Netflix Data Exploration

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1 Business Case: Netflix - Data Exploration and Mindset

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

[ ]:
```
netflix_raw = pd.read_csv("./netflix.csv")
netflix_raw.head(2)
```

[ ]:
```
  show_id     type                  title         director  \
0      s1    Movie  Dick Johnson Is Dead  Kirsten Johnson
1      s2  TV Show          Blood & Water              NaN

                                                cast        country  \
0                                                NaN  United States
1  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban…   South Africa

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

                                      listed_in  \
0                                 Documentaries
1  International TV Shows, TV Dramas, TV Mysteries

                                      description
0  As her father nears the end of his life, filmm…
1  After crossing paths at a party, a Cape Town t…
```

1.1 Exploring The Data Set

[ ]:
```
netflix_raw.shape
```

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

[ ]:
```
netflix_raw.rename(columns={'cast': 'actor'}, inplace=True)
```

[ ]:
```
netflix_raw.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   actor         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
```

Insight:

- There is 8807 number of content avilable, with 12 criteria/ details for each content
- All 12 criteria/ details are mentioned above

1.1.1 Missing value detection & fill with relevent data.

[ ]:
```
netflix_raw.isnull().sum()
```

[ ]:
```
show_id           0
type              0
title             0
director       2634
actor           825
country         831
date_added       10
release_year      0
rating            4
duration          3
listed_in         0
description       0
dtype: int64
```

[ ]:
```
netflix_raw['director'] = netflix_raw['director'].fillna("Unknown Director")
netflix_raw['actor'] = netflix_raw['actor'].fillna("Unknown Actor")
netflix_raw['country'] = netflix_raw['country'].fillna("Unknown Country")
netflix_raw['date_added']=netflix_raw['date_added'].fillna('0')
netflix_raw['rating']=netflix_raw['rating'].fillna('Unknown Rating')
netflix_raw['duration']=netflix_raw['duration'].fillna('Unknown Duration')
```

Insight:

- There is 2634 content avilable, with out **Director Details**.
- There is 825 content avilable, with out **Actors Details**.
- There is 831 content avilable, with out **Country Details**.
- There is 10 content avilable, with out **Date Details** on which date that added to Netflix Platform.
- There is 4 content avilable, with out **Rating Details** on which category they belongs to.
- There is 3 content avilable, with out **Duration Details**.

1.1.2 Conversion of categorical attributes to 'category'.

[ ]:
```
netflix_raw['type'] = netflix_raw['type'].astype('category')
netflix_raw['country'] = netflix_raw['country'].astype('category')
netflix_raw.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   category
 2   title         8807 non-null   object
 3   director      8807 non-null   object
 4   actor         8807 non-null   object
 5   country       8807 non-null   category
 6   date_added    8807 non-null   object
 7   release_year  8807 non-null   int64
 8   rating        8807 non-null   object
 9   duration      8807 non-null   object
 10  listed_in     8807 non-null   object
 11  description   8807 non-null   object
dtypes: category(2), int64(1), object(9)
memory usage: 736.1+ KB
```

Insight:

- 'Type', 'Director', 'Cast/Actor', 'Country', 'Rating', 'listed_in/Genre' are Converted as Categorical Attributes.
- Only Type & Country are Converted as Type Category.
- Because C-C analysis like, 'Type-Rating' or 'Country-Release year' It brings all catogory to graph.

1.1.3 Statistical summary of Data

[ ]:
```
netflix_raw.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
```

1.1.4 Un-nesting Director Column

[ ]:
```
netflix_director = netflix_raw.copy()
netflix_director = netflix_director.loc[netflix_raw['director']!='Unknown␣
↪Director']
netflix_director['director'] = netflix_director['director'].str.split(',')
netflix_director = netflix_director.explode('director')
netflix_director['director'] = netflix_director['director'].str.strip()
```

1.1.5 Un-nesting Actor Column

[ ]:
```
netflix_actor = netflix_raw.copy()
netflix_actor = netflix_actor.loc[netflix_actor['actor']!='Unknown Actor']
netflix_actor['actor'] = netflix_actor['actor'].str.split(',')
netflix_actor = netflix_actor.explode('actor')
netflix_actor['actor'] = netflix_actor['actor'].str.strip()
```

1.1.6 Un-nesting Country Column

[ ]:
```
netflix_country = netflix_raw.copy()
netflix_country = netflix_country.loc[netflix_raw['country']!='Unknown Country']
netflix_country['country'] = netflix_country['country'].str.split(',')
netflix_country = netflix_country.explode('country')
netflix_country['country'] = netflix_country['country'].str.strip()
```

1.1.7 Un-nesting Date Added Column (Day, Month, Year, week_day)

[ ]:
```
netflix_date = netflix_raw.copy()
netflix_date = netflix_date.loc[netflix_raw['date_added']!='0']

netflix_date['date_added_utc'] = pd.to_datetime(netflix_date['date_added'])
netflix_date['add_year'] = netflix_date['date_added_utc'].dt.year
netflix_date['add_month_name'] = netflix_date['date_added_utc'].dt.month_name()
```

```
netflix_date['add_month'] = netflix_date['date_added_utc'].dt.month
netflix_date['add_day'] = netflix_date['date_added_utc'].dt.day
netflix_date['add_weekday'] = netflix_date['date_added_utc'].dt.day_name()

weekday_order = ['Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday',␣
 ↪'Saturday', 'Sunday']
netflix_date['add_weekday'] = pd.Categorical(netflix_date['add_weekday'],␣
 ↪categories=weekday_order, ordered=True)

month_order = ['January', 'February', 'March', 'April', 'May', 'June',
               'July', 'August', 'September', 'October', 'November', 'December']
netflix_date['add_month_name'] = pd.Categorical(netflix_date['add_month_name'],␣
 ↪categories=month_order, ordered=True)
```

1.1.8 Un-nesting Listed In / Genre Column

[ ]:
```
netflix_genre = netflix_raw.copy()
netflix_genre['genre'] = netflix_genre['listed_in'].str.split(',')
netflix_genre = netflix_genre.explode('genre')
netflix_genre['genre'] = netflix_genre['genre'].str.strip()
```

1.1.9 Range of Data

[ ]:
```
old_date = netflix_date['date_added_utc'].min()
latest_date = netflix_date['date_added_utc'].max()
print(f'Oldest Date of available record: {old_date}\nLatest Date of available␣
 ↪record: {latest_date}')
```

```
Oldest Date of available record: 2008-01-01 00:00:00
Latest Date of available record: 2021-09-25 00:00:00
```

1.2 Analysis

[ ]:
```
netflix_raw.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   category
 2   title         8807 non-null   object
 3   director      8807 non-null   object
 4   actor         8807 non-null   object
 5   country       8807 non-null   category
 6   date_added    8807 non-null   object
 7   release_year  8807 non-null   int64
```

```
 8   rating        8807 non-null   object
 9   duration      8807 non-null   object
 10  listed_in     8807 non-null   object
 11  description   8807 non-null   object
dtypes: category(2), int64(1), object(9)
memory usage: 736.1+ KB
```

1.2.1 Type (Movie vs TV Show)

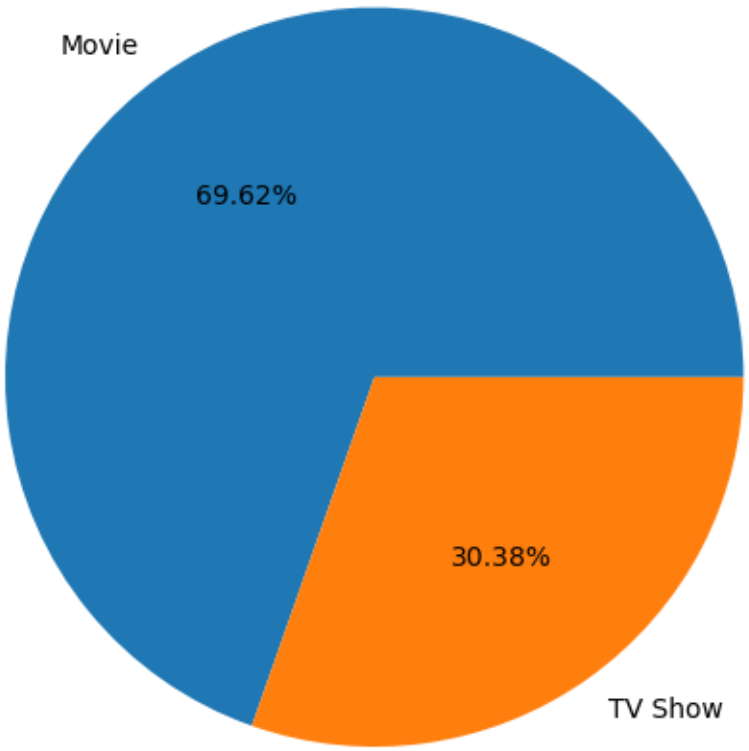
[ ]:
```
netflix_raw['type'].unique()
```

[ ]:
```
['Movie', 'TV Show']
Categories (2, object): ['Movie', 'TV Show']
```

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

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

[ ]:
```
plt.pie(netflix_raw['type'].value_counts().values,labels = netflix_raw['type'].
↪value_counts().index,radius = 1.3,autopct = '%1.2f%%',) # type: ignore
plt.show()
```



Observation:

- Netflix has about 69.62% of movies and 30.38% TV Shows

Insight:

- There is only 2 type of Contents. which are Movies & TV Show
- There are 6131 `Movies` which is equivalent to 69.62%.
- There are 2676 `TV Show` which is equivalent to 30.38%.

1.2.2 Title

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

[ ]:
```
8807
```

[ ]:
```
netflix_raw['title'].value_counts()
```

[ ]:
```
Dick Johnson Is Dead                     1
Ip Man 2                                 1
Hannibal Buress: Comedy Camisado         1
Turbo FAST                               1
Masha's Tales                            1
                                        ..
Love for Sale 2                          1
ROAD TO ROMA                             1
Good Time                                1
Captain Underpants Epic Choice-o-Rama    1
Zubaan                                   1
Name: title, Length: 8807, dtype: int64
```

Obersvation:

- There are 8807 unique titles for each contents.

1.2.3 Based on Director

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

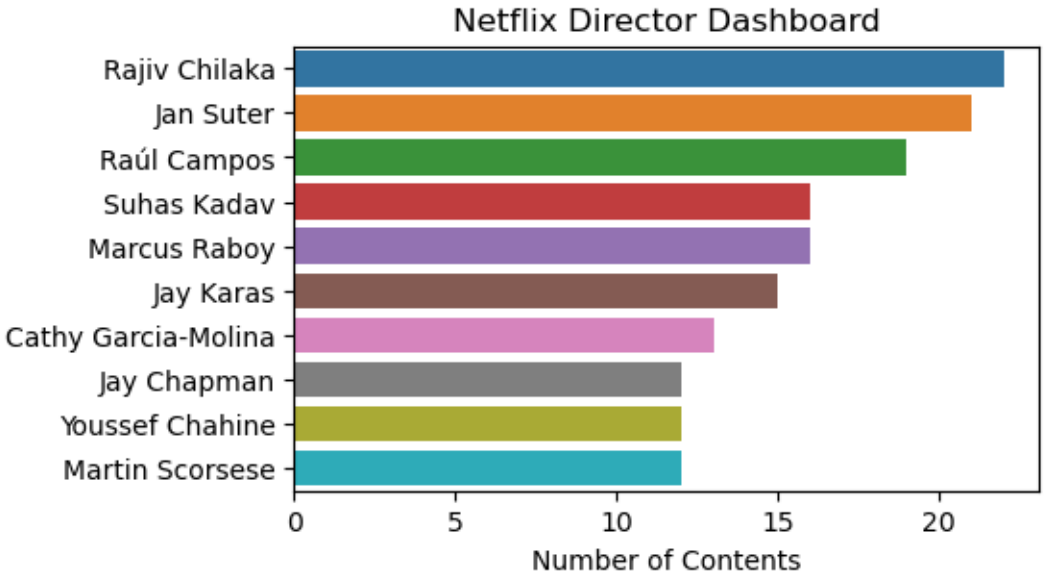
[ ]:
```
4993
```

[ ]:
```
netflix_director['director'].value_counts().reset_index()
```

[ ]:
```
                index  director
0      Rajiv Chilaka        22
1          Jan Suter        21
2        Raúl Campos        19
3        Suhas Kadav        16
4       Marcus Raboy        16
…                …       …
4988  Raymie Muzquiz         1
```

```
4989  Stu Livingston         1
4990    Joe Menendez         1
4991      Eric Bross         1
4992     Mozez Singh         1

[4993 rows x 2 columns]
```

[ ]:
```
plt.figure(figsize=(5,3))
sns.barplot(data=netflix_director['director'].value_counts().reset_index()[:
↪10], y='index', x='director')
plt.title('Netflix Director Dashboard', fontsize=12)
plt.ylabel('')
plt.xlabel('Number of Contents', fontsize=10)
plt.show()
```



1.2.4 Based on Actor

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

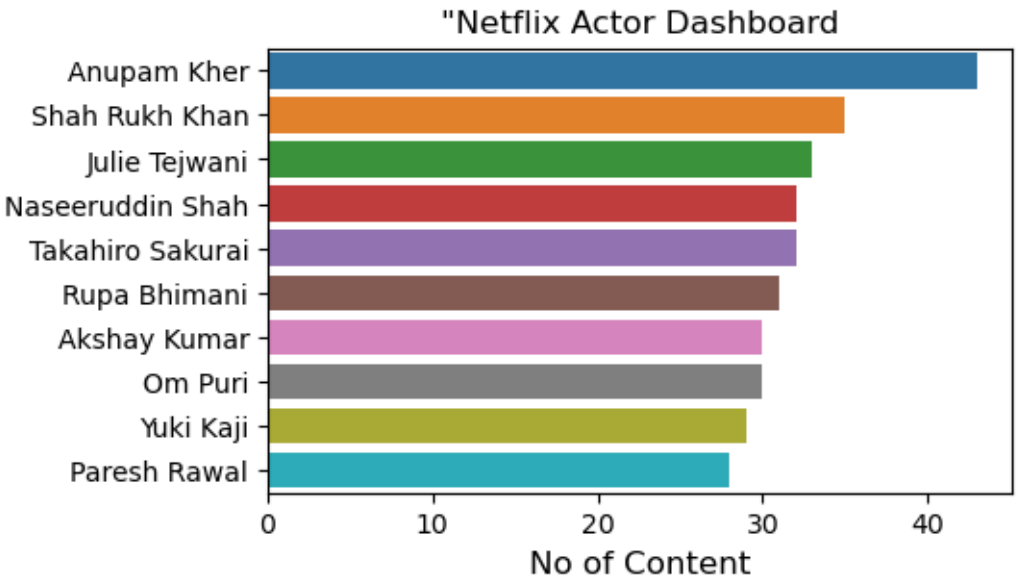
[ ]:
```
36439
```

[ ]:
```
netflix_actor['actor'].value_counts().reset_index()
```

[ ]:
```
                      index  actor
0                 Anupam Kher     43
1             Shah Rukh Khan     35
2              Julie Tejwani     33
```

```
3              Naseeruddin Shah     32
4              Takahiro Sakurai     32
…                            …    …
36434              Maryam Zaree      1
36435            Melanie Straub      1
36436  Gabriela Maria Schmeide       1
36437             Helena Zengel      1
36438    Chittaranjan Tripathy       1

[36439 rows x 2 columns]
```

[ ]:
```
plt.figure(figsize=(5,3))
sns.barplot(data=netflix_actor['actor'].value_counts().reset_index()[:10],␣
 ↪y='index', x='actor')
plt.title('"Netflix Actor Dashboard', fontsize=12)
plt.ylabel('')
plt.xlabel('No of Content', fontsize=12)
plt.show()
```



