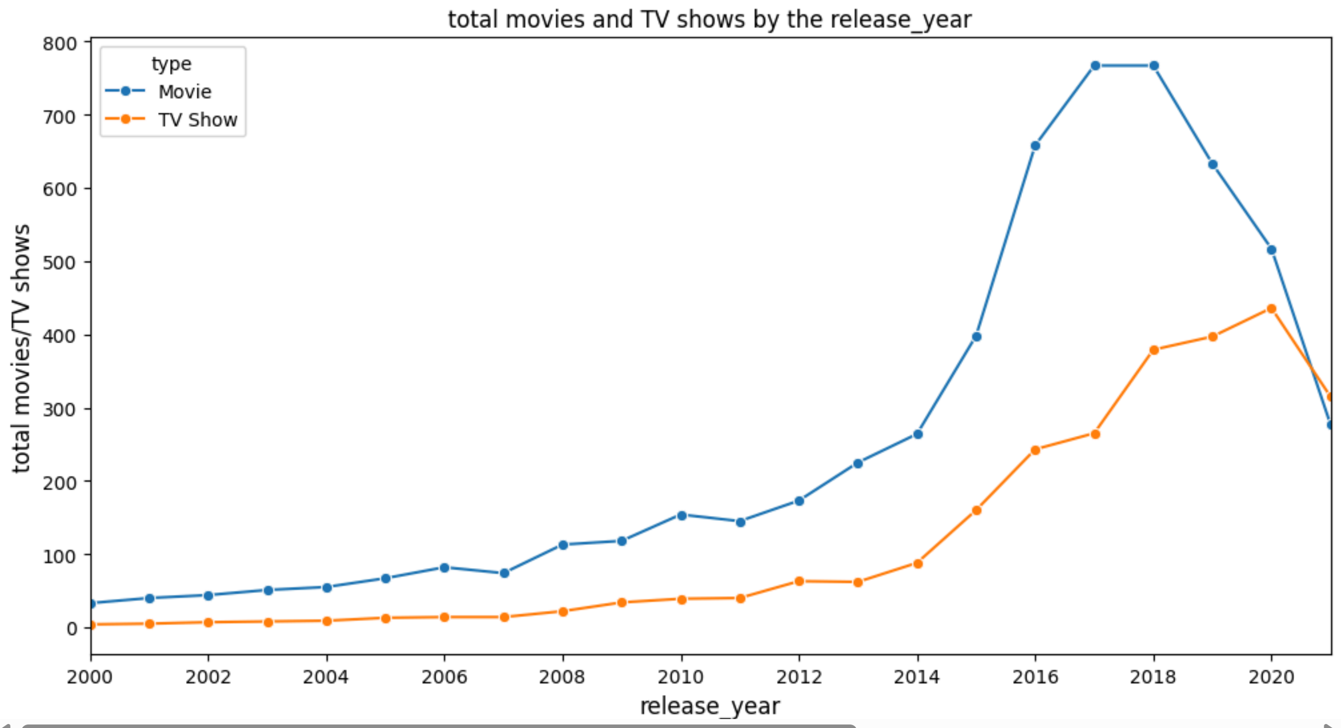
```
d = df.groupby(['type' , 'release_year'])['show_id'].count().reset_index()
d.rename({'show_id' : 'total movies/TV shows'}, axis = 1 , inplace = True)
d
```

	type	release_year	total movies/TV shows
0	Movie	1942	2
1	Movie	1943	3
2	Movie	1944	3
3	Movie	1945	3
4	Movie	1946	1
...	...	...	...
114	TV Show	2017	265
115	TV Show	2018	379
116	TV Show	2019	397
117	TV Show	2020	436
118	TV Show	2021	315

119 rows × 3 columns

Next steps: Generate code with d | View recommended plots | New interactive sheet

```
plt.figure(figsize = (12,6))
sns.lineplot(data = d , x = 'release_year' , y = 'total movies/TV shows' , hue = 'type' , marker = 'o'  , ms = 6 )
plt.xlabel('release_year' , fontsize = 12)
plt.ylabel('total movies/TV shows' , fontsize = 12)
plt.title('total movies and TV shows by the release_year' , fontsize = 12)
plt.xlim( left = 2000 , right = 2021)
plt.xticks(np.arange(2000 , 2021 , 2))
plt.show()
```



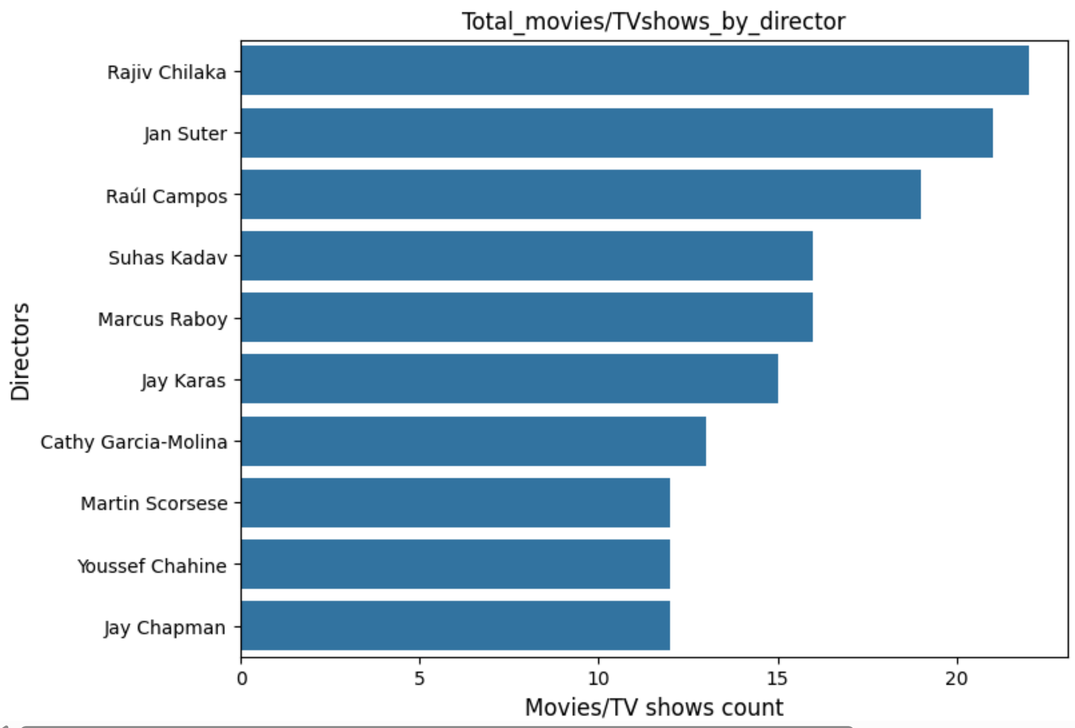
Observations :

- 2018 marks the highest number of movie and TV show releases.
- Since 2018, A drop in movies is seen and rise in TV shows is observed clearly, and TV shows surpasses the movies count in mid 2020.

- In recent years TV shows are focussed more than Movies.
- The yearly number of releases has surged drastically from 2015.