1.2.5 Based on Country

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

[ ]:
```
123
```

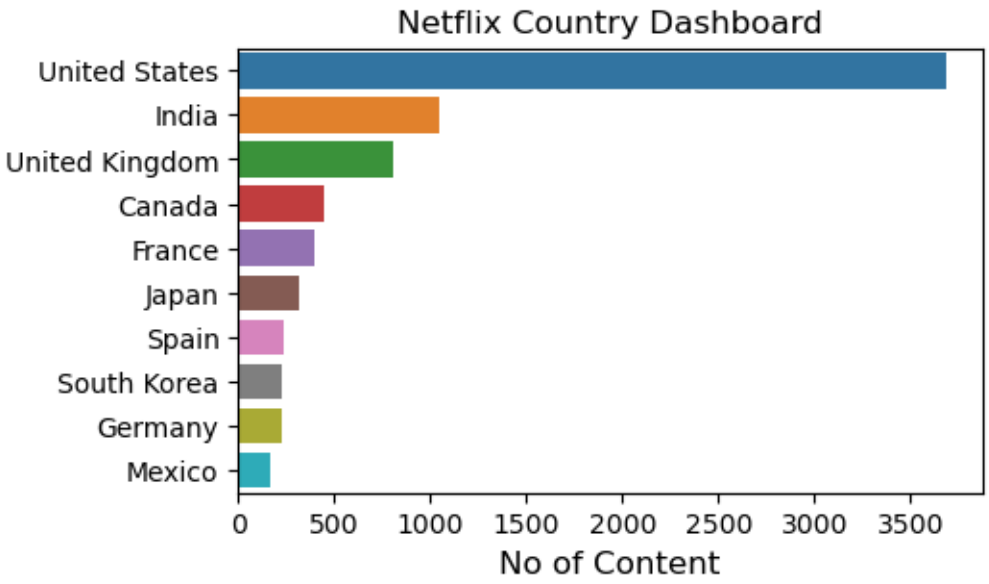
[ ]:
```
netflix_country['country'].value_counts().reset_index()
```

[ ]:

	index	country
0	United States	3690
1	India	1046
2	United Kingdom	806
3	Canada	445
4	France	393
..	…	…
118	Ecuador	1
119	Armenia	1
120	Mongolia	1
121	Bahamas	1
122	Montenegro	1

[123 rows x 2 columns]

[ ]:
```
plt.figure(figsize=(5,3))
sns.barplot(data=netflix_country['country'].value_counts().reset_index()[:10],␣
 ↪y='index', x='country')
plt.title('Netflix Country Dashboard', fontsize=12)
plt.ylabel('')
plt.xlabel('No of Content', fontsize=12)
plt.show()
```



1.2.6 Based on Date Added (Date on which added to Netflix)

[ ]:
```
print(f"Oldest Content on Netflix is: {netflix_date['date_added_utc'].min()}")
print(f"Latest Content on Netflix is: {netflix_date['date_added_utc'].max()}")
```

```
Oldest Content on Netflix is: 2008-01-01 00:00:00
Latest Content on Netflix is: 2021-09-25 00:00:00
```

[ ]:
```
netflix_date['date_added_utc'].nunique()
```

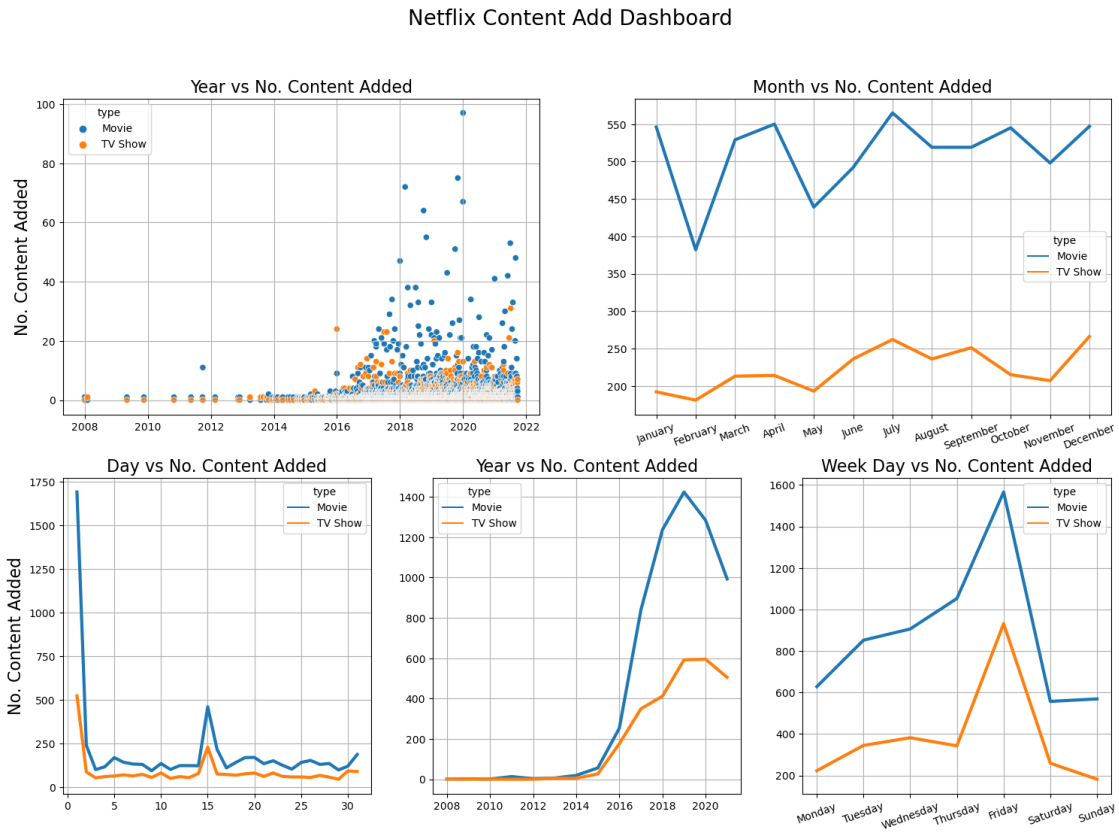
[ ]:
```
1714
```

[ ]:
```
netflix_date['date_added_utc'].value_counts().reset_index()
```

[ ]:
```
          index  date_added_utc
0    2020-01-01             110
1    2019-11-01              91
2    2018-03-01              75
3    2019-12-31              74
4    2018-10-01              71
…         …              …
1709 2017-02-21               1
1710 2017-02-07               1
1711 2017-01-29               1
1712 2017-01-25               1
1713 2020-01-11               1

[1714 rows x 2 columns]
```

[ ]:
```
plt.figure(figsize=(18,12)).suptitle("Netflix Content Add␣
 ↪Dashboard",fontsize=20)

plt.subplot(2, 2, 1)
plt.grid()
sns.scatterplot(data=netflix_date.groupby(['date_added_utc', 'type'])['title'].
 ↪aggregate('nunique'
               ).reset_index(), x='date_added_utc', y='title', hue='type')
plt.title('Year vs No. Content Added', fontsize=16)
plt.xlabel('')
plt.ylabel('No. Content Added', fontsize=16)

plt.subplot(2, 2, 2)
plt.grid()
sns.lineplot(data=netflix_date.groupby(['add_month_name', 'type'])['title'].
 ↪aggregate('nunique'
               ).reset_index(), x='add_month_name', y='title', hue='type',␣
 ↪linewidth=3)
plt.title('Month vs No. Content Added', fontsize=16)
```

```
plt.xlabel('')
plt.ylabel('')
plt.xticks(rotation= 20)

plt.subplot(2, 3, 4)
plt.grid()
sns.lineplot(data=netflix_date.groupby(['add_day', 'type'])['title'].
 ↪aggregate('nunique'
               ).reset_index(), x='add_day', y='title', hue='type',␣
 ↪linewidth=3)
plt.title('Day vs No. Content Added', fontsize=16)
plt.xlabel('')
plt.ylabel('No. Content Added', fontsize=16)

plt.subplot(2, 3, 5)
plt.grid()
sns.lineplot(data=netflix_date.groupby(['add_year', 'type'])['title'].
 ↪aggregate('nunique'
               ).reset_index(), x='add_year', y='title', hue='type',␣
 ↪linewidth=3)
plt.title('Year vs No. Content Added', fontsize=16)
plt.xlabel('')
plt.ylabel('')

plt.subplot(2, 3, 6)
plt.grid()
sns.lineplot(data=netflix_date.groupby(['add_weekday', 'type'])['title'].
 ↪aggregate('nunique'
               ).reset_index(), x='add_weekday', y='title', hue='type',␣
 ↪linewidth=3)
plt.title('Week Day vs No. Content Added', fontsize=16)
plt.xlabel('')
plt.ylabel('')
plt.xticks(rotation= 20)

plt.show()
```



Insight:

- Contents are added to Netflix Platform from 2008 upto `mid 2021`.
- No of content add to Netflix grows significantly since 2014.
- Highest in Number of Movie added to Netflix around Year 2019. and TV Show on Year 2019 & 2020.
- Here we have observed `+ve Co-Relation` between Year & No of content added during 2014 to 2019. >
- Most of the Movie & TV Show are added to Netflix in `July` Month.
- Found that in `Frebruary` Month very less Movie & TV Show are added to Netflix. >
- Most of the Movie & TV Show are added to Netflix during `Start` of a month fallowed by `Mid` of the Month.
- Similarly, Most of the Movie & TV Show are added to Netflix on `Friday` fallowed by `Thursday`.

There are 1714 Unique Dates are available where Movie or TV Shows are Added to Netflix Platform.

1.2.7 Based on Release year

[ ]:
```
print(f"Oldest Content on Netflix is: {netflix_raw['release_year'].min()}")
print(f"Latest Content on Netflix is: {netflix_raw['release_year'].max()}")
```

```
Oldest Content on Netflix is: 1925
Latest Content on Netflix is: 2021
```

[ ]:
```
netflix_raw['release_year'].nunique()
```

[ ]: 74

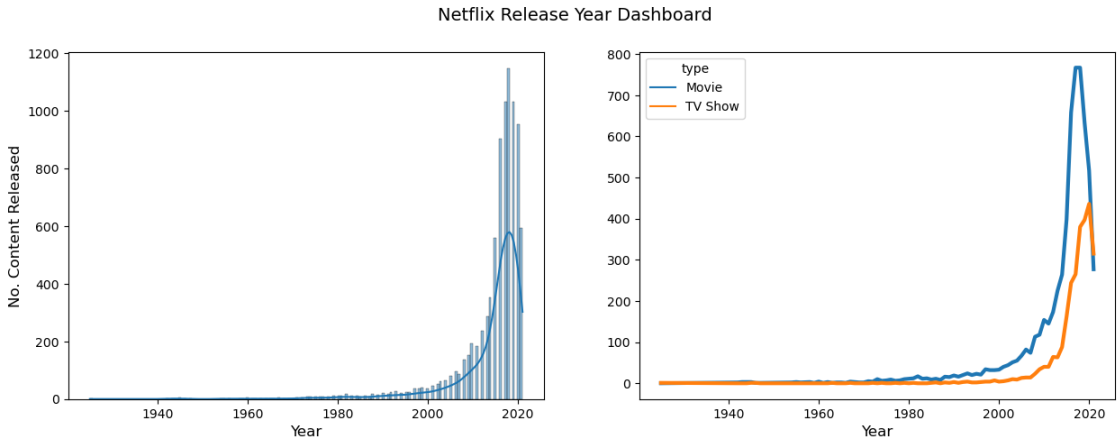
[ ]:
```
netflix_raw['release_year'].value_counts().reset_index()
```

[ ]:

	index	release_year
0	2018	1147
1	2017	1032
2	2019	1030
3	2020	953
4	2016	902
..	…	…
69	1959	1
70	1925	1
71	1961	1
72	1947	1
73	1966	1

[74 rows x 2 columns]

[ ]:
```
plt.figure(figsize=(15,5)).suptitle("Netflix Release Year␣
 ↪Dashboard",fontsize=14)

plt.subplot(1, 2, 1)
sns.histplot(x=netflix_raw['release_year'], kde=True)
plt.xlabel('Year', fontsize=12)
plt.ylabel('No. Content Released', fontsize=12)

plt.subplot(1, 2, 2)
sns.lineplot(data=netflix_raw.groupby(['release_year', 'type'])['title'].
 ↪aggregate('nunique'
                    ).reset_index(), x='release_year', y='title', hue='type',␣
 ↪linewidth=3)
plt.xlabel('Year', fontsize=12)
plt.ylabel('', fontsize=12)

plt.show()
```



Insight: * Range of Contents which are available at Netflix Platform is `1925 to 2021`.

Considering Available Content in NetFlix * Highest in Number of Movie released in Year `2019`. and TV Show in Year `2020` * Here we have observed `+ve Co-Relation` between Year & No of content released during `2000 to 2019` * Most No the Movie are released on `2017-2018`. * Most No the TV Show are released on `2020`.

There are `74` Unique Year are available where Movie or TV Shows are released.

1.2.8 Based on Rating

[ ]:
```
netflix_raw['rating'].nunique()
```

[ ]:
```
18
```

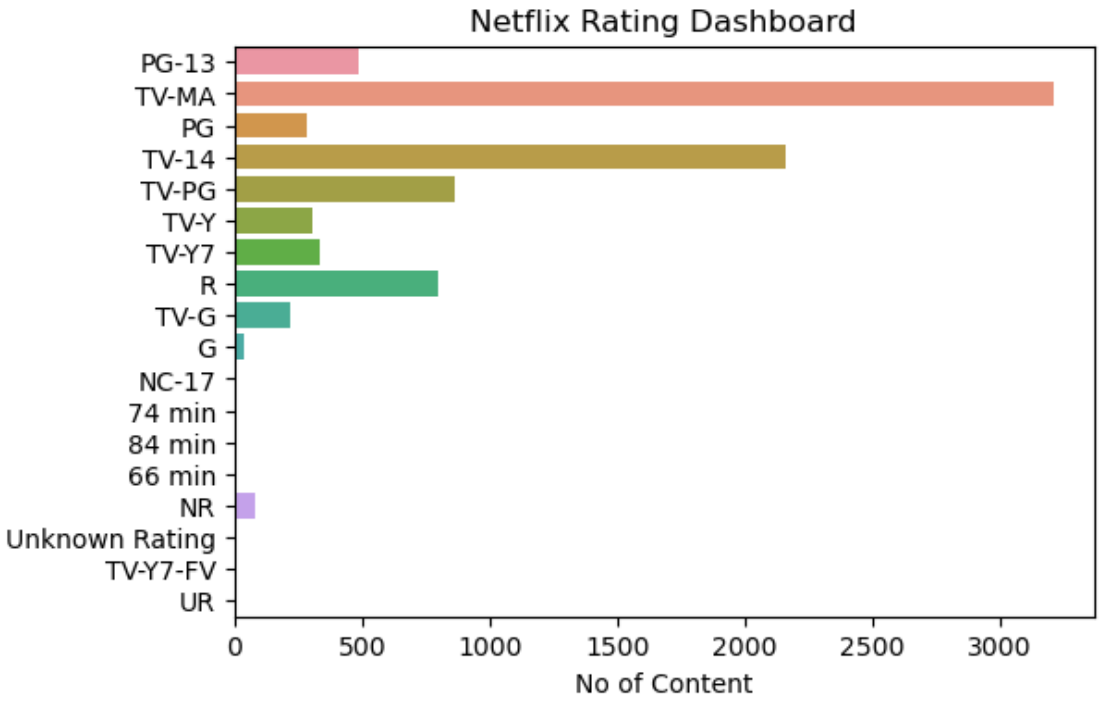
[ ]:
```
netflix_raw['rating'].value_counts().reset_index()
```

[ ]:

	index	rating
0	TV-MA	3207
1	TV-14	2160
2	TV-PG	863
3	R	799
4	PG-13	490
5	TV-Y7	334
6	TV-Y	307
7	PG	287
8	TV-G	220
9	NR	80
10	G	41
11	TV-Y7-FV	6
12	Unknown Rating	4
13	NC-17	3
14	UR	3

```
15          74 min       1
16          84 min       1
17          66 min       1
```

[ ]:
```
plt.figure(figsize=(6,4))
sns.countplot(y=netflix_raw['rating'])
plt.title('Netflix Rating Dashboard', fontsize=12)
plt.ylabel('', fontsize=10)
plt.xlabel('No of Content', fontsize=10)
plt.show()
```



1.2.9 Based on Duration

[ ]:
```
netflix_raw['duration'].nunique()
```

[ ]: 221

[ ]:
```
netflix_raw['duration'].value_counts().reset_index()
```

[ ]:
```
          index  duration
0     1 Season      1793
1    2 Seasons       425
2    3 Seasons       199
3       90 min       152
```

```
4       94 min       146
..         …       …
216    189 min         1
217     10 min         1
218      3 min         1
219    229 min         1
220    191 min         1

[221 rows x 2 columns]
```

[ ]:
```
tvshow_duration = netflix_raw[netflix_raw['type']=='TV Show']
movie_duration = netflix_raw.copy().loc[netflix_raw['type']=='Movie']
movie_duration['duration_int'] = pd.to_numeric(movie_duration['duration'
                                    ].str.split(' ', expand=True)[0].
 ↪replace('Unknown',0))
```

[ ]:
```
tvshow_duration['duration'].nunique()
```

[ ]:
```
15
```

[ ]:
```
tvshow_duration['duration'].value_counts().reset_index()[:3]
```

[ ]:
```
        index  duration
0   1 Season      1793
1  2 Seasons       425
2  3 Seasons       199
```

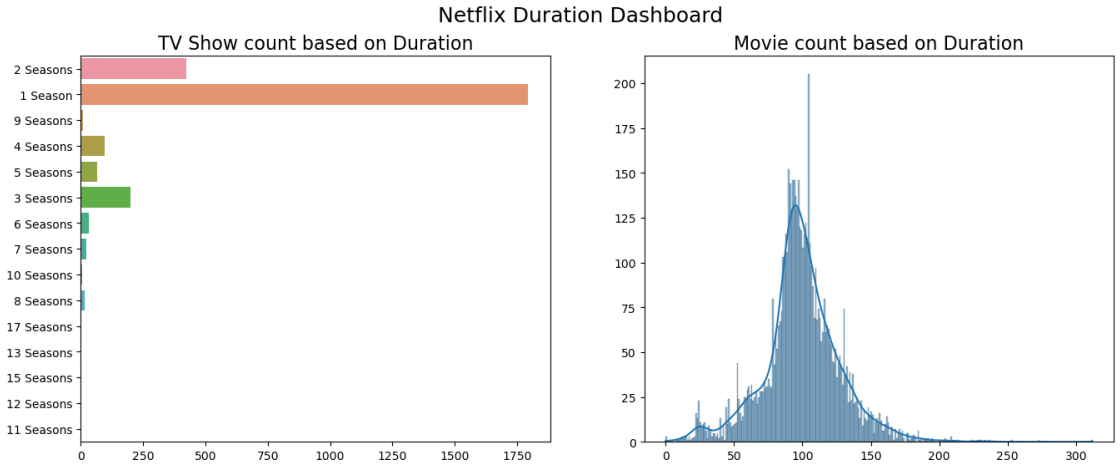
[ ]:
```
movie_duration['duration'].nunique()
```

[ ]:
```
206
```

[ ]:
```
movie_duration['duration'].value_counts().reset_index()
```

[ ]:
```
        index  duration
0     90 min       152
1     94 min       146
2     93 min       146
3     97 min       146
4     91 min       144
..       …       …
201   16 min         1
202    8 min         1
203    9 min         1
204  208 min         1
205  191 min         1

[206 rows x 2 columns]
```

[ ]:
```
plt.figure(figsize=(16,6)).suptitle("Netflix Duration Dashboard",fontsize=18)

plt.subplot(1, 2, 1)
sns.countplot(y=tvshow_duration['duration']) # type: ignore
plt.title('TV Show count based on Duration', fontsize=16)
plt.ylabel('')
plt.xlabel('')

plt.subplot(1, 2, 2)
sns.histplot(x=movie_duration['duration_int'], bins=300, kde=True) # type:␣
↪ignore
plt.title('Movie count based on Duration', fontsize=16)
plt.ylabel('')
plt.xlabel('')

plt.show()
```



Insight:

- Netflix have only `1 Seasons or 2 Seasons` for most of the TV Shows.
- This States as TV Shows with `1 Seasons` are most Popular.
- Most of the Movies in Netflix are of `90 min` duration fallowed by `94 & 93 min`.
- This States as `around 90 min` duration movies are most Popular.

There are `18` Unique Rating are available for Movies and TV Shows.

1.2.10 Based on Genre

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

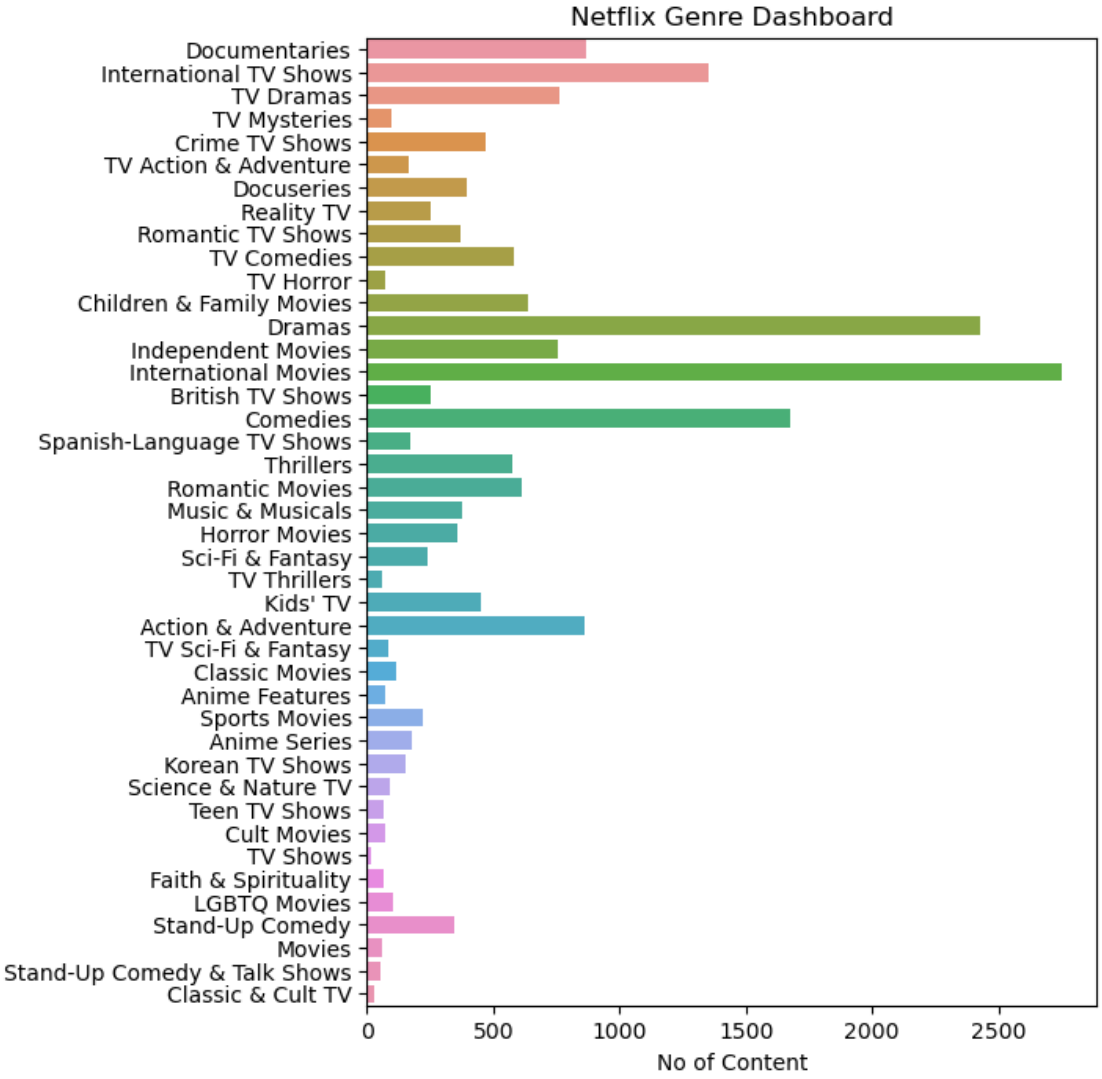
[ ]: 42

[ ]:
```
netflix_genre['genre'].value_counts().reset_index()
```

[ ]:

	index	genre
0	International Movies	2752
1	Dramas	2427
2	Comedies	1674
3	International TV Shows	1351
4	Documentaries	869
5	Action & Adventure	859
6	TV Dramas	763
7	Independent Movies	756
8	Children & Family Movies	641
9	Romantic Movies	616
10	TV Comedies	581
11	Thrillers	577
12	Crime TV Shows	470
13	Kids' TV	451
14	Docuseries	395
15	Music & Musicals	375
16	Romantic TV Shows	370
17	Horror Movies	357
18	Stand-Up Comedy	343
19	Reality TV	255
20	British TV Shows	253
21	Sci-Fi & Fantasy	243
22	Sports Movies	219
23	Anime Series	176
24	Spanish-Language TV Shows	174
25	TV Action & Adventure	168
26	Korean TV Shows	151
27	Classic Movies	116
28	LGBTQ Movies	102
29	TV Mysteries	98
30	Science & Nature TV	92
31	TV Sci-Fi & Fantasy	84
32	TV Horror	75
33	Anime Features	71
34	Cult Movies	71
35	Teen TV Shows	69
36	Faith & Spirituality	65
37	TV Thrillers	57
38	Movies	57
39	Stand-Up Comedy & Talk Shows	56
40	Classic & Cult TV	28
41	TV Shows	16

```
[ ]: plt.figure(figsize=(6,8))
     sns.countplot(y=netflix_genre['genre'])
     plt.title('Netflix Genre Dashboard', fontsize=12)
     plt.ylabel('', fontsize=10)
     plt.xlabel('No of Content', fontsize=10)
     plt.show()
```



Insight:

- `International Movies` Genre have highest number of contents as Movie. Fallowed by `Dramas & Comedies`.
- `International TV Shows` Genre have highest number of TV Shows. Fallowed by `TV Dramas & TV Comedies`.
- This states that `Dramas & Comedies` are the popular Genres.

There are 42 Unique Genre are available for Movies and TV Shows.

1.3 ****Consolidated Data**** `netflix_consolidated`

[ ]:
```
netflix_consolidated = netflix_raw.copy()

netflix_consolidated.insert(0, 'id', netflix_consolidated['show_id'].str.
 ↪extract(
    '(\d+)', expand=False).astype(int))
netflix_consolidated.rename(columns=
    {
    'director': 'org_director',
    'actor': 'org_actor',
    'country': 'org_country'
    }, inplace=True)

un_dir = netflix_consolidated.loc[
    netflix_consolidated['org_director']=='Unknown Director']
netflix_consolidated = netflix_consolidated.loc[
    netflix_consolidated['org_director']!='Unknown Director']
netflix_consolidated['director'] = netflix_consolidated['org_director'].str.
 ↪split(',')
netflix_consolidated = netflix_consolidated.explode('director')
netflix_consolidated['director'] = netflix_consolidated['director'].str.strip()
netflix_consolidated['director'] = netflix_consolidated['director'].
 ↪astype('category')
netflix_consolidated = pd.concat([netflix_consolidated, un_dir])


un_actor = netflix_consolidated.loc[
    netflix_consolidated['org_actor']=='Unknown Actor']
netflix_consolidated = netflix_consolidated.loc[
    netflix_consolidated['org_actor']!='Unknown Actor']
netflix_consolidated['actor'] = netflix_consolidated['org_actor'].str.split(',')
netflix_consolidated = netflix_consolidated.explode('actor')
netflix_consolidated['actor'] = netflix_consolidated['actor'].str.strip()
netflix_consolidated['actor'] = netflix_consolidated['actor'].astype('category')
netflix_consolidated = pd.concat([netflix_consolidated, un_actor])

un_con = netflix_consolidated.loc[
    netflix_consolidated['org_country']=='Unknown Country']
netflix_consolidated = netflix_consolidated.loc[
    netflix_consolidated['org_country']!='Unknown Country']
netflix_consolidated['country'] = netflix_consolidated['org_country'].str.
 ↪split(',')
netflix_consolidated = netflix_consolidated.explode('country')
netflix_consolidated['country'] = netflix_consolidated['country'].str.strip()
```

```
netflix_consolidated['country'] = netflix_consolidated['country'].
 ↪astype('category')
netflix_consolidated = pd.concat([netflix_consolidated, un_con])

un_date_add = netflix_consolidated.loc[netflix_consolidated['date_added']=='0']
netflix_consolidated = netflix_consolidated.
 ↪loc[netflix_consolidated['date_added']!='0']

netflix_consolidated['date_added_utc'] = pd.
 ↪to_datetime(netflix_consolidated['date_added'])
netflix_consolidated['add_year'] = netflix_consolidated['date_added_utc'].dt.
 ↪year
netflix_consolidated['add_month'] = netflix_consolidated['date_added_utc'].dt.
 ↪month
netflix_consolidated['add_day'] = netflix_consolidated['date_added_utc'].dt.day
netflix_consolidated['add_month_name'] = netflix_consolidated['date_added_utc'].
 ↪dt.month_name()
netflix_consolidated['add_weekday'] = netflix_consolidated['date_added_utc'].dt.
 ↪day_name()

weekday_order = ['Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday',␣
 ↪'Saturday', 'Sunday']
netflix_consolidated['add_weekday'] = pd.Categorical(
    netflix_consolidated['add_weekday'], categories=weekday_order, ordered=True)
month_order = ['January', 'February', 'March', 'April', 'May', 'June',
               'July', 'August', 'September', 'October', 'November', 'December']
netflix_consolidated['add_month_name'] = pd.Categorical(
    netflix_consolidated['add_month_name'], categories=month_order,␣
 ↪ordered=True)

netflix_consolidated = pd.concat([netflix_consolidated, un_date_add])

netflix_consolidated['duration_int'] = pd.to_numeric(
    netflix_consolidated['duration'].str.split(' ', expand=True)[0].
 ↪replace('Unknown',0))

netflix_consolidated['genre'] = netflix_consolidated['listed_in'].str.split(',')
netflix_consolidated = netflix_consolidated.explode('genre')
netflix_consolidated['genre'] = netflix_consolidated['genre'].str.strip()
netflix_consolidated['genre'] = netflix_consolidated['genre'].astype('category')

netflix_consolidated = netflix_consolidated.sort_values('id').
 ↪reset_index(drop=True)
```

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

```
<class 'pandas.core.frame.DataFrame'>
```

```
RangeIndex: 202065 entries, 0 to 202064
Data columns (total 24 columns):
 #   Column          Non-Null Count   Dtype
---  ------          --------------   -----
 0   id              202065 non-null  int32
 1   show_id         202065 non-null  object
 2   type            202065 non-null  category
 3   title           202065 non-null  object
 4   org_director    202065 non-null  object
 5   org_actor       202065 non-null  object
 6   org_country     202065 non-null  category
 7   date_added      202065 non-null  object
 8   release_year    202065 non-null  int64
 9   rating          202065 non-null  object
 10  duration        202065 non-null  object
 11  listed_in       202065 non-null  object
 12  description     202065 non-null  object
 13  director        151422 non-null  category
 14  actor           199916 non-null  category
 15  country         190168 non-null  category
 16  date_added_utc  201907 non-null  datetime64[ns]
 17  add_year        201907 non-null  float64
 18  add_month       201907 non-null  float64
 19  add_day         201907 non-null  float64
 20  add_month_name  201907 non-null  category
 21  add_weekday     201907 non-null  category
 22  duration_int    202065 non-null  int64
 23  genre           202065 non-null  category
dtypes: category(8), datetime64[ns](1), float64(3), int32(1), int64(2),
object(9)
memory usage: 27.9+ MB
```

[ ]:
```
netflix_consolidated.columns
```

[ ]:
```
Index(['id', 'show_id', 'type', 'title', 'org_director', 'org_actor',
       'org_country', 'date_added', 'release_year', 'rating', 'duration',
       'listed_in', 'description', 'director', 'actor', 'country',
       'date_added_utc', 'add_year', 'add_month', 'add_day', 'add_month_name',
       'add_weekday', 'duration_int', 'genre'],
      dtype='object')
```

[ ]:
```
netflix_consolidated.nunique()
```

[ ]:
```
id                8807
show_id           8807
type                 2
title             8807
org_director      4529
```

```
org_actor          7693
org_country         749
date_added         1768
release_year         74
rating               18
duration            221
listed_in           514
description        8775
director           4993
actor             36439
country             123
date_added_utc     1714
add_year             14
add_month            12
add_day              31
add_month_name       12
add_weekday           7
duration_int        211
genre                42
dtype: int64
```

[ ]:
```
# netflix_consolidated.loc[netflix_consolidated['title']=='Blood & Water'].
↪sort_values('actor')
```

1.4 Q1. Which country has the number of movies released per year changed over the last 20-30 years?

Problem Statement

- Here We need to find out number of movie released in each country per year. (considering last 30 years `1991 - latest`)
- For ease of visualization & understanding we will convert `country` to type 'object'.