- 4.4 Total movies/TV shows by each director

```
# total Movies directed by top 10 directors
top_10_dir = dir_tb.director.value_counts().head(10).index
df_new = dir_tb.loc[dir_tb['director'].isin(top_10_dir)]


plt.figure(figsize= (8 , 6))
sns.countplot(data = df_new , y = 'director' , order = top_10_dir , orient = 'v')
plt.xlabel('total_movies/TV shows' , fontsize = 12)
plt.xlabel('Movies/TV shows count')
plt.ylabel('Directors' , fontsize = 12)
plt.title('Total_movies/TVshows_by_director')
plt.show()
```



Observation :

- The top 3 directors on Netflix in terms of count of movies directed by them are - Rajiv Chilaka, Jan Suter, Raúl Campos

- 4.4 Checking Outliers for number of movies directed by each director

```
x = dir_tb.director.value_counts()
x
```

director	count
Rajiv Chilaka	22
Jan Suter	21
Raúl Campos	19
Suhas Kadav	16
Marcus Raboy	16
...	...
Phillip Youmans	1
Pawan Kumar	1
Xavier Durringer	1
Luke Snellin	1
Parthiban	1

4993 rows × 1 columns

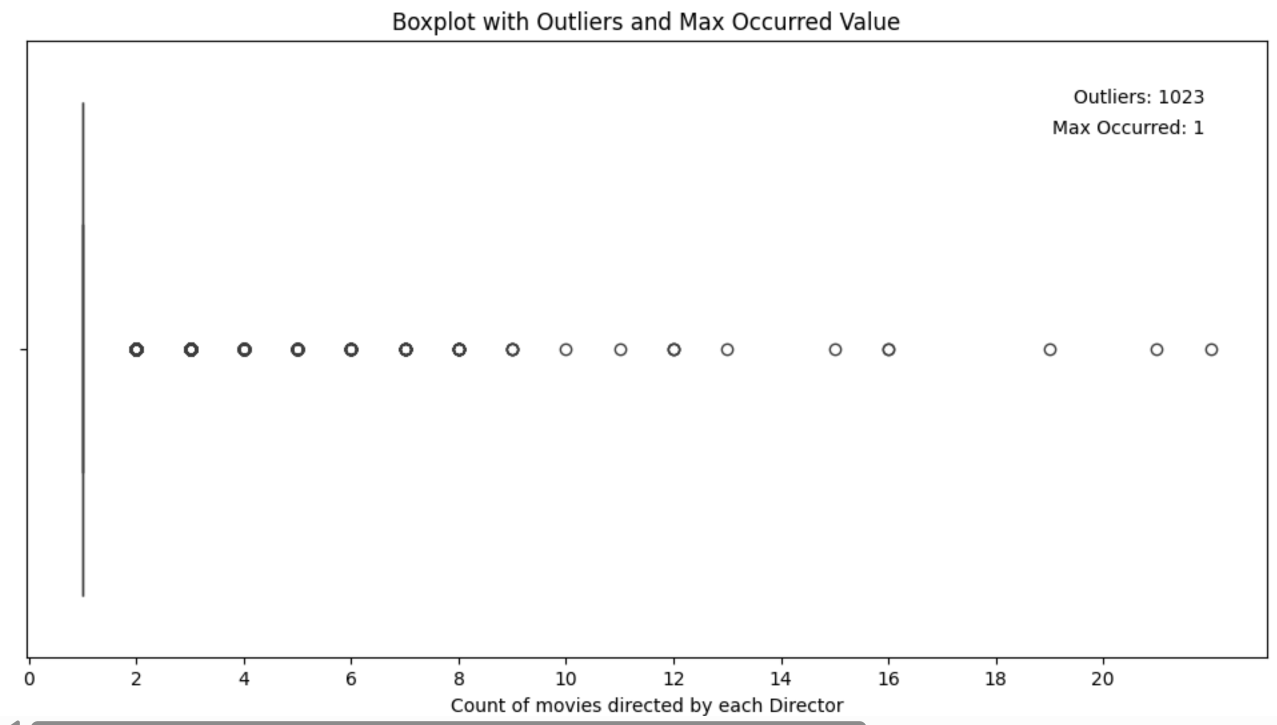
```python
def calculate_outliers(data):
    # Calculate the first quartile (Q1)
    q1 = np.percentile(data, 25)

    # Calculate the third quartile (Q3)
    q3 = np.percentile(data, 75)

    # Calculate the interquartile range (IQR)
    iqr = q3 - q1

    # Determine the lower and upper bounds for outliers
    lower_bound = q1 - 1.5 * iqr
    upper_bound = q3 + 1.5 * iqr

    # Identify outliers in the dataset
    outliers = [value for value in data if value < lower_bound or value > upper_bound]

    return outliers


def calculate_max_occurred_value(data):
    # Calculate the unique values and their counts in the dataset
    unique_values, value_counts = np.unique(data, return_counts=True)

    # Find the index of the maximum count
    max_count_index = np.argmax(value_counts)

    # Retrieve the corresponding unique value with the maximum count
    max_occurred_value = unique_values[max_count_index]

    return max_occurred_value


outliers = calculate_outliers(x)  # Implement your outlier calculation method
max_occurred_value = calculate_max_occurred_value(x)  # Implement your method to find the maximum-occurred value
set(outliers)
```

```
{2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 19, 21, 22}
```

```python
max_occurred_value
```

```
np.int64(1)
```

```python
plt.figure(figsize = (12,6))
sns.boxplot(data=x, showfliers=True, whis=1.5 , orient = 'h')

# Calculate the outliers and maximum-occurred value
outliers = calculate_outliers(x)  # Implement your outlier calculation method
max_occurred_value = calculate_max_occurred_value(x)  # Implement your method to find the maximum-occurred value

# Annotate the plot
plt.text(0.95, 0.9, f"Outliers: {len(outliers)}", transform=plt.gca().transAxes, ha='right')
plt.text(0.95, 0.85, f"Max Occurred: {max_occurred_value}", transform=plt.gca().transAxes, ha='right')
plt.xlabel("Count of movies directed by each Director")
plt.xticks(np.arange(0,22,2))
plt.title("Boxplot with Outliers and Max Occurred Value")

# Show the plot
plt.show()
```



It is Observed that maximum occured value is 1, which means maximum directors on the Netflix have directed 1 movie/Tv show. There are few directors who have directed more than 1 movies/tv shows and they are outliers.

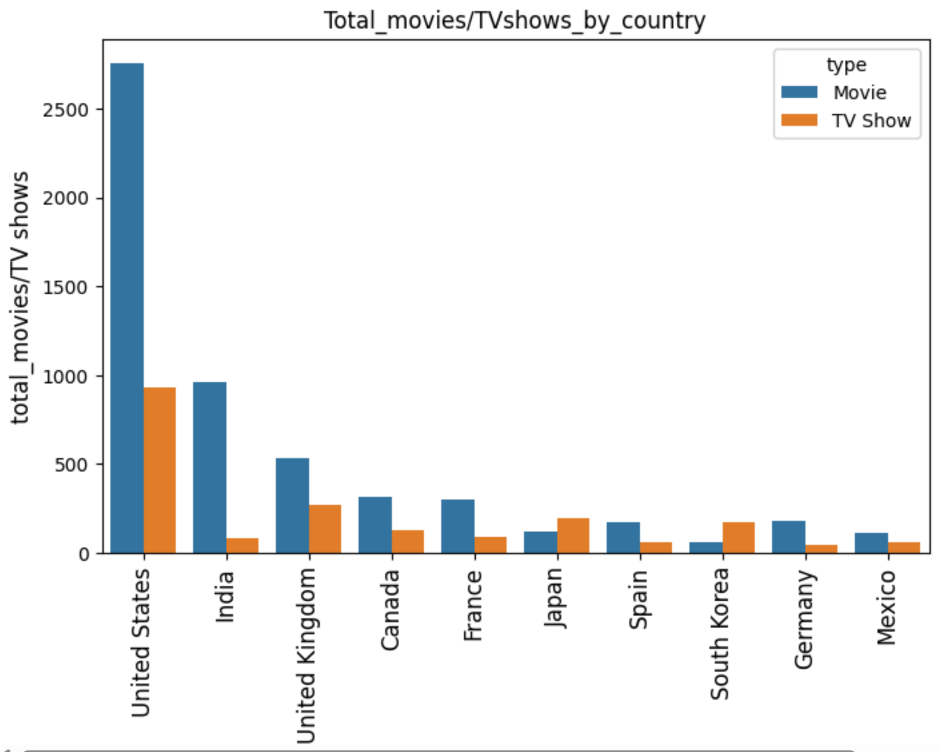
- 4.5 Total movies/TV shows by each country

```
# Lets check for top 10 countries
top_10_country = country_tb.country.value_counts().head(10).index
df_new = country_tb.loc[country_tb['country'].isin(top_10_country)]
```