Basic Matrics

- Filter the Consolidated / Un-nested Data set as Type `Movie` & release year grater then `1990`.
- Find `Unique No of Countries` with in Data Set & Find Top 10 Countries.

[ ]:
```
movies_year = netflix_consolidated.copy().loc[
    (netflix_consolidated['type']=='Movie') &
    (netflix_consolidated['release_year']>1990)
    ]
movies_year['country'] = movies_year['country'].astype(object)
```

1.4.1

Pre Processing

- `Group the Data set` with 'country','release_year' & aggregate as unique title count for each Combinations & store that in to '`movie_per_year_country`'.

- Group the `movie_per_year_country` with 'country' after sort it by 'country', 'release_year.
- Add a new column '`rate_of_change`' to `movie_per_year_country` as `difference of movie count` from previos year to current year at each country group.
- Replace Null valus for `rate_of_change` column & sort it as descending order.
- Then find`top_countries` which belongs to `Higher & lower *20*` rate_of_change.
- Filter `movie_per_year_country` with countrirs which belongs to `top_countries`.

1.4.2 Find Countries where higher change is obserbed

[ ]:
```
movie_per_year_country = movies_year.
 ↪groupby(['country','release_year'])['title'].aggregate('nunique').
 ↪reset_index(
                                          ).sort_values('title',␣
 ↪ascending=False)
movie_per_year_country = movie_per_year_country.rename(columns = {'title':
 ↪'movie_count'})
movie_per_year_country.sort_values(['country', 'release_year'], inplace=True)

grouped = movie_per_year_country.groupby('country')
movie_per_year_country['rate_of_change'] = grouped['movie_count'].diff()
movie_per_year_country['rate_of_change'].fillna(0, inplace=True)

movie_per_year_country.sort_values(['rate_of_change'], ascending=False,␣
 ↪inplace=True)
movie_per_year_country
```

[ ]:

	country	release_year	movie_count	rate_of_change
834	United States	2016	283	114.0
835	United States	2017	360	77.0
833	United States	2015	169	54.0
338	India	2017	108	29.0
803	United Kingdom	2016	71	27.0
..	…	…	…	…
342	India	2021	25	-35.0
836	United States	2018	317	-43.0
837	United States	2019	268	-49.0
838	United States	2020	199	-69.0
839	United States	2021	66	-133.0

[859 rows x 4 columns]

[ ]:
```
top_conuntries = pd.concat([movie_per_year_country.head(20),␣
 ↪movie_per_year_country.tail(20)]
                           ).groupby('country')['country'].nunique()
```

[ ]:
```
movie_per_year_country = movie_per_year_country.copy().loc[
    movie_per_year_country['country'].isin(top_conuntries.index)]
```

```
movie_per_year_country.sort_values(['country', 'release_year'],␣
 ↪ascending=False, inplace=True)
movie_per_year_country.reset_index(drop=True, inplace=True)
```

1.4.3 Understanding of Data Set

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

[ ]:
```
115
```

[ ]:
```
movies_year['country'].value_counts()
```

[ ]:
```
United States     43120
India             20132
United Kingdom     8129
France             6485
Canada             5732
                  …
Panama                2
Botswana              2
Nicaragua             1
Kazakhstan            1
Uganda                1
Name: country, Length: 115, dtype: int64
```

[ ]:
```
movie_per_year_country.shape
```

[ ]:
```
(254, 4)
```

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

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 254 entries, 0 to 253
Data columns (total 4 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   country         254 non-null    object
 1   release_year    254 non-null    int64
 2   movie_count     254 non-null    int64
 3   rate_of_change  254 non-null    float64
dtypes: float64(1), int64(2), object(1)
memory usage: 8.1+ KB
```

[ ]:
```
movie_per_year_country.describe()
```

[ ]:
```
       release_year  movie_count  rate_of_change
count    254.000000   254.000000      254.000000
mean    2008.669291    21.216535        0.484252
```

```
std        8.282135    44.402627       15.551704
min     1991.000000     1.000000     -133.000000
25%     2003.000000     3.000000       -1.000000
50%     2010.000000     7.000000        0.000000
75%     2016.000000    20.000000        3.000000
max     2021.000000   360.000000      114.000000
```

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

[ ]:
```
11
```

[ ]:
```
movie_per_year_country['country'].value_counts()
```

[ ]:
```
United States     31
United Kingdom    31
India             31
France            28
Germany           26
Canada            25
Spain             19
China             18
Indonesia         16
Philippines       15
Nigeria           14
Name: country, dtype: int64
```

[ ]:
```
movie_per_year_country['release_year'].nunique()
```

[ ]:
```
31
```

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

[ ]:
```
2020    11
2019    11
2018    11
2017    11
2016    11
2015    11
2014    11
2013    11
2011    11
2021    10
2012    10
2010    10
2009    10
2008    10
2003     9
2006     9
```

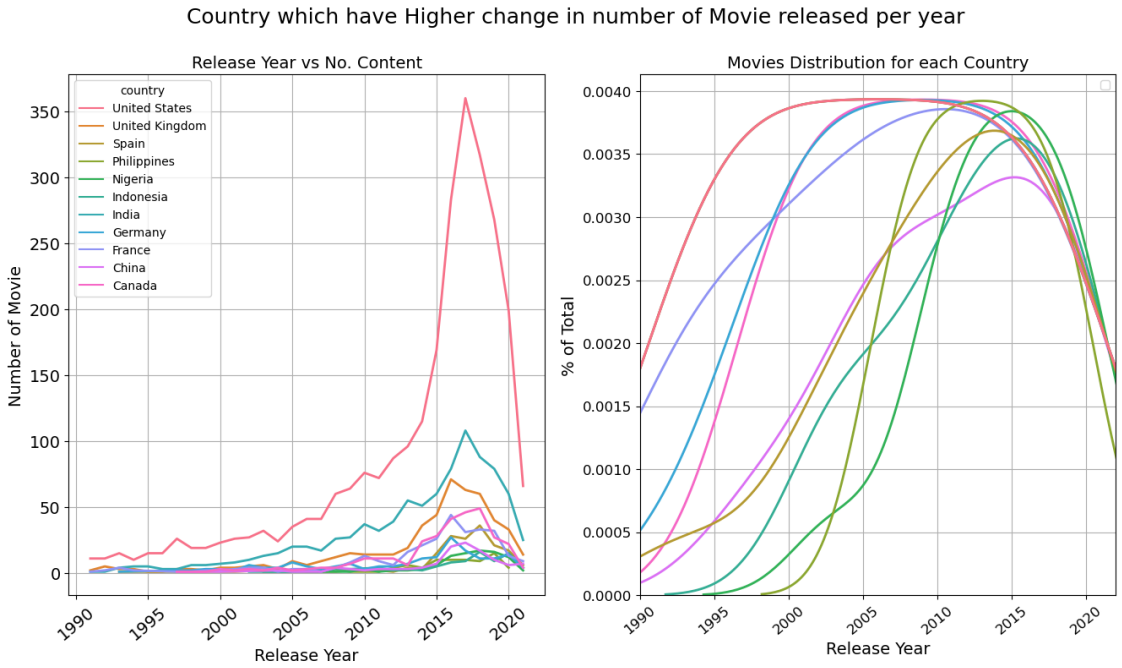
```
2005     8
2004     8
2007     8
2002     7
2000     7
1997     7
2001     6
1999     6
1998     6
1993     6
1994     4
1992     4
1991     4
1996     3
1995     3
Name: release_year, dtype: int64
```

1.4.4 PLot the Graph

[ ]:
```
plt.figure(figsize=(16,8)).suptitle("Country which have Higher change in number␣
 ↪of Movie released per year",fontsize=18)

plt.subplot(1, 2, 1)
plt.grid()
sns.lineplot(data=movie_per_year_country, x='release_year', y='movie_count',␣
 ↪hue='country', linewidth=2)
plt.title('Release Year vs No. Content', fontsize=14)
plt.xlabel('Release Year', fontsize=14)
plt.ylabel('Number of Movie', fontsize=14)
plt.xticks(rotation= 40, fontsize=14)
plt.yticks(fontsize=14)

plt.subplot(1, 2, 2)
plt.grid()
sns.kdeplot(data=movie_per_year_country, x='release_year', hue='country',␣
 ↪linewidth=2)
plt.legend(loc=1)
plt.title('Movies Distribution for each Country', fontsize=14)
plt.xlabel('Release Year', fontsize=14)
plt.ylabel('% of Total', fontsize=14)
plt.xticks(rotation= 40, fontsize=12)
plt.yticks(fontsize=12)
plt.xlim(left=1990, right=2022)

plt.show()
```

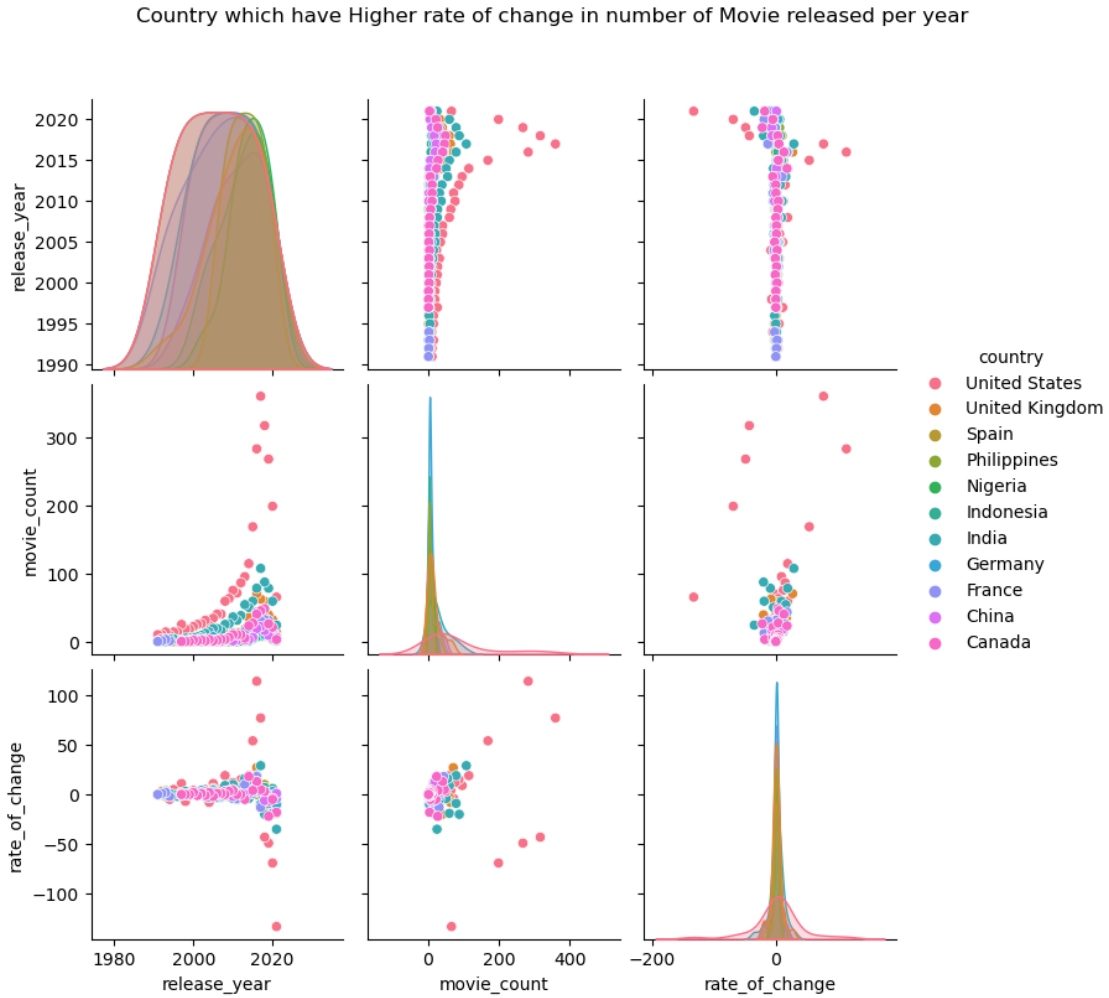
```
No artists with labels found to put in legend.  Note that artists whose label
```

start with an underscore are ignored when legend() is called with no argument.



[ ]:
```
p = sns.pairplot(data=movie_per_year_country, hue='country')
p.fig.suptitle("Country which have Higher rate of change in number of Movie␣
↪released per year", y=1.08) # y= some height>1
```

[ ]:
```
Text(0.5, 1.08, 'Country which have Higher rate of change in number of Movie
released per year')
```



1.4.5

Insights

- The rate of movie released over year have the year range of 1991 to 'latest'.
- We have observed that Number of movies released per year ranges between 0 to 360.
- Where `United State` have highest number of movie releases, followed by 'India', 'United Kingdom', 'Canada' etc.

Business Insights

- Number of movie released over year increases since 1990 to 2015 and decreases after 2015.
- Higher number of movies released between `2010 and 2017`.
- `After 2017` we have seen a big fall (Number of movie release per year decresaes).
- `TV Shows` might have effect on number of movie per year.

Recommendations

- 'Canada' have stedy market for movies.

- Although United State obsered huge srink in movie market but it is still higher number of movie released per year.
- Idia still have the 2nd position for number of movie released per year.

1.5 Q2. Comparison of TV Shows vs. Movies.

Problem Statement

- Here we need to compare Movie & TV Show in each criterias like.
  - No of Content
  - Directors
  - Actors
  - Coutry
  - Release Year
  - Added to Nelflix
  - Genre
  - Rating

Basic Matrics

- Group the Consolidated / Un-nested Data on the `Type`.
- Find **`Unique count / nunique`** 'title', 'director', 'actor', 'country', 'release_year', 'rating', 'genre', 'duration', 'date_added_utc', 'add_year', 'add_month', 'add_day', 'add_month_name', 'add_weekday', 'duration_int'.

[ ]:
```
grouped_type = netflix_consolidated.groupby('type')[
    ['title', 'director', 'actor', 'country', 'release_year', 'rating',␣
 ↪'genre', 'duration', 'date_added_utc',
     'add_year', 'add_month', 'add_day', 'add_month_name', 'add_weekday',␣
 ↪'duration_int']]
```

[ ]:
```
type_count = grouped_type.nunique()
type_count
```

[ ]:
```
          title  director  actor  country  release_year  rating  genre  \
type
Movie      6131      4777  25951      118            73      18     20
TV Show    2676       299  14863       66            46      10     22

          duration  date_added_utc  add_year  add_month  add_day  \
type
Movie          206            1533        14         12       31
TV Show         15            1012        10         12       31

          add_month_name  add_weekday  duration_int
type
Movie                 12            7           206
TV Show               12            7            15
```

1.5.1

Pre Processing

- `Group the Data set` with 'type','director' & aggregate as unique title count for each Combinations & store that in to 'director'.
- Convert D=director type category to object. Then filter by 'Movie' & 'TV Show' to find `Top Director` in each category.
- Silimar Actions will be done for:
  - Actors
  - Coutry
  - Release Year
  - Added to Nelflix (year, month, weekday)
  - Genre
  - Rating

1.5.2 Analyzing `Top` for TV show & Movie based on different Parameter

[ ]:
```
director = netflix_consolidated.groupby(['type', 'director']).aggregate(
    title_count = ('title','nunique'),
    ).reset_index()
director['director'] = director['director'].astype(object)
mDir = director.loc[director['type']=='Movie'].sort_values('title_count',␣
 ↪ascending=False).head(1)
tvDir = director.loc[director['type']=='TV Show'].sort_values('title_count',␣
 ↪ascending=False).head(1)

pd.concat([mDir, tvDir]).reset_index(drop=True)
```

[ ]:

	type	director	title_count
0	Movie	Rajiv Chilaka	22
1	TV Show	Alastair Fothergill	3

[ ]:
```
actor = netflix_consolidated.groupby(['type', 'actor']).aggregate(
    title_count = ('title','nunique'),
    ).reset_index()
actor['actor'] = actor['actor'].astype(object)
actor.rename(columns={'actor': 'actor'}, inplace=True)
mCast = actor.loc[actor['type']=='Movie'].sort_values('title_count',␣
 ↪ascending=False).head(1)
tvCast = actor.loc[actor['type']=='TV Show'].sort_values('title_count',␣
 ↪ascending=False).head(1)

pd.concat([mCast, tvCast]).reset_index(drop=True)
```

[ ]:

	type	actor	title_count
0	Movie	Anupam Kher	42

```
1  TV Show  Takahiro Sakurai           25
```

[ ]:
```
country = netflix_consolidated.groupby(['type', 'country']).aggregate(
    title_count = ('title','nunique'),
    ).reset_index()
country['country'] = country['country'].astype(object)
mCountry = country.loc[country['type']=='Movie'].sort_values('title_count',␣
 ↪ascending=False).head(3)
tvCountry = country.loc[country['type']=='TV Show'].sort_values('title_count',␣
 ↪ascending=False).head(3)

pd.concat([mCountry, tvCountry]).reset_index(drop=True)
```

[ ]:

	type	country	title_count
0	Movie	United States	2752
1	Movie	India	962
2	Movie	United Kingdom	534
3	TV Show	United States	938
4	TV Show	United Kingdom	272
5	TV Show	Japan	199

[ ]:
```
release_year = netflix_consolidated.groupby(['type', 'release_year']).aggregate(
    title_count = ('title','nunique'),
    ).reset_index()
release_year['release_year'] = release_year['release_year'].astype(object)
mrelease_year = release_year.loc[release_year['type']=='Movie'].
 ↪sort_values('title_count', ascending=False)
tvrelease_year = release_year.loc[release_year['type']=='TV Show'].
 ↪sort_values('title_count', ascending=False)

# mrelease_year['release_year'].min()
# mrelease_year['release_year'].max()
# tvrelease_year['release_year'].min()
# tvrelease_year['release_year'].max()
pd.concat([mrelease_year.head(1), tvrelease_year.head(1)]).
 ↪reset_index(drop=True)
```

[ ]:

	type	release_year	title_count
0	Movie	2018	767
1	TV Show	2020	436

[ ]:
```
add_year = netflix_consolidated.groupby(['type', 'add_year']).aggregate(
    title_count = ('title','nunique'),
    ).reset_index()
add_year['add_year'] = add_year['add_year'].astype(object)
madd_year = add_year.loc[add_year['type']=='Movie'].sort_values('title_count',␣
 ↪ascending=False).head(1)
```

```
tvadd_year = add_year.loc[add_year['type']=='TV Show'].
 ↪sort_values('title_count', ascending=False).head(1)

pd.concat([madd_year, tvadd_year]).reset_index(drop=True)
```

[ ]:
```
      type add_year  title_count
0    Movie   2019.0         1424
1  TV Show   2020.0          595
```

[ ]:
```
add_month_name = netflix_consolidated.groupby(['type', 'add_month_name']).
 ↪aggregate(
    title_count = ('title','nunique'),
    ).reset_index()
add_month_name['add_month_name'] = add_month_name['add_month_name'].
 ↪astype(object)
madd_month_name = add_month_name.loc[add_month_name['type']=='Movie'].
 ↪sort_values('title_count', ascending=False).head(1)
tvadd_month_name = add_month_name.loc[add_month_name['type']=='TV Show'].
 ↪sort_values('title_count', ascending=False).head(1)

pd.concat([madd_month_name, tvadd_month_name]).reset_index(drop=True)
```

[ ]:
```
      type add_month_name  title_count
0    Movie           July          565
1  TV Show       December          266
```

[ ]:
```
add_weekday = netflix_consolidated.groupby(['type', 'add_weekday']).aggregate(
    title_count = ('title','nunique'),
    ).reset_index()
add_weekday['add_weekday'] = add_weekday['add_weekday'].astype(object)
madd_weekday = add_weekday.loc[add_weekday['type']=='Movie'].
 ↪sort_values('title_count', ascending=False).head(1)
tvadd_weekday = add_weekday.loc[add_weekday['type']=='TV Show'].
 ↪sort_values('title_count', ascending=False).head(1)

pd.concat([madd_weekday, tvadd_weekday]).reset_index(drop=True)
```

[ ]:
```
      type add_weekday  title_count
0    Movie      Friday         1566
1  TV Show      Friday          932
```

[ ]:
```
duration = netflix_consolidated.groupby(['type', 'duration']).aggregate(
    title_count = ('title','nunique'),
    ).reset_index()
duration['duration'] = duration['duration'].astype(object)
mduration = duration.loc[duration['type']=='Movie'].sort_values('title_count',␣
 ↪ascending=False).head(1)
```

```
tvduration = duration.loc[duration['type']=='TV Show'].
 ↪sort_values('title_count', ascending=False).head(1)

pd.concat([mduration, tvduration]).reset_index(drop=True)
```

[ ]:
```
      type  duration  title_count
0    Movie    90 min          152
1  TV Show  1 Season         1793
```

[ ]:
```
rating = netflix_consolidated.groupby(['type', 'rating']).aggregate(
    title_count = ('title','nunique'),
    ).reset_index()
rating['rating'] = rating['rating'].astype(object)
mrating = rating.loc[rating['type']=='Movie'].sort_values('title_count',␣
 ↪ascending=False).head(1)
tvrating = rating.loc[rating['type']=='TV Show'].sort_values('title_count',␣
 ↪ascending=False).head(1)

pd.concat([mrating, tvrating]).reset_index(drop=True)
```

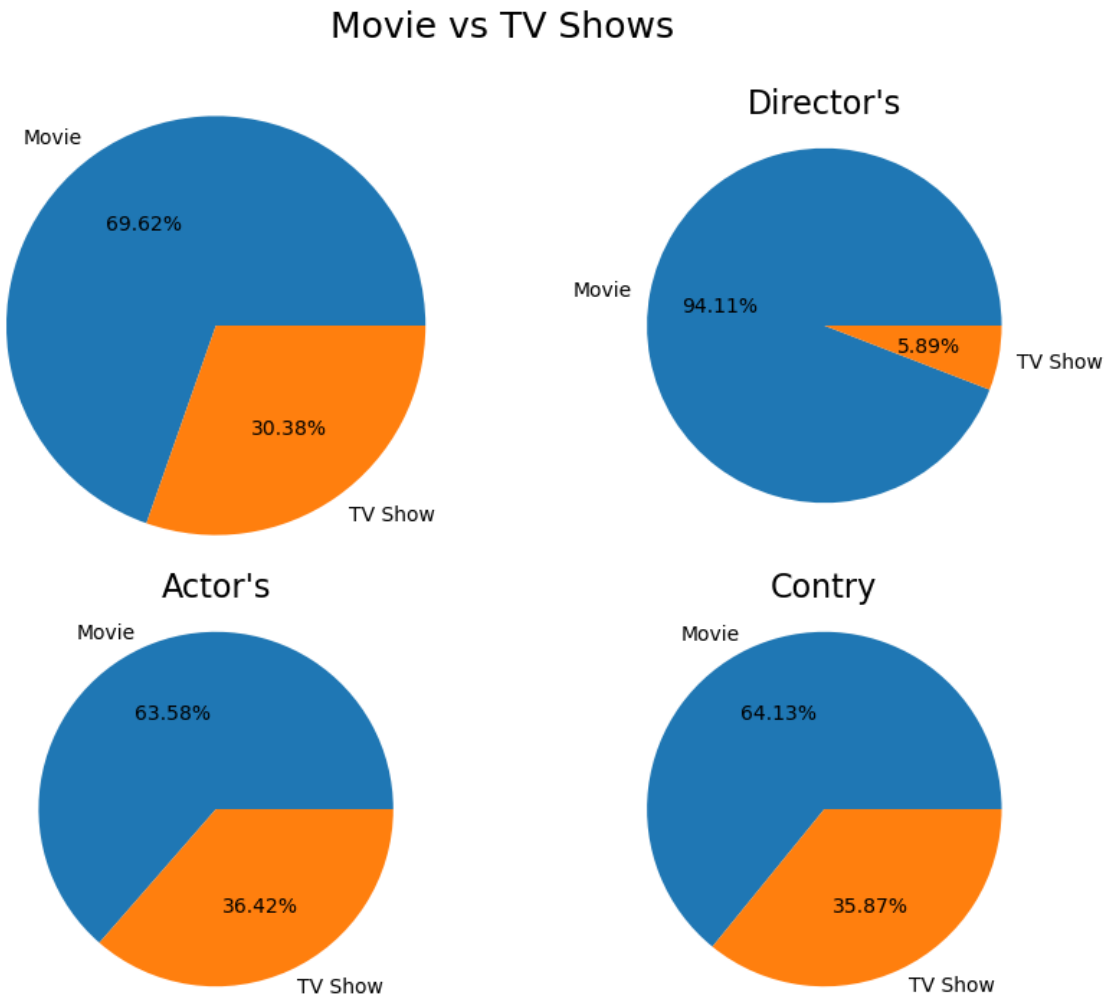
[ ]:
```
      type rating  title_count
0    Movie  TV-MA         2062
1  TV Show  TV-MA         1145
```

[ ]:
```
genre = netflix_consolidated.groupby(['type', 'genre']).aggregate(
    title_count = ('title','nunique'),
    ).reset_index()
genre['genre'] = genre['genre'].astype(object)
mGenre = genre.loc[genre['type']=='Movie'].sort_values('title_count',␣
 ↪ascending=False)[1:4]
tvGenre = genre.loc[genre['type']=='TV Show'].sort_values('title_count',␣
 ↪ascending=False)[1:4]

pd.concat([mGenre, tvGenre]).reset_index(drop=True)
```

[ ]:
```
      type           genre  title_count
0    Movie          Dramas         2427
1    Movie        Comedies         1674
2    Movie   Documentaries          869
3  TV Show       TV Dramas          763
4  TV Show     TV Comedies          581
5  TV Show  Crime TV Shows          470
```

1.5.3 Plot the Graph

[ ]:
```
plt.figure(figsize=(10,8)).suptitle("Movie vs TV Shows",fontsize=18)

plt.subplot(2, 2, 1)
plt.pie(type_count['title'],labels = type_count.index,radius = 1.3 ,autopct =␣
 ↪'%1.2f%%',) # type: ignore
plt.title('', fontsize=14)

plt.subplot(2, 2, 2)
plt.pie(type_count['director'],labels = type_count.index,radius = 1.1 ,autopct␣
 ↪= '%1.2f%%',) # type: ignore
plt.title('Director\'s', fontsize=16)

plt.subplot(2, 2, 3)
plt.pie(type_count['actor'],labels = type_count.index,radius = 1.1 ,autopct =␣
 ↪'%1.2f%%',) # type: ignore
plt.title('Actor\'s', fontsize=16)

plt.subplot(2, 2, 4)
plt.pie(type_count['country'],labels = type_count.index,radius = 1.1 ,autopct =␣
 ↪'%1.2f%%',) # type: ignore
plt.title('Contry', fontsize=16)