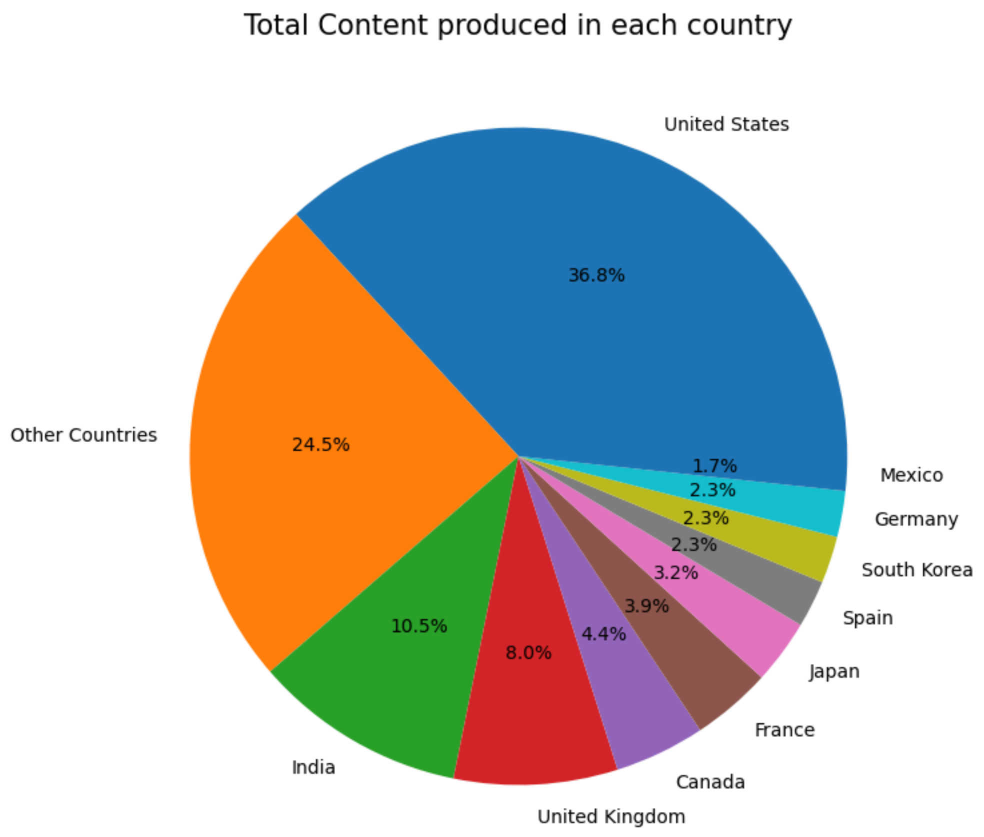
```
x = df_new.groupby(['country' , 'type'])['show_id'].count().reset_index()
x.pivot(index = 'country' , columns = 'type' , values = 'show_id').sort_values('Movie',ascending = False)
```

type	Movie	TV Show
country		
United States	2752	932
India	962	84
United Kingdom	534	271
Canada	319	126
France	303	90
Germany	182	44
Spain	171	61
Japan	119	198
Mexico	111	58
South Korea	61	170

```
plt.figure(figsize= (8,5))
sns.countplot(data = df_new , x = 'country' , order = top_10_country , hue = 'type')
plt.xticks(rotation = 90 , fontsize = 12)
plt.ylabel('total_movies/TV shows' , fontsize = 12)
plt.xlabel('')
plt.title('Total_movies/TVshows_by_country')
plt.show()
```



```
top_10_country = country_tb.country.value_counts().head(10).index
country_tb['cat'] = country_tb['country'].apply(lambda x : x if x in top_10_country else 'Other Countries' )


x = country_tb.cat.value_counts()

plt.figure(figsize = (8,8))
plt.pie(x , labels = x.index, autopct='%1.1f%%')
plt.title('Total Content produced in each country' , fontsize = 15)
plt.show()
```

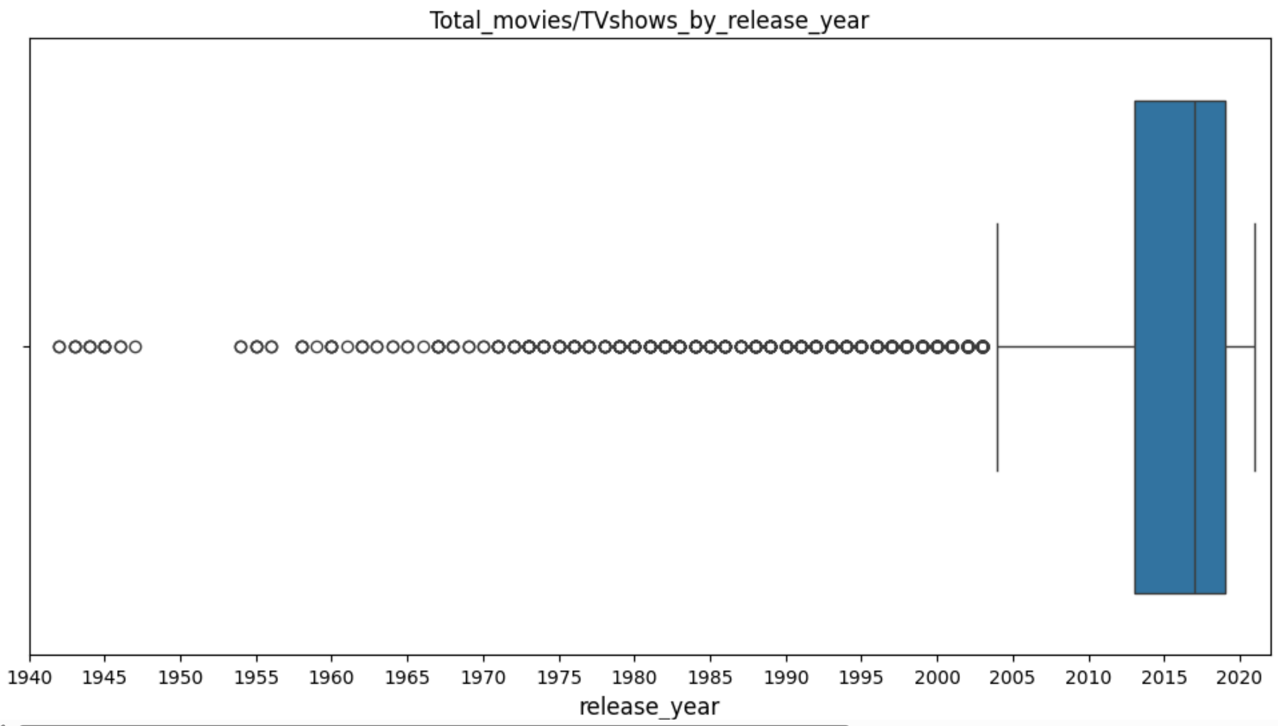


Observations :

```
 * United States is the HIGHEST contributor country on Netflix, followed by India and United Kingdom.


 * Maximum content of Netflix which is around 75% , is coming from these top 10 countries.  Rest of the world only contributes 25% of the conten
```

- 4.6 Total content distribution by release year of the content

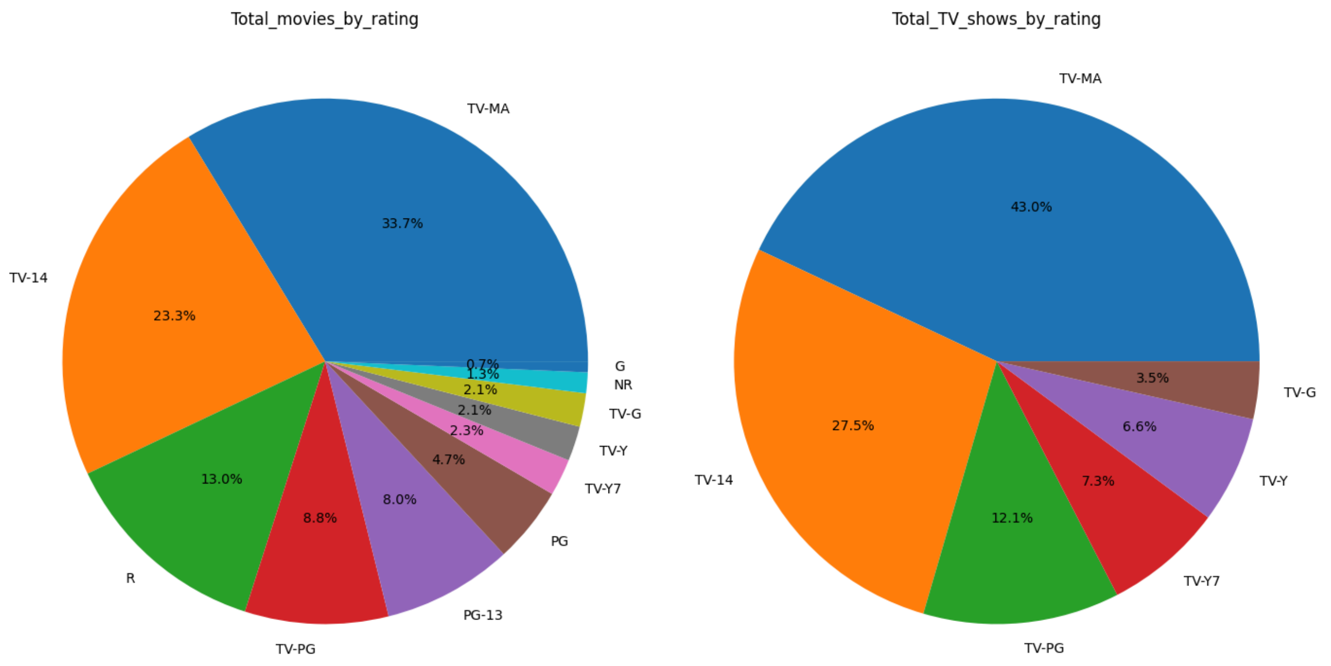
```
plt.figure(figsize= (12,6))
sns.boxplot(data = df , x = 'release_year')
plt.xlabel('release_year' , fontsize = 12)
plt.title('Total_movies/TVshows_by_release_year')
plt.xticks(np.arange(1940 , 2021 , 5))
plt.xlim((1940 , 2022))
plt.show()
```



- Netflix has most of its content released in the year range 2000-2021
- It seems that the content older than year 2000 is almost missing from the Netflix.

- 4.7 Total movies/TV shows distribution by rating of the content

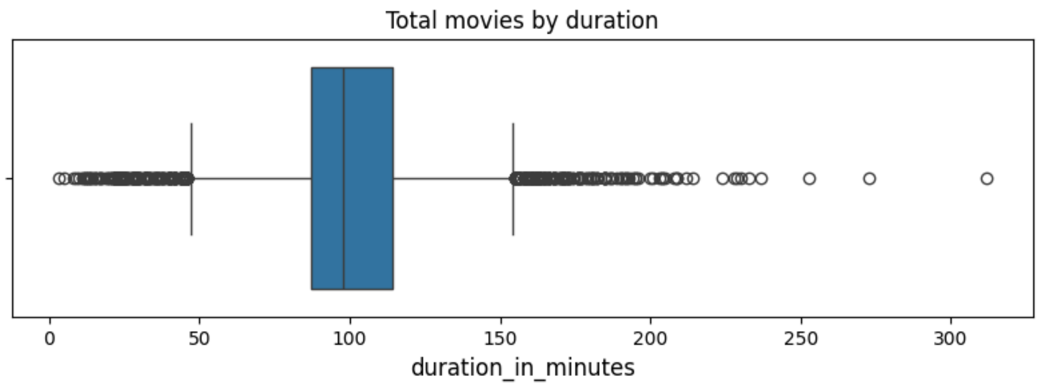
```
m = movies.loc[~movies.rating.isin(['Not Available' , 'NC-17' , 'TV-Y7-FV'])]
m = m.rating.value_counts()
t = tv_shows.loc[~tv_shows.rating.isin(['Not Available' , 'R' , 'NR', 'TV-Y7-FV'])]
t = t.rating.value_counts()


fig, ax = plt.subplots(1,2, figsize=(14,8))
ax[0].pie(m , labels = m.index, autopct='%1.1f%%')
ax[0].set_title('Total_movies_by_rating')

ax[1].pie(t , labels = t.index, autopct='%1.1f%%')
ax[1].set_title('Total_TV_shows_by_rating')

plt.tight_layout()
plt.show()
```

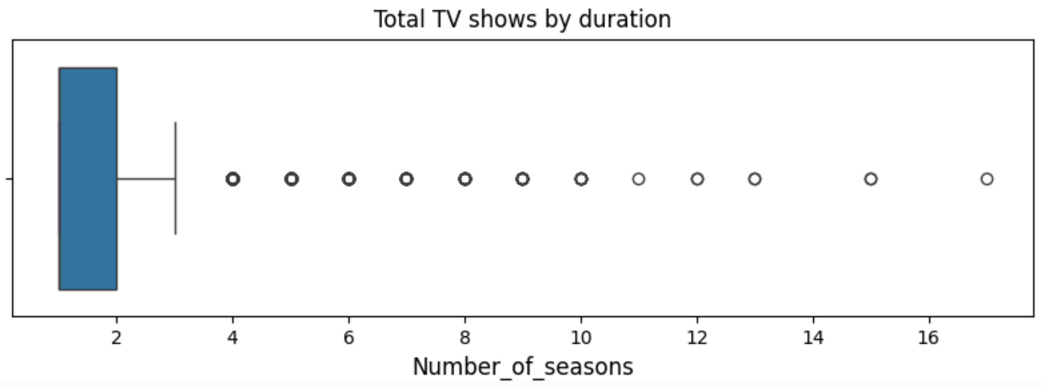


Highest number of movies and TV shows are rated TV-MA (for mature audiences), followed by TV-14 & R/TV-PG

- 4.8 Total movies/TV shows distributionby duration of the content

```
fig, ax = plt.subplots(2,1, figsize=(8,6))

sns.boxplot (data = movies , x = 'duration_in_minutes' ,ax =ax[0])
ax[0].set_xlabel('duration_in_minutes' ,  fontsize = 12)
ax[0].set_title('Total movies by duration')

sns.boxplot (data = tv_shows , x = 'duration_in_seasons' , ax = ax[1])
ax[1].set_xlabel('Number_of_seasons' ,  fontsize = 12)
ax[1].set_title('Total TV shows by duration')

plt.tight_layout()
plt.show()
```