plt.show()
```



1.5.4

Insights

- There are more Movies then TV Shows present at Netflix, like
  - Number of movie is `6131` as (69.62%)
  - Number of tv shows is `2676` as (30.38%)
- Maximun number of TV Show relesed on `2020` & Maximun number of Movie released on `2018`.
- Where `United State` have highest number of Movie & TV Show Produced.
- 'India', 'United Kingdom' are at 2nd & 3rd position for Number of `Movie`.
- 'United Kingdom', 'Japan' are at 2nd & 3rd position for Number of `TV Show`.
- `July` month registered maximum number of Movies added to Netflix as (565)
- `December` month registered maximum number of TV Show added to Netflix as (266).
- On `Friday` Maximum number of TV Shows & Movies are added to Netflix.
- Most of the Movies & TV Shows are of`TV-MA` Rated.

- Most of the Movies & TV Shows are of`Drama & Comedies` Genre.
- TV Show with 1 season & Movie with 90 minute duration are popular.

Business Insights

- Movies are have more market share the TV Shows.
- Probebly Covid Pandemic increases no of TV Shows then Movies.
- Similar to No of Director involved in Movies are significantly higher then the No of Director involved in TV Shows.
- Although, there is a significant differance in no of Actors involved with Movies & Tv Show, this is not higher, It states several actors paticipate in both Movies & TV Shows.
- United States is the most popular country in Netflix.
- Here we observed that TV Shows are more engaging then Movies.

Recommendationss

- 'United State' origin Drama, Comedie genre's Movie & TV Shows are more popular .
- Need to incourage TV Shows so it can have more engaging to viewer.

1.6 Q3. Best time to lunch a TV Show

Problem Statement

- Here we need to find best Month, Weekday, and day of month to lunch a TV Show.
- Here we observe the pattern of past TV Show Add date.

Basic Matrics

- Filter out Consolidated / Un-nested Data as TV Shows and valid date added contents stor that in `tvshow`.
- Also, find no of reords with missing values.

[ ]:
```
tvshow = netflix_consolidated.copy().loc[(netflix_consolidated['type']=='TV␣
↪Show')]
```

Find Number of Missing Date of Add

[ ]:
```
missing_values = netflix_consolidated.copy().loc[
    (netflix_consolidated['type']=='TV Show') &
    (netflix_raw['date_added']=='0')
    ].reset_index()
missing_values['title'].nunique()
```

[ ]:
```
2
```

1.6.1

Pre Processing

- Group the 'tvshow' on the `add_month_name , add_weekday, add_day` individually & combined.
- Find `Unique count / nunique` 'title'.

1.6.2 Analyzing Month, Day, Weekday

[ ]:
```
month_lunch = tvshow.groupby(['add_month_name'])['title'].aggregate('nunique').
 ↪reset_index()
month_lunch.rename(columns={'title': 'tvshow_count'}, inplace=True)
month_lunch.sort_values('tvshow_count', ascending=False).head(3)
```

[ ]:
	add_month_name	tvshow_count
11	December	266
6	July	262
8	September	251

[ ]:
```
weekday_lunch = tvshow.groupby(['add_weekday'])['title'].aggregate('nunique').
 ↪reset_index()
weekday_lunch.rename(columns={'title': 'tvshow_count'}, inplace=True)
weekday_lunch.sort_values('tvshow_count', ascending=False).head(3)
```

[ ]:
	add_weekday	tvshow_count
4	Friday	932
2	Wednesday	382
1	Tuesday	345

[ ]:
```
day_lunch = tvshow.groupby(['add_day'])['title'].aggregate('nunique').
 ↪reset_index()
day_lunch.rename(columns={'title': 'tvshow_count'}, inplace=True)
day_lunch.sort_values('tvshow_count', ascending=False).head(3)
```

[ ]:
	add_day	tvshow_count
0	1.0	522
14	15.0	228
29	30.0	91

[ ]:
```
tvshow_lunch = tvshow.groupby(['add_month_name', 'add_day', 'add_weekday']
                              )['title'].aggregate('nunique').reset_index()
tvshow_lunch.rename(columns={'title': 'tvshow_count'}, inplace=True)
tvshow_lunch.sort_values('tvshow_count', ascending=False).
 ↪reset_index(drop=True).head(5)
```

[ ]:
	add_month_name	add_day	add_weekday	tvshow_count
0	January	1.0	Friday	32
1	July	6.0	Tuesday	31
2	August	1.0	Tuesday	23
3	July	1.0	Saturday	23
4	June	19.0	Saturday	21

1.6.3 Understanding of Data Set

[ ]:
```
month_lunch.shape
```

[ ]:
```
(12, 2)
```

[ ]:
```
weekday_lunch.shape
```

[ ]:
```
(7, 2)
```

[ ]:
```
day_lunch.shape
```

[ ]:
```
(31, 2)
```

[ ]:
```
tvshow_lunch.shape
```

[ ]:
```
(2604, 4)
```

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

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 12 entries, 0 to 11
Data columns (total 2 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   add_month_name  12 non-null     category
 1   tvshow_count    12 non-null     int64
dtypes: category(1), int64(1)
memory usage: 632.0 bytes
```

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

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7 entries, 0 to 6
Data columns (total 2 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   add_weekday   7 non-null      category
 1   tvshow_count  7 non-null      int64
dtypes: category(1), int64(1)
memory usage: 547.0 bytes
```

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

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 31 entries, 0 to 30
Data columns (total 2 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   add_day       31 non-null     float64
```

```
 1   tvshow_count  31 non-null     int64
dtypes: float64(1), int64(1)
memory usage: 624.0 bytes
```

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

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2604 entries, 0 to 2603
Data columns (total 4 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   add_month_name  2604 non-null   category
 1   add_day         2604 non-null   float64
 2   add_weekday     2604 non-null   category
 3   tvshow_count    2604 non-null   int64
dtypes: category(2), float64(1), int64(1)
memory usage: 46.6 KB
```

[ ]:
```
month_lunch.describe()
```

[ ]:
```
       tvshow_count
count     12.000000
mean     222.166667
std       27.976722
min      181.000000
25%      203.500000
50%      214.500000
75%      239.750000
max      266.000000
```

[ ]:
```
weekday_lunch.describe()
```

[ ]:
```
       tvshow_count
count      7.000000
mean     380.857143
std      253.571442
min      182.000000
25%      241.000000
50%      343.000000
75%      363.500000
max      932.000000
```

[ ]:
```
day_lunch.describe()
```

[ ]:
```
         add_day  tvshow_count
count  31.000000     31.000000
mean   16.000000     86.000000
std     9.092121     86.812058
```

```
min      1.000000     44.000000
25%      8.500000     57.000000
50%     16.000000     66.000000
75%     23.500000     78.500000
max     31.000000    522.000000
```

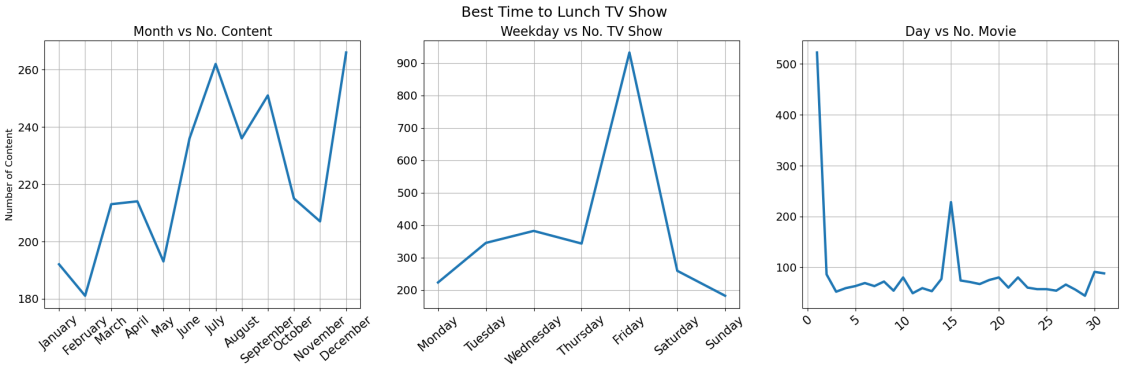
[ ]:
```
tvshow_lunch.describe()
```

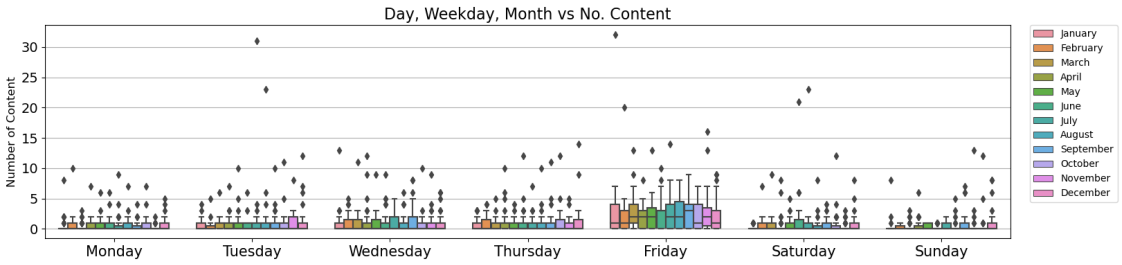
[ ]:
```
          add_day  tvshow_count
count  2604.00000   2604.000000
mean     16.00000      1.023810
std       8.94599      2.232416
min       1.00000      0.000000
25%       8.00000      0.000000
50%      16.00000      0.000000
75%      24.00000      1.000000
max      31.00000     32.000000
```

1.6.4 Plot the Graph

[ ]:
```
plt.figure(figsize=(24,6)).suptitle("Best Time to Lunch TV Show",fontsize=18)

plt.subplot(1, 3, 1)
plt.grid()
sns.lineplot(data=month_lunch, y='tvshow_count', x='add_month_name',␣
 ↪linewidth=3)
plt.title('Month vs No. Content', fontsize=16)
plt.ylabel('Number of Content', fontsize=12)
plt.xlabel('', fontsize=12)
plt.xticks(rotation= 40, fontsize=15)
plt.yticks(fontsize=14)

plt.subplot(1, 3, 2)
plt.grid()
sns.lineplot(data=weekday_lunch, y='tvshow_count', x='add_weekday', linewidth=3)
plt.title('Weekday vs No. TV Show', fontsize=16)
plt.ylabel('', fontsize=12)
plt.xlabel('', fontsize=12)
plt.xticks(rotation= 40, fontsize=15)
plt.yticks(fontsize=14)

plt.subplot(1, 3, 3)
plt.grid()
sns.lineplot(data=day_lunch, y='tvshow_count', x='add_day', linewidth=3)
plt.title('Day vs No. Movie', fontsize=16)
plt.ylabel('', fontsize=12)
plt.xlabel('', fontsize=12)
```

```
plt.xticks(rotation= 40, fontsize=15)
plt.yticks(fontsize=14)

plt.subplot(1, 3, 1)
plt.figure(figsize=(18,4))
plt.grid()
sns.boxplot(data=tvshow_lunch, y='tvshow_count', hue='add_month_name',␣
 ↪x='add_weekday')
plt.legend(bbox_to_anchor=(1.02, 1), loc='upper left', borderaxespad=0)
plt.title('Day, Weekday, Month vs No. Content', fontsize=16)
plt.ylabel('Number of Content', fontsize=12)
plt.xlabel('', fontsize=12)
plt.xticks(fontsize=15)
plt.yticks(fontsize=14)

plt.show()
```





1.6.5

Insight

- Only 2 of the TV Show have missing Date of added to platform are missing.
- There are several Outlier observed, out of them (Tuesday, Saturday)-(July, August), Friday-January are crucials.

- `December` & `July` month have higher no. of TV Show added to Netflix (Cummulative). (from Month vs No. Content)
- Also, `Friday` & `Wednesday` have higher no. of TV Show added to Netflix (Cummulative). (from Weekday vs No. Content)
- And, `1st` & `15th` have higher no. of TV Show added to Netflix (Cummulative). (from Day vs No. Content)
- After combining Month & Weekday, found that `Friday-(August, July, September, January, March) & Wednesday-(September & July)` have recorded High.

  Business Insights * `Friday` is the most prferable day to add a TV Show. * `September, August, July` are most preferable month to add a TV Show. * There are several out liears are present across All months & days, but `'Tuesday and Saturday of July & August' and ' Friday of January & Frebruary'` have higher impact.

  Recommendations

- Friday-August or Friday-September and Month Start like '1st' are the best.

1.7 Q4. Analysis of actors/directors of different types of shows/movies.

Problem Statement

- Here we need to find `Actors & Directors` who are part of of `Movie / TV Show`, filter them with `Rating & genre`.
- We are lokking forward to find `Top 3` Actor & Director of `Top 5` Rating & Genre.

Basic Matrics

- Need to drop all null values belongs to `'director', 'actor', 'rating', 'genre'` and store as `actor_director`.
- Sort the 'actor_director' as `'type', 'rating', 'genre'`.
- Conveert `Rating & Genre` to Object Type.

[ ]:
```
actor_director = netflix_consolidated.copy()
actor_director = actor_director.loc[
    (actor_director['rating']!='Unknown Rating') &
    (actor_director['director']!='Unknown Director') &
    (actor_director['actor']!='Unknown Actor')
    ]
actor_director.sort_values(['type', 'rating', 'genre'], inplace=True)
actor_director = actor_director[['id','type', 'rating', 'genre', 'title',␣
 ↪'director', 'actor',
                                 ]].reset_index(drop=True)
actor_director['rating'] = actor_director['rating'].astype(object)
actor_director['genre'] = actor_director['genre'].astype(object)
actor_director['director'] = actor_director['director'].astype(object)
actor_director['actor'] = actor_director['actor'].astype(object)
actor_director.rename(columns={'actor': 'actor'}, inplace=True)
```

1.7.1

Pre Processing

- Find Top 3 Rating & Genre for each type as 'top_movie_rating', 'top_movie_genre', 'top_tv_rating', 'top_tv_genre'.
- By `Filtering` as Type & `Grouping` by Genre and Rating.
- Aggregate as `No of Unique Title`, sort in Descending Order and `pick top 3` Rating or Genre.
- Filter out `actor_director` with all `top 3` Criteria. as `'actor_director_movie', 'actor_director_tv'`.
- Then group the 'actor_director_movie' or 'actor_director_tv' with 'rating, genre, Actor or director' to find `Top3` 'Actor & Director' for All TOP 3 'Genre & Rating' in TV Shows & Movies.
- Plot the graph for Movie & TV Show Representing relation between Number of Director, Actor and Rating, Genre.

1.7.2 Understanding of Data Set

[ ]:
```
actor_director.shape
```

[ ]:
```
(201998, 7)
```

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

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 201998 entries, 0 to 201997
Data columns (total 7 columns):
 #   Column    Non-Null Count   Dtype
---  ------    --------------   -----
 0   id        201998 non-null  int32
 1   type      201998 non-null  category
 2   rating    201998 non-null  object
 3   genre     201998 non-null  object
 4   title     201998 non-null  object
 5   director  151415 non-null  object
 6   actor     199849 non-null  object
dtypes: category(1), int32(1), object(5)
memory usage: 8.7+ MB
```

[ ]:
```
actor_director.describe()
```

[ ]:
```
                id
count  201998.000000
mean     4372.759483
std      2592.607399
min         1.000000
25%      2122.000000
50%      4330.000000
```

```
75%      6675.000000
max      8807.000000
```

[ ]:
```
actor_director['type'].nunique()
```

[ ]:
```
2
```

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

[ ]:
```
Movie      145908
TV Show     56090
Name: type, dtype: int64
```

[ ]:
```
actor_director['rating'].nunique()
```

[ ]:
```
17
```

[ ]:
```
actor_director['rating'].value_counts()
```

[ ]:
```
TV-MA       73915
TV-14       43957
R           25860
PG-13       16246
TV-PG       14926
PG          10919
TV-Y7        6304
TV-Y         3665
TV-G         2779
NR           1573
G            1530
NC-17         149
TV-Y7-FV       86
UR             86
74 min          1
84 min          1
66 min          1
Name: rating, dtype: int64
```

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

[ ]:
```
42
```

[ ]:
```
actor_director['genre'].value_counts()
```

[ ]:
```
Dramas                          29799
International Movies            28243
Comedies                        20829
International TV Shows          12823
```

```
Action & Adventure              12216
Independent Movies               9834
Children & Family Movies         9771
TV Dramas                        8942
Thrillers                        7107
Romantic Movies                  6412
TV Comedies                      4956
Crime TV Shows                   4733
Horror Movies                    4571
Kids' TV                         4561
Sci-Fi & Fantasy                 4037
Music & Musicals                 3077
Romantic TV Shows                3049
Documentaries                    2409
Anime Series                     2291
TV Action & Adventure            2288
Spanish-Language TV Shows        2126
British TV Shows                 1808
Sports Movies                    1531
Classic Movies                   1443
TV Mysteries                     1281
Korean TV Shows                  1122
Cult Movies                      1077
TV Sci-Fi & Fantasy              1045
Anime Features                   1045
TV Horror                         941
Docuseries                        845
LGBTQ Movies                      838
TV Thrillers                      768
Teen TV Shows                     742
Reality TV                        735
Faith & Spirituality              719
Stand-Up Comedy                   540
Movies                            410
TV Shows                          337
Classic & Cult TV                 272
Stand-Up Comedy & Talk Shows      268
Science & Nature TV               157
Name: genre, dtype: int64
```

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

[ ]:
```
8803
```

[ ]:
```
actor_director['title'].value_counts()
```

```
Kahlil Gibran's The Prophet             700
Holidays                                504
Movie 43                                468
The Eddy                                416
Narcos                                  378
                                        ...
The Last Man on the Moon                  1
Stink!                                    1
Silicon Cowboys                           1
Secrets of the Tower of London            1
Louis C.K.: Live at the Comedy Store      1
Name: title, Length: 8803, dtype: int64
```