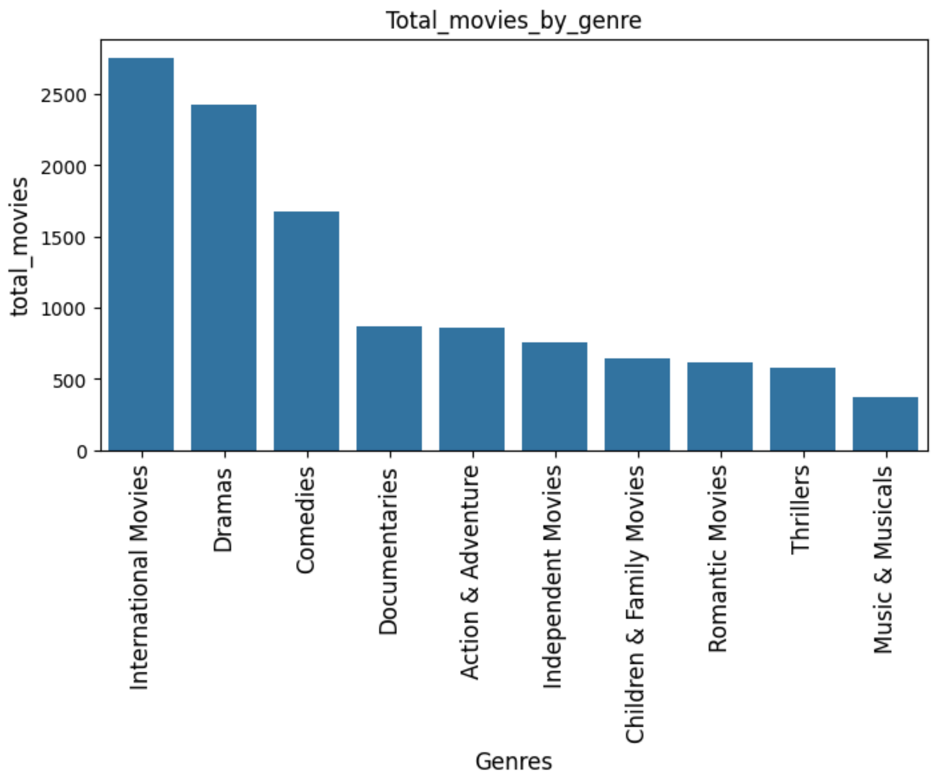




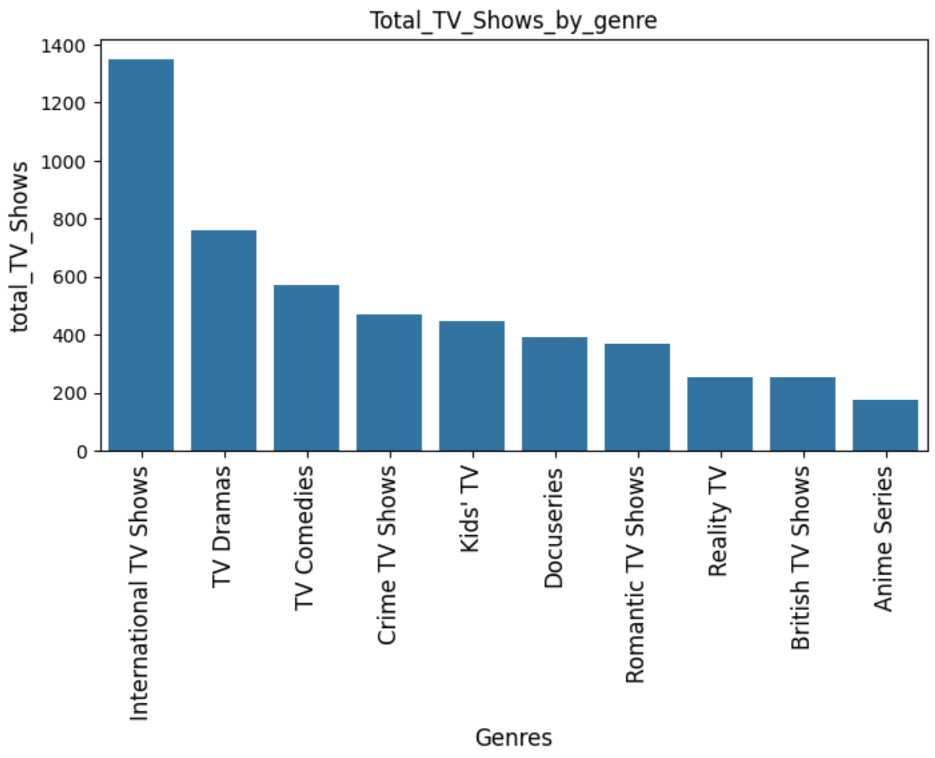
- Movie Duration: 50 mins - 150 mins is the range excluding potential outliers (values lying outside the whiskers of boxplot)
- TV Show Duration: 1-3 seasons is the range for TV shows excluding potential outliers

- 4.9 Total movies/TV shows in each Genre

```
# Lets check the count for top 10 genres in Movies and TV_shows

top_10_movie_genres = genre_tb[genre_tb['type'] == 'Movie'].listed_in.value_counts().head(10).index
df_movie = genre_tb.loc[genre_tb['listed_in'].isin(top_10_movie_genres)]

top_10_TV_genres = genre_tb[genre_tb['type'] == 'TV Show'].listed_in.value_counts().head(10).index
df_tv = genre_tb.loc[genre_tb['listed_in'].isin(top_10_TV_genres)]


plt.figure(figsize= (8,4))
sns.countplot(data = df_movie , x = 'listed_in' , order = top_10_movie_genres)
plt.xticks(rotation = 90 , fontsize = 12)
plt.ylabel('total_movies' , fontsize = 12)
plt.xlabel('Genres' , fontsize = 12)
plt.title('Total_movies_by_genre')
plt.show()
```



```
plt.figure(figsize= (8,4))
sns.countplot(data = df_tv , x = 'listed_in' , order = top_10_TV_genres)
plt.xticks(rotation = 90 , fontsize = 12)
plt.ylabel('total_TV_Shows' , fontsize = 12)
plt.xlabel('Genres' , fontsize = 12)
plt.title('Total_TV_Shows_by_genre')
plt.show()
```



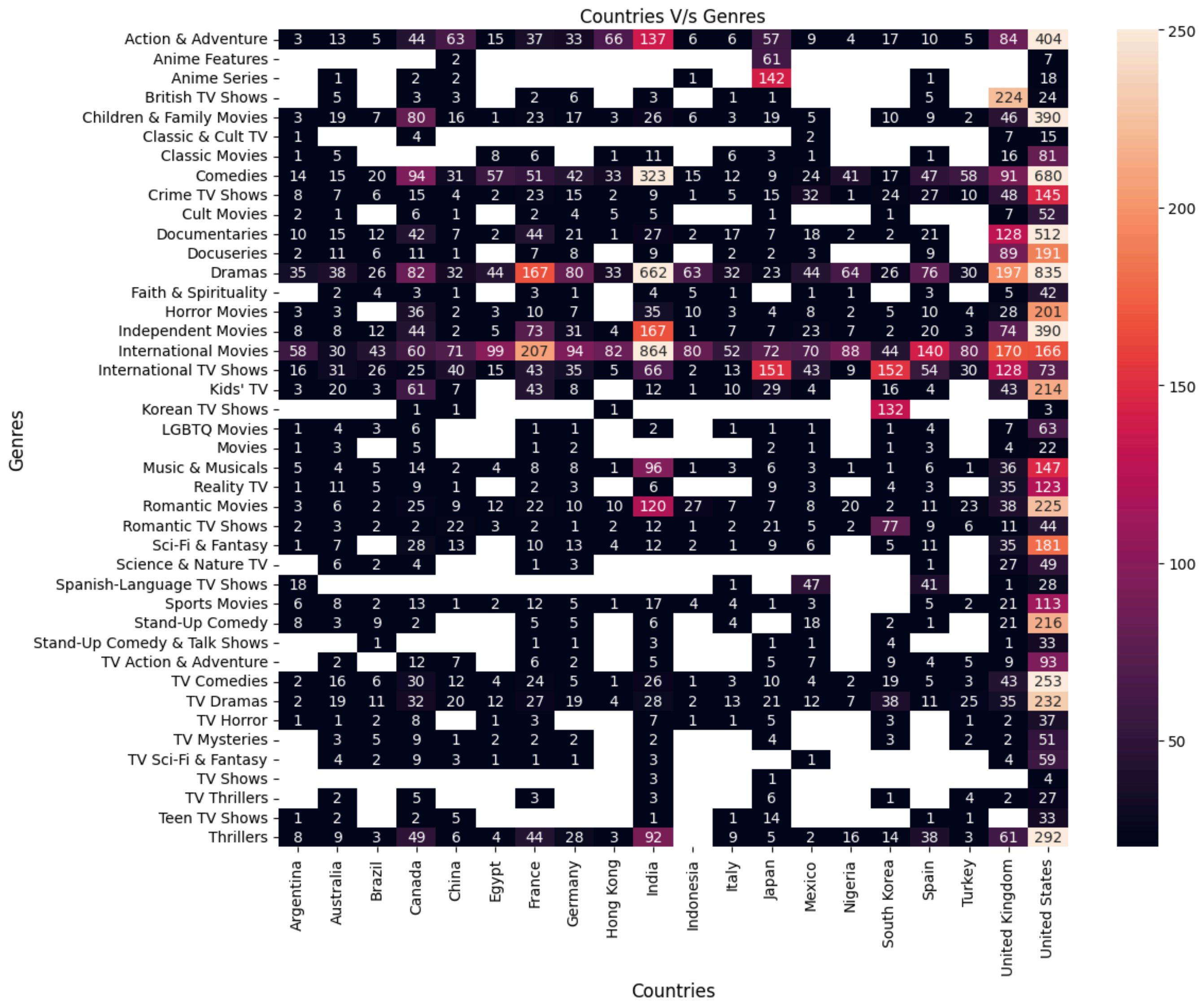
- International Movies and TV Shows , Dramas , and Comedies are the top 3 genres on Netflix for both Movies and TV shows.

5. Bivariate Analysis

- 5.1 Lets check popular genres in top 20 countries

```
top_20_country = country_tb.country.value_counts().head(20).index
top_20_country = country_tb.loc[country_tb['country'].isin(top_20_country)]


x = top_20_country.merge(genre_tb , on = 'show_id').drop_duplicates()
country_genre = x.groupby([ 'country' , 'listed_in'])['show_id'].count().sort_values(ascending = False).reset_index()
country_genre = country_genre.pivot(index = 'listed_in' , columns = 'country' , values = 'show_id')


plt.figure(figsize = (12,10))
sns.heatmap(data = country_genre , annot = True , fmt=".0f" , vmin = 20 , vmax = 250 )
plt.xlabel('Countries' , fontsize = 12)
plt.ylabel('Genres' , fontsize = 12)
plt.title('Countries V/s Genres' , fontsize = 12)
```

```
Text(0.5, 1.0, 'Countries V/s Genres')
```



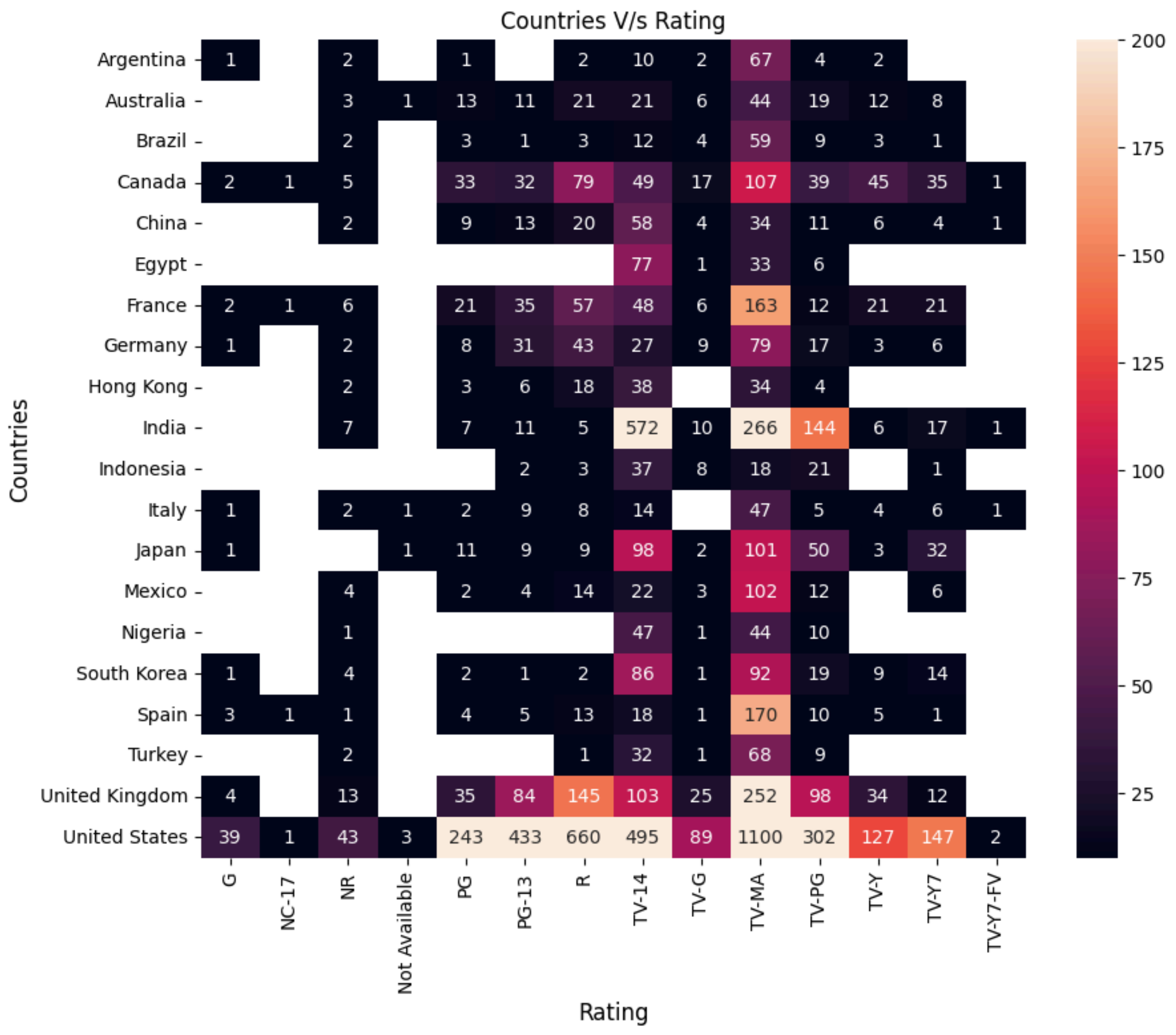
- Popular genres across countries: Action & Adventure, Children & Family Movies, Comedies, Dramas, International Movies & TV Shows, TV Dramas, Thrillers
- Country-specific genres: Korean TV shows (Korea), British TV Shows (UK), Anime features and Anime series (Japan), Spanish TV Shows (Argentina, Mexico and Spain)
- United States and UK have a good mix of almost all genres.
- Maximum International movies are produced in India.

5.2 Country-wise Rating of Content

```
x = top_20_country.merge(df , on = 'show_id').groupby(['country_x' , 'rating'])['show_id'].count().reset_index()
```

```
country_rating = x.pivot(index = ['country_x'] , columns = 'rating' , values = 'show_id')


plt.figure(figsize = (10,8))
sns.heatmap(data = country_rating , annot = True , fmt=".0f"  , vmin = 10 , vmax=200)
plt.ylabel('Countries' , fontsize = 12)
plt.xlabel('Rating' , fontsize = 12)
plt.title('Countries V/s Rating' , fontsize = 12)
```

```
Text(0.5, 1.0, 'Countries V/s Rating')
```



- Netflix offers a significant amount of adult content (rated TV-MA & TV-14) across all countries.
- In India, there is also a substantial number of titles rated TV-PG, in addition to TV-MA and TV-14.
- The US, Canada, UK, France, and Japan are the only countries that offer content for young audiences (rated TV-Y & TV-Y7).
- Content suitable for a general audience (rated TV-G & G) is rare across all countries, with the exception of the US.