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

```
4992
```

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

```
Martin Scorsese        419
Youssef Chahine        409
Cathy Garcia-Molina    356
Steven Spielberg       355
Lars von Trier         336
                      ...
Smriti Keshari           1
Jeremy Seifert           1
Stephanie Soechtig       1
Damani Baker             1
Maïa Sandoz              1
Name: director, Length: 4992, dtype: int64
```

```
actor_director['actor'].nunique()
```

```
36428
```

```
actor_director['actor'].value_counts()
```

```
Liam Neeson         161
Alfred Molina       160
John Krasinski      139
Salma Hayek         130
Frank Langella      128
                   ...
Waco O'Guin           1
Cedric Yarbrough      1
Julie Cox             1
Ray Fearon            1
```

```
Katia Gomez           1
Name: actor, Length: 36428, dtype: int64
```

1.7.3 Movies

[ ]:
```
actor_director.copy().loc[actor_director['type']=='Movie']['rating'].nunique()
```

[ ]:
```
17
```

[ ]:
```
top_movie_rating =actor_director.copy().loc[actor_director['type']=='Movie'].
 ↪groupby('rating').aggregate(
   title_count = ('title','nunique'),
   ).reset_index().sort_values('title_count', ascending=False).
 ↪reset_index(drop=True)[:3]
top_movie_rating
```

[ ]:
```
  rating  title_count
0  TV-MA         2062
1  TV-14         1427
2      R          797
```

[ ]:
```
actor_director.copy().loc[actor_director['type']=='Movie']['genre'].nunique()
```

[ ]:
```
20
```

[ ]:
```
top_movie_genre =actor_director.copy().loc[actor_director['type']=='Movie'].
 ↪groupby('genre').aggregate(
   title_count = ('title','nunique'),
   ).reset_index().sort_values('title_count', ascending=False).
 ↪reset_index(drop=True)[:3]
top_movie_genre
```

[ ]:
```
                 genre  title_count
0  International Movies         2752
1               Dramas         2426
2             Comedies         1674
```

Filtered Data Set of Movies with TOP Rating & Genre

[ ]:
```
actor_director_movie = actor_director.copy().loc[
    (actor_director['type']=='Movie') &
    (actor_director['rating'].isin(top_movie_rating['rating'])) &
    (actor_director['genre'].isin(top_movie_genre['genre']))
    ]
```

Movie Actors

[ ]:
```
movie_actors = actor_director_movie.groupby(['rating', 'genre', 'actor']).
 ↪aggregate(
```

```
    movie_count=('title', 'nunique'),
    ).reset_index().sort_values(['rating', 'genre', 'movie_count'],␣
 ↪ascending=False).reset_index(drop=True
    ).groupby(['rating', 'genre']).head(3).reset_index(drop=True
    )
movie_actors
```

[ ]:

	rating	genre	actor	movie_count
0	TV-MA	International Movies	Ramsey Nouah	11
1	TV-MA	International Movies	Adil Hussain	9
2	TV-MA	International Movies	Blossom Chukwujekwu	8
3	TV-MA	Dramas	Adil Hussain	10
4	TV-MA	Dramas	Naseeruddin Shah	8
5	TV-MA	Dramas	Seema Biswas	8
6	TV-MA	Comedies	Ramsey Nouah	8
7	TV-MA	Comedies	Carmen Machi	7
8	TV-MA	Comedies	Ayo Makun	6
9	TV-14	International Movies	Anupam Kher	27
10	TV-14	International Movies	Shah Rukh Khan	23
11	TV-14	International Movies	Kareena Kapoor	19
12	TV-14	Dramas	Shah Rukh Khan	21
13	TV-14	Dramas	Anupam Kher	17
14	TV-14	Dramas	Naseeruddin Shah	15
15	TV-14	Comedies	Shah Rukh Khan	14
16	TV-14	Comedies	Anupam Kher	13
17	TV-14	Comedies	Boman Irani	11
18	R	International Movies	Ben Mendelsohn	4
19	R	International Movies	Donnie Yen	4
20	R	International Movies	Stephen Campbell Moore	4
21	R	Dramas	Robert De Niro	9
22	R	Dramas	Ben Mendelsohn	8
23	R	Dramas	Amy Adams	7
24	R	Comedies	Danny McBride	7
25	R	Comedies	Kathryn Hahn	7
26	R	Comedies	Martin Lawrence	7

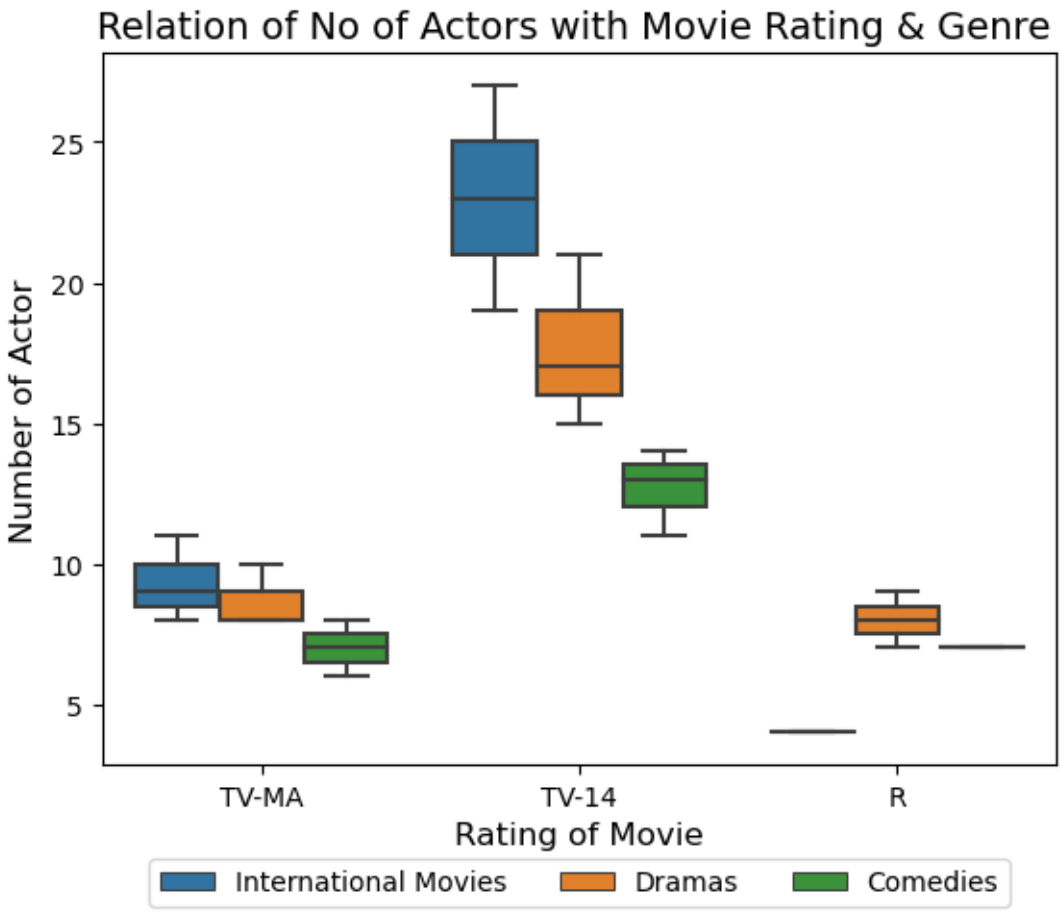
[ ]:
```
movie_actors.groupby('actor').aggregate(
    repet=('movie_count', 'nunique'),
    movie_count=('movie_count', 'sum'),
    ).reset_index().sort_values(['repet', 'movie_count'], ascending=False).
 ↪reset_index(drop=True)
```

[ ]:

	actor	repet	movie_count
0	Shah Rukh Khan	3	58
1	Anupam Kher	3	57
2	Naseeruddin Shah	2	23
3	Adil Hussain	2	19

```
4              Ramsey Nouah      2           19
5            Ben Mendelsohn      2           12
6            Kareena Kapoor      1           19
7               Boman Irani      1           11
8            Robert De Niro      1            9
9       Blossom Chukwujekwu      1            8
10              Seema Biswas      1            8
11                 Amy Adams      1            7
12              Carmen Machi      1            7
13             Danny McBride      1            7
14              Kathryn Hahn      1            7
15          Martin Lawrence      1            7
16                Ayo Makun      1            6
17               Donnie Yen      1            4
18  Stephen Campbell Moore      1            4
```

[ ]:
```
sns.boxplot(movie_actors, x='rating', y='movie_count', hue='genre')
plt.legend(bbox_to_anchor =(0.5,-0.2), loc='lower center', borderaxespad=0,␣
 ↪ncol=3)
plt.title('Relation of No of Actors with Movie Rating & Genre ', fontsize=14)
plt.xlabel('Rating of Movie', fontsize=12)
plt.ylabel('Number of Actor', fontsize=12)
plt.show()
```



Movie Directors

```
[ ]: movie_directors = actor_director_movie.groupby(['rating', 'genre', 'director']).
      ↪aggregate(
         movie_count = ('title','nunique'),
         ).reset_index().sort_values(['rating', 'genre', 'movie_count'],␣
      ↪ascending=False).reset_index(drop=True
         ).groupby(['rating', 'genre']).head(3).reset_index(drop=True
         )
    movie_directors
```

```
[ ]:    rating                 genre             director  movie_count
     0   TV-MA  International Movies        Anurag Kashyap            6
     1   TV-MA  International Movies          Rocky Soraya            6
     2   TV-MA  International Movies           Hakan Algül            5
     3   TV-MA                Dramas       Youssef Chahine            7
     4   TV-MA                Dramas        Anurag Kashyap            4
     5   TV-MA                Dramas          Ozan Açıktan            4
     6   TV-MA              Comedies           Hakan Algül            5
```

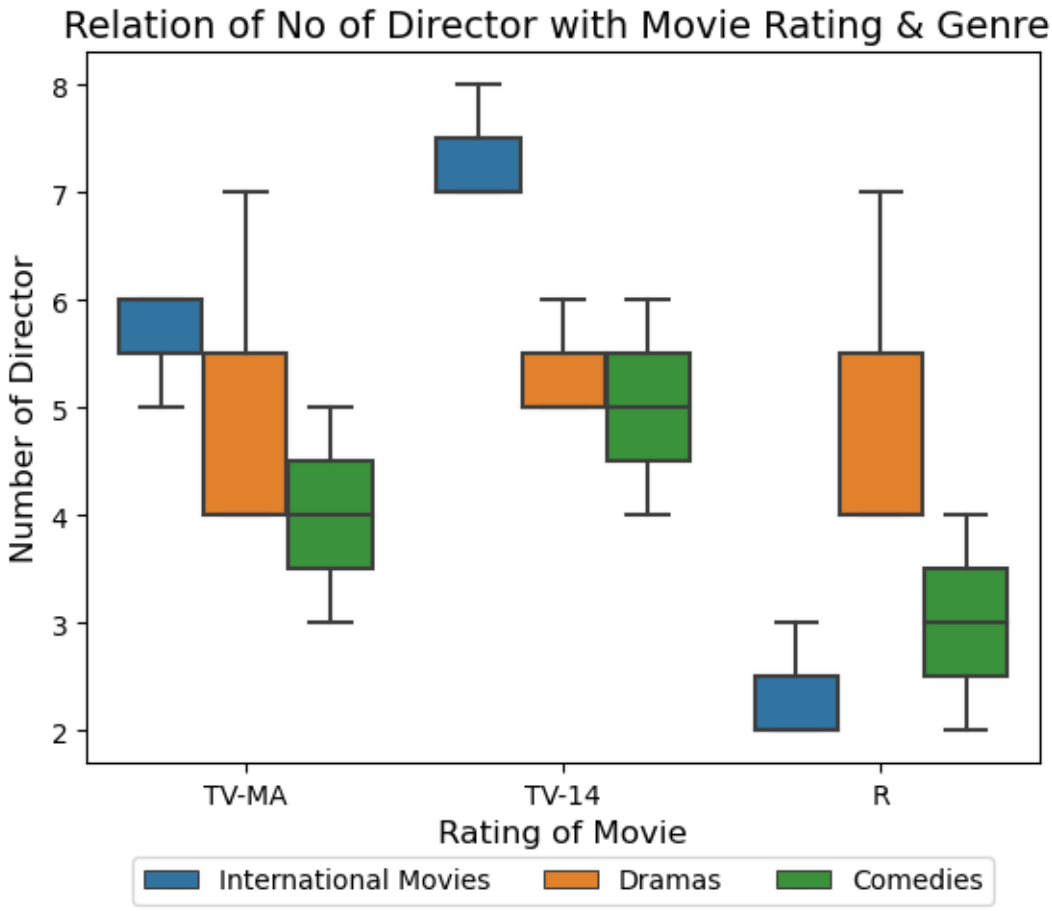
```
7   TV-MA              Comedies       Fernando Ayllón           4
8   TV-MA              Comedies          Bedran Güzel           3
9   TV-14  International Movies          Umesh Mehra           8
10  TV-14  International Movies   Cathy Garcia-Molina           7
11  TV-14  International Movies        Kunle Afolayan           7
12  TV-14                Dramas          Umesh Mehra           6
13  TV-14                Dramas   Cathy Garcia-Molina           5
14  TV-14                Dramas        Hidenori Inoue           5
15  TV-14              Comedies          David Dhawan           6
16  TV-14              Comedies       Wenn V. Deramas           5
17  TV-14              Comedies           Omoni Oboli           4
18      R  International Movies            Cheh Chang           3
19      R  International Movies        Alfonso Cuarón           2
20      R  International Movies        Chia-Liang Liu           2
21      R                Dramas       Martin Scorsese           7
22      R                Dramas         Noah Baumbach           4
23      R                Dramas  Paul Thomas Anderson           4
24      R              Comedies         Noah Baumbach           4
25      R              Comedies           Kevin Smith           3
26      R              Comedies          Brett Ratner           2
```

[ ]:
```
movie_directors.groupby('director').aggregate(
    repet=('movie_count', 'nunique'),
    movie_count=('movie_count', 'sum'),
    ).reset_index().sort_values(['repet', 'movie_count'], ascending=False).
 ↪reset_index(drop=True)
```

[ ]:
```
                director  repet  movie_count
0           Umesh Mehra      2           14
1    Cathy Garcia-Molina      2           12
2         Anurag Kashyap      2           10
3            Hakan Algül      1           10
4          Noah Baumbach      1            8
5         Kunle Afolayan      1            7
6        Martin Scorsese      1            7
7        Youssef Chahine      1            7
8           David Dhawan      1            6
9           Rocky Soraya      1            6
10        Hidenori Inoue      1            5
11       Wenn V. Deramas      1            5
12       Fernando Ayllón      1            4
13           Omoni Oboli      1            4
14          Ozan Açıktan      1            4
15  Paul Thomas Anderson      1            4
16          Bedran Güzel      1            3
17            Cheh Chang      1            3
18           Kevin Smith      1            3
```

```
19          Alfonso Cuarón       1             2
20            Brett Ratner       1             2
21          Chia-Liang Liu       1             2
```

[ ]:
```
sns.boxplot(movie_directors, x='rating', y='movie_count', hue='genre')
plt.legend(bbox_to_anchor =(0.5,-0.2), loc='lower center', borderaxespad=0,␣
 ↪ncol=3)
plt.title('Relation of No of Director with Movie Rating & Genre ', fontsize=14)
plt.xlabel('Rating of Movie', fontsize=12)
plt.ylabel('Number of Director', fontsize=12)
plt.show()
```



1.7.4

Movie Insight

- `'TV-MA'`, `'TV-14'`, `'R'` rated movies are most popular outof 17 unique rating.
- `'International Movies'`, `'Dramas'`, `'Comedies'` are most popular genre's outof 20 unique genre.