5.3 The Top actors by country

```
x = cast_tb.merge(country_tb , on = 'show_id').drop_duplicates()
x = x.groupby(['country' , 'cast'])['show_id'].count().reset_index()
x.loc[x['country'].isin(['United States'])].sort_values('show_id' , ascending = False).head(5)
```

	country	cast	show_id
49405	United States	Tara Strong	22
48330	United States	Samuel L. Jackson	22
40463	United States	Fred Tatasciore	21
35733	United States	Adam Sandler	20
46429	United States	Nicolas Cage	19

```
country_list = ['India'  , 'United Kingdom' , 'Canada' , 'France' , 'Japan']
top_5_actors = x.loc[x['country'].isin(['United States'])].sort_values('show_id' , ascending = False).head(5)
```

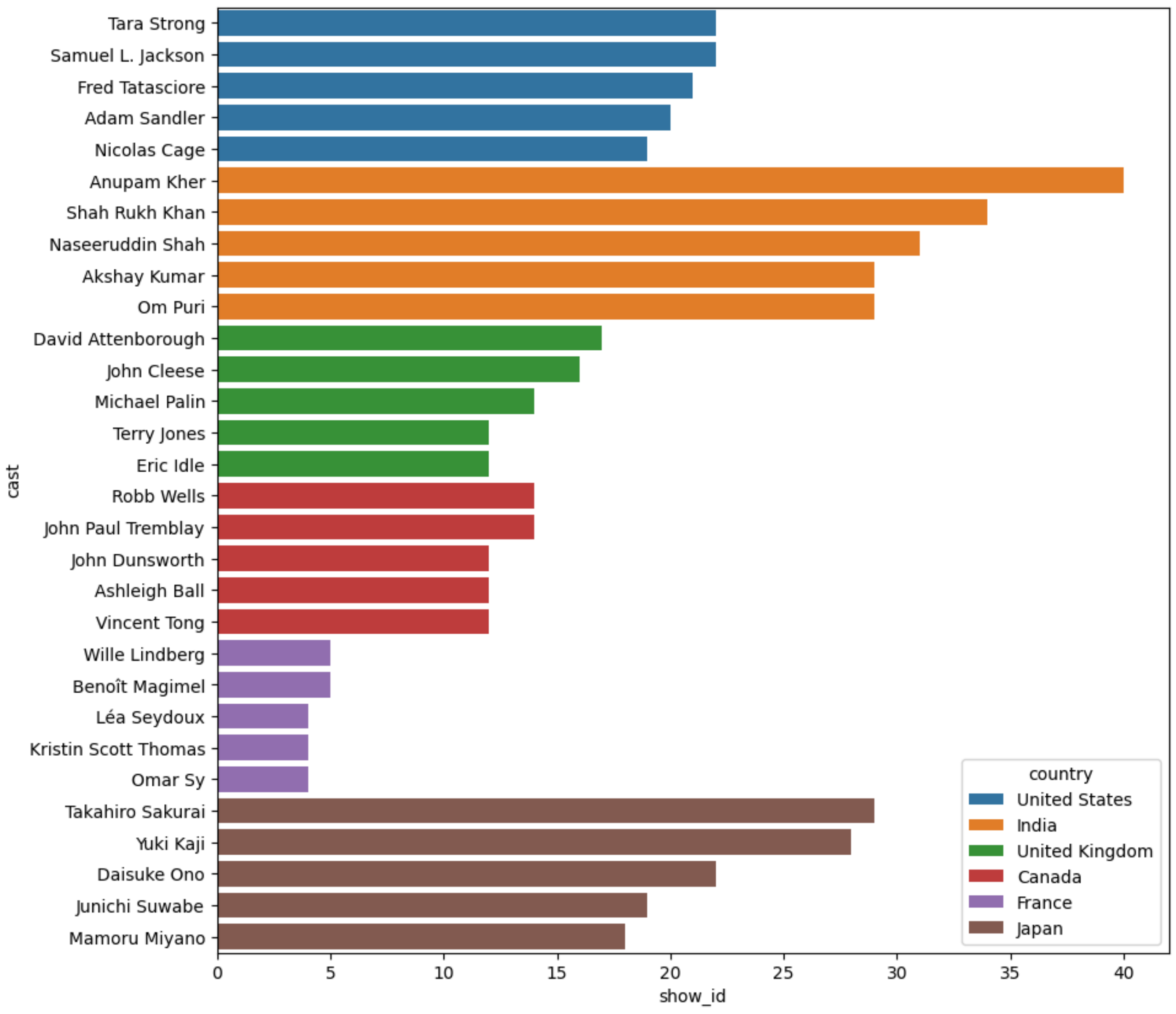
```
for i in country_list:
    new = x.loc[x['country'].isin([i])].sort_values('show_id' , ascending = False).head(5)
    top_5_actors = pd.concat( [top_5_actors , new] , ignore_index = True)


# top 5 actors in top countries and their movies/tv shows count
top_5_actors
```

	country	cast	show_id
0	United States	Tara Strong	22
1	United States	Samuel L. Jackson	22
2	United States	Fred Tatasciore	21
3	United States	Adam Sandler	20
4	United States	Nicolas Cage	19
5	India	Anupam Kher	40
6	India	Shah Rukh Khan	34
7	India	Naseeruddin Shah	31
8	India	Akshay Kumar	29
9	India	Om Puri	29
10	United Kingdom	David Attenborough	17
11	United Kingdom	John Cleese	16
12	United Kingdom	Michael Palin	14
13	United Kingdom	Terry Jones	12
14	United Kingdom	Eric Idle	12
15	Canada	Robb Wells	14
16	Canada	John Paul Tremblay	14
17	Canada	John Dunsworth	12
18	Canada	Ashleigh Ball	12
19	Canada	Vincent Tong	12
20	France	Wille Lindberg	5
21	France	Benoît Magimel	5
22	France	Léa Seydoux	4
23	France	Kristin Scott Thomas	4
24	France	Omar Sy	4
25	Japan	Takahiro Sakurai	29
26	Japan	Yuki Kaji	28
27	Japan	Daisuke Ono	22
28	Japan	Junichi Suwabe	19
29	Japan	Mamoru Miyano	18

Next steps: Generate code with `top_5_actors` View recommended plots New interactive sheet

```
plt.figure(figsize = (10,10))
sns.barplot(data = top_5_actors , y = 'cast' , x = 'show_id' , hue = 'country')
```

```
<Axes: xlabel='show_id', ylabel='cast'>
```



- 5.4 Top 5 directors by Genre

```
genre_list = [ 'Children & Family Movies', 'Comedies','Dramas', 'International Movies', 'Documentaries' ,
              'International TV Shows', 'Sci-Fi & Fantasy', 'Thrillers', 'Horror Movies']

x = dir_tb.merge(genre_tb , on = 'show_id').groupby([ 'listed_in' , 'director',])['show_id'].count().reset_index()

top_5_dir = x.loc[x['listed_in'] == 'Action & Adventure'].sort_values('show_id' , ascending = False).head()

for i in genre_list:
    new = x.loc[x['listed_in'] == i].sort_values('show_id' , ascending = False).head()
    top_5_dir = pd.concat([top_5_dir , new])

top_5_dir
```

	listed_in	director	show_id
147	Action & Adventure	Don Michael Paul	9
215	Action & Adventure	Hidenori Inoue	7
550	Action & Adventure	S.S. Rajamouli	7
651	Action & Adventure	Toshiya Shinohara	7
398	Action & Adventure	McG	5
1215	Children & Family Movies	Rajiv Chilaka	22
1303	Children & Family Movies	Suhas Kadav	16
1211	Children & Family Movies	Prakash Satam	7
1241	Children & Family Movies	Robert Rodriguez	7
1295	Children & Family Movies	Steven Spielberg	6
1756	Comedies	David Dhawan	9
1905	Comedies	Hakan Algül	8
2686	Comedies	Suhas Kadav	8
1663	Comedies	Cathy Garcia-Molina	7
2456	Comedies	Prakash Satam	7
5935	Dramas	Youssef Chahine	12
5099	Dramas	Martin Scorsese	9
4254	Dramas	Cathy Garcia-Molina	9
4590	Dramas	Hanung Bramantyo	8
4611	Dramas	Hidenori Inoue	7
7509	International Movies	Cathy Garcia-Molina	13
9330	International Movies	Youssef Chahine	10
9340	International Movies	Yılmaz Erdoğan	9
7866	International Movies	Hakan Algül	8
8208	International Movies	Kunle Afolayan	8
3834	Documentaries	Vlad Yudin	6
3799	Documentaries	Thierry Donard	5
3312	Documentaries	Hernán Zin	4
3262	Documentaries	Frank Capra	4
3553	Documentaries	Matt Askem	4
9373	International TV Shows	Alastair Fothergill	3
9501	International TV Shows	Shin Won-ho	2
9436	International TV Shows	Jung-ah Im	2
9419	International TV Shows	Hsu Fu-chun	2
9369	International TV Shows	Adrián García Bogliano	1
10752	Sci-Fi & Fantasy	Lilly Wachowski	4
10744	Sci-Fi & Fantasy	Lana Wachowski	4
10635	Sci-Fi & Fantasy	Barry Sonnenfeld	3
10684	Sci-Fi & Fantasy	Guillermo del Toro	3
10790	Sci-Fi & Fantasy	Paul W.S. Anderson	3
11974	Thrillers	Rathindran R Prasad	4
11698	Thrillers	David Fincher	4
11636	Thrillers	Brad Anderson	3
11851	Thrillers	Kunle Afolayan	3
11616	Thrillers	Ashwin Saravanan	3
6280	Horror Movies	Rocky Soraya	6
6260	Horror Movies	Poj Arnon	5
6267	Horror Movies	Rathindran R Prasad	4
6183	Horror Movies	Kevin Smith	3

6052	Horror Movies	Banjong Pisanthanakun	3

Next steps: Generate code with top_5_dir View recommended plots New interactive sheet

- 5.5 Top 5 genres in each country

```
x = genre_tb.merge(country_tb , on = 'show_id').drop_duplicates()
x = x.groupby(['country' , 'listed_in'])['show_id'].count().reset_index()
x.loc[x['country'] == 'United States'].sort_values('show_id' , ascending = False).head(5)

country_list = ['India'  , 'United Kingdom' , 'Canada' , 'France' , 'Japan']
top_5_genre = x.loc[x['country'].isin(['United States'])].sort_values('show_id' , ascending = False).head(5)

for i in country_list:
    new = x.loc[x['country'] == i].sort_values('show_id' , ascending = False).head(5)
    top_5_genre = pd.concat( [top_5_genre , new] , ignore_index = True)


top_5_genre
```

	country	listed_in	show_id
0	United States	Dramas	835
1	United States	Comedies	680
2	United States	Documentaries	512
3	United States	Action & Adventure	404
4	United States	Children & Family Movies	390
5	India	International Movies	864
6	India	Dramas	662
7	India	Comedies	323
8	India	Independent Movies	167
9	India	Action & Adventure	137
10	United Kingdom	British TV Shows	224
11	United Kingdom	Dramas	197
12	United Kingdom	International Movies	170
13	United Kingdom	Documentaries	128
14	United Kingdom	International TV Shows	128
15	Canada	Comedies	94
16	Canada	Dramas	82
17	Canada	Children & Family Movies	80
18	Canada	Kids' TV	61
19	Canada	International Movies	60
20	France	International Movies	207
21	France	Dramas	167
22	France	Independent Movies	73
23	France	Comedies	51
24	France	Documentaries	44
25	Japan	International TV Shows	151
26	Japan	Anime Series	142
27	Japan	International Movies	72
28	Japan	Anime Features	61
29	Japan	Action & Adventure	57

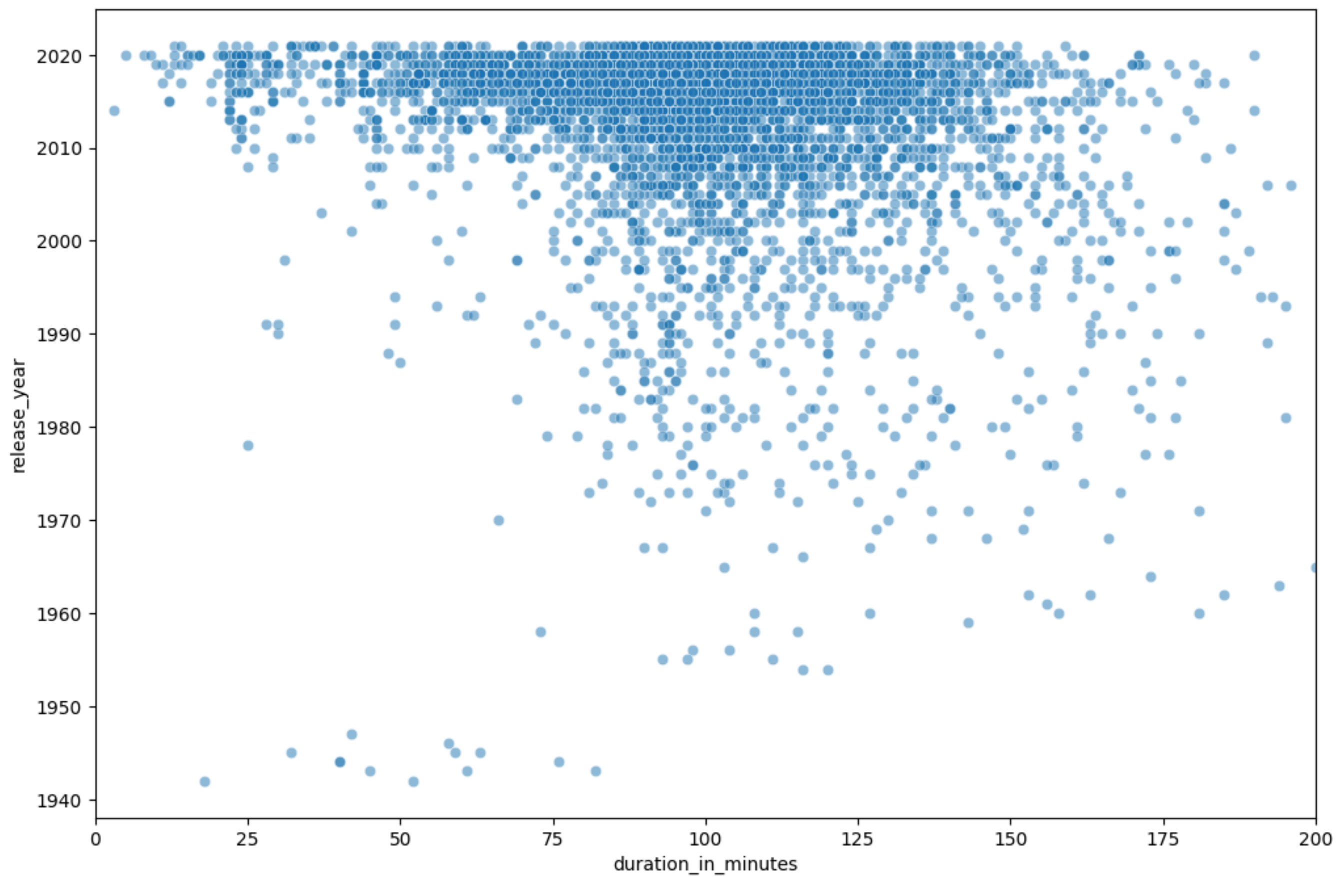
Next steps: Generate code with top_5_genre View recommended plots New interactive sheet

- 5.6 Variation in duration of movies by Release year

```
plt.figure(figsize = (12,8))
sns.scatterplot(x = movies['duration_in_minutes'],y = movies['release_year'],  alpha=0.5)
```

```
plt.xlim((0,200))
```

```
(0.0, 200.0)
```



Observations:

- The movies shorter than 150 minutes duration have increased drastically after 2000 while movies longer than 150 minutes are not much popular.
- There is a huge surge in the number of shorter duration movies (less than 75 mins) post 2010. Overall, Short movies have been popular in last 10 years.

- 5.7 What is the best time of the year when maximum content get added on the Netflix?

```
month_year = df.groupby(['year_added' , 'month_added'])['show_id'].count().reset_index()
```

```
plt.figure(figsize = (10,6))
sns.lineplot(data=month_year, x = 'year_added', y = 'show_id', hue='month_added')
plt.title('Year and Month of Adding Shows on Netflix')
```