- Actors:
  - `'Ramsey Nouah', 'Adil Hussain', 'Blossom Chukwujekwu'` belong to 'TV-MA' & 'International Movies' which are Rank 1 Rating & Genre.
  - `'Shah Rukh Khan', 'Anupam Kher'` have 3 ranks each with 58 & 57 movies, who belongs to 'TV-14' Rating & All Top 3 Genre.
- Directors:
  - `'Anurag Kashyap', 'Rocky Soraya', 'Hakan Algül'` belong to 'TV-MA' & 'International Movies' which are Rank 1 Rating & Genre.
  - `'Umesh Mehra', 'Cathy Garcia-Molina'`have 2 ranks each with 14 & 12 movies, who belongs to 'TV-14' Rating & 'International Movies', 'Dramas' Genre.
  - `'Anurag Kashyap'`have 2 ranks with 10 movies, who belongs to 'TV-MA' Rating & 'International Movies', 'Dramas' Genre.

Business Insights * Higher number of Actors belongs to 'TV-MA' & 'International Movies'. * Popular Actors who belongs to 'TV-14' have higher number of movies. * Higher number of Director belongs to 'TV-MA' & 'International Movies'. also More directors are involved in 'Drama' genre. * Popular Directors who belongs to 'TV-14' have higher number of movies.

Recommendations

- 'Ramsey Nouah', 'Shah Rukh Khan', 'Anupam Kher' are more popular Actors.
- 'Anurag Kashyap', 'Rocky Soraya', 'Umesh Mehra', 'Cathy Garcia-Molina' are more popular Director.
- Movie with above Actor & Director combination might have more popularity.

1.7.5 TV Show

[ ]:
```
actor_director.copy().loc[actor_director['type']=='TV Show']['rating'].nunique()
```

[ ]:
```
9
```

[ ]:
```
top_tv_rating =actor_director.copy().loc[actor_director['type']=='TV Show'].
 ↪groupby('rating').aggregate(
    title_count = ('title','nunique'),
    ).reset_index().sort_values('title_count', ascending=False).
 ↪reset_index(drop=True)[:3]
top_tv_rating
```

[ ]:

	rating	title_count
0	TV-MA	1145
1	TV-14	733
2	TV-PG	323

[ ]:
```
actor_director.copy().loc[actor_director['type']=='TV Show']['genre'].nunique()
```

[ ]:
```
22
```

[ ]:
```
top_tv_genre = actor_director.copy().loc[actor_director['type']=='TV Show'].
 ↪groupby('genre').aggregate(
    title_count = ('title','nunique'),
    ).reset_index().sort_values('title_count', ascending=False).
 ↪reset_index(drop=True)[:3]
top_tv_genre
```

[ ]:

	genre	title_count
0	International TV Shows	1350
1	TV Dramas	763
2	TV Comedies	580

Filtered Data Set of TV Show with TOP Rating & Genre

[ ]:
```
actor_director_tv = actor_director.copy().loc[
    (actor_director['type']=='TV Show') &
    (actor_director['rating'].isin(top_tv_rating['rating'])) &
    (actor_director['genre'].isin(top_tv_genre['genre']))
    ]
```

TV Show Actors

[ ]:
```
tv_actors = actor_director_tv.groupby(['rating', 'genre', 'actor']).aggregate(
    tvshow_count = ('title','nunique'),
    ).reset_index().sort_values(['rating', 'genre', 'tvshow_count'],␣
 ↪ascending=False).reset_index(drop=True
    ).groupby(['rating', 'genre']).head(3).reset_index(drop=True
    )
tv_actors
```

[ ]:

	rating	genre	actor	tvshow_count
0	TV-PG	TV Dramas	Amit Behl	2
1	TV-PG	TV Dramas	Fawad Khan	2
2	TV-PG	TV Dramas	Figaro Tseng	2
3	TV-PG	TV Comedies	Antonio Banderas	3
4	TV-PG	TV Comedies	Mike Myers	3
5	TV-PG	TV Comedies	Seth Rogen	3
6	TV-PG	International TV Shows	David Attenborough	4
7	TV-PG	International TV Shows	Amit Behl	2
8	TV-PG	International TV Shows	Bettany Hughes	2
9	TV-MA	TV Dramas	Giancarlo Esposito	4
10	TV-MA	TV Dramas	Mike Colter	4
11	TV-MA	TV Dramas	Alican Yücesoy	3
12	TV-MA	TV Comedies	Fortune Feimster	4
13	TV-MA	TV Comedies	Jason Schwartzman	4
14	TV-MA	TV Comedies	John Paul Tremblay	4
15	TV-MA	International TV Shows	Takahiro Sakurai	14
16	TV-MA	International TV Shows	Jun Fukuyama	10
17	TV-MA	International TV Shows	Yuki Kaji	10

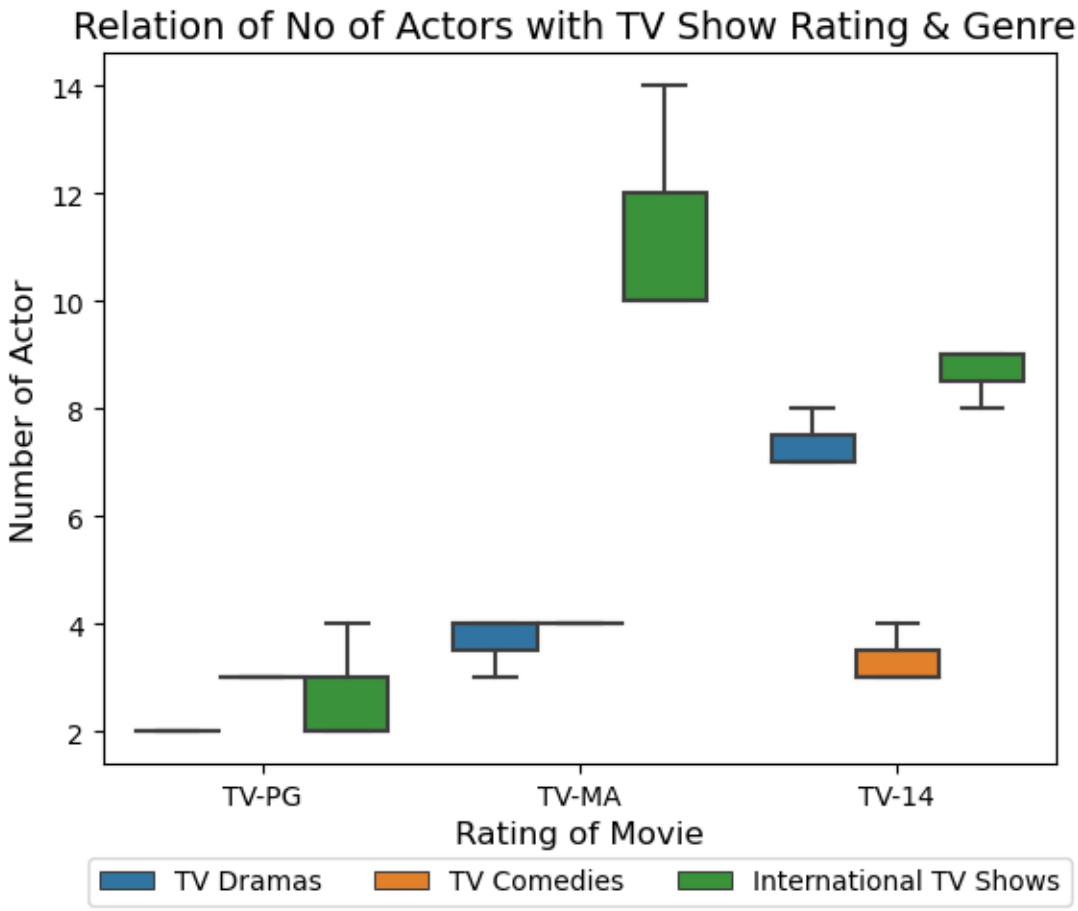
```
18  TV-14               TV Dramas        Tay Ping Hui            8
19  TV-14               TV Dramas         Jeanette Aw            7
20  TV-14               TV Dramas       Zhang Zhenhuan           7
21  TV-14              TV Comedies            George Hu            4
22  TV-14              TV Comedies            Aaron Yan            3
23  TV-14              TV Comedies           Annie Chen            3
24  TV-14  International TV Shows            Ai Kayano            9
25  TV-14  International TV Shows          Tay Ping Hui           9
26  TV-14  International TV Shows        Junichi Suwabe           8
```

[ ]:
```
tv_actors.groupby('actor').aggregate(
    repet=('tvshow_count', 'nunique'),
    movie_count=('tvshow_count', 'sum'),
    ).reset_index().sort_values(['repet', 'movie_count'], ascending=False).
 ↪reset_index(drop=True)
```

[ ]:
```
                 actor  repet  movie_count
0         Tay Ping Hui      2           17
1     Takahiro Sakurai      1           14
2         Jun Fukuyama      1           10
3            Yuki Kaji      1           10
4            Ai Kayano      1            9
5       Junichi Suwabe      1            8
6          Jeanette Aw      1            7
7       Zhang Zhenhuan      1            7
8            Amit Behl      1            4
9   David Attenborough      1            4
10    Fortune Feimster      1            4
11           George Hu      1            4
12  Giancarlo Esposito      1            4
13   Jason Schwartzman      1            4
14  John Paul Tremblay      1            4
15         Mike Colter      1            4
16           Aaron Yan      1            3
17      Alican Yücesoy      1            3
18          Annie Chen      1            3
19    Antonio Banderas      1            3
20          Mike Myers      1            3
21          Seth Rogen      1            3
22      Bettany Hughes      1            2
23          Fawad Khan      1            2
24        Figaro Tseng      1            2
```

[ ]:
```
sns.boxplot(tv_actors, x='rating', y='tvshow_count', hue='genre')
plt.legend(bbox_to_anchor =(0.5,-0.2), loc='lower center', borderaxespad=0,␣
 ↪ncol=3)
plt.title('Relation of No of Actors with TV Show Rating & Genre ', fontsize=14)
```

```
plt.xlabel('Rating of Movie', fontsize=12)
plt.ylabel('Number of Actor', fontsize=12)
plt.show()
```



TV Show Director

[ ]:
```
tv_directors = actor_director_tv.groupby(['rating', 'genre', 'director']).
 ↪aggregate(
    tvshow_count = ('title','nunique'),
    ).reset_index().sort_values(['rating', 'genre', 'tvshow_count'],␣
 ↪ascending=False).reset_index(drop=True
    ).groupby(['rating', 'genre']).head(3).reset_index(drop=True
    )
tv_directors
```

[ ]:

	rating	genre	director	tvshow_count
0	TV-PG	TV Dramas	Ehtesham Uddin	1
1	TV-PG	TV Dramas	Everardo Gout	1
2	TV-PG	TV Dramas	Jay Chandrasekhar	1

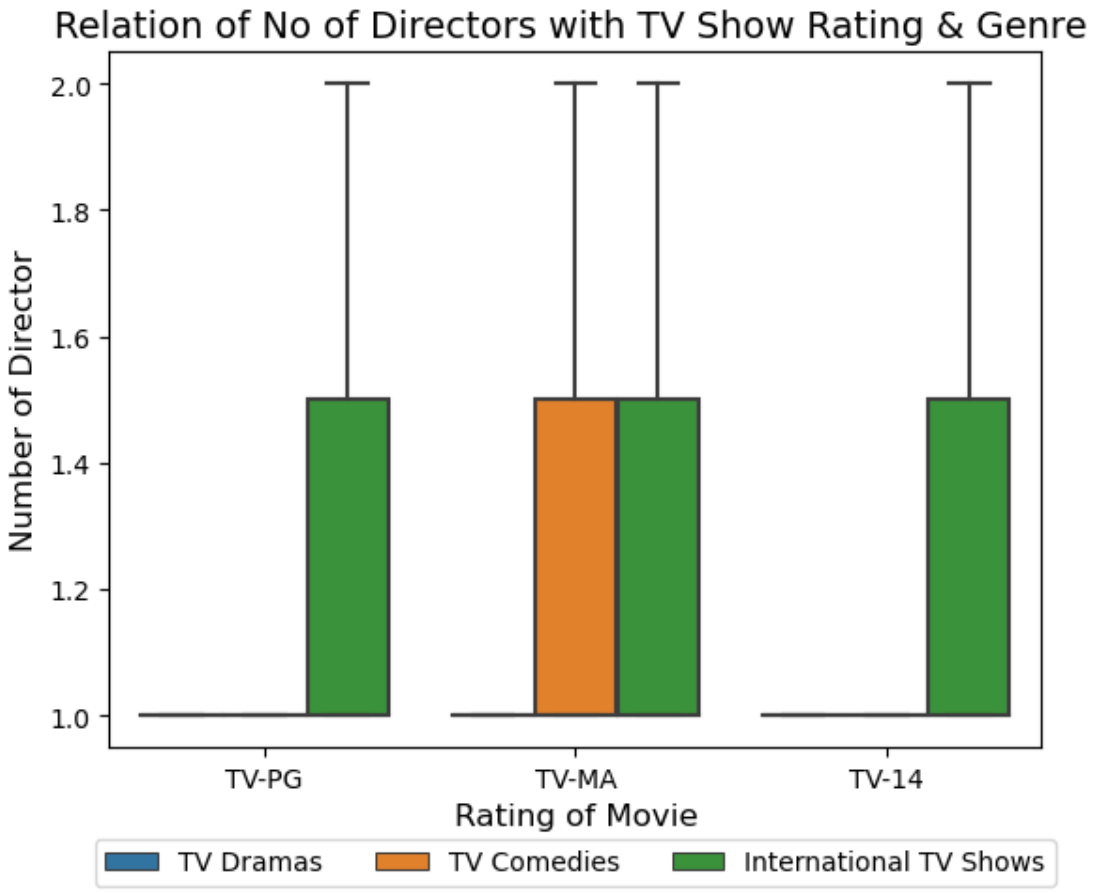
3	TV-PG	TV Comedies	Jay Chandrasekhar	1
4	TV-PG	International TV Shows	Alastair Fothergill	2
5	TV-PG	International TV Shows	Ehtesham Uddin	1
6	TV-PG	International TV Shows	Estela Renner	1
7	TV-MA	TV Dramas	Abhishek Chaubey	1
8	TV-MA	TV Dramas	Aco Tenriyagelli	1
9	TV-MA	TV Dramas	Ahmet Katıksız	1
10	TV-MA	TV Comedies	Stan Lathan	2
11	TV-MA	TV Comedies	Aco Tenriyagelli	1
12	TV-MA	TV Comedies	Adrien Lagier	1
13	TV-MA	International TV Shows	Shin Won-ho	2
14	TV-MA	International TV Shows	Abhishek Chaubey	1
15	TV-MA	International TV Shows	Aco Tenriyagelli	1
16	TV-14	TV Dramas	Gary Sing	1
17	TV-14	TV Dramas	Han Qing	1
18	TV-14	TV Dramas	Hsu Fu-chun	1
19	TV-14	TV Comedies	Cai Cong	1
20	TV-14	TV Comedies	Han Qing	1
21	TV-14	TV Comedies	Hsu Fu-chun	1
22	TV-14	International TV Shows	Hsu Fu-chun	2
23	TV-14	International TV Shows	Adrián García Bogliano	1
24	TV-14	International TV Shows	Alain Brunard	1

[ ]:
```
tv_directors.groupby('director').aggregate(
    repet=('tvshow_count', 'nunique'),
    movie_count=('tvshow_count', 'sum'),
    ).reset_index().sort_values(['repet', 'movie_count'], ascending=False).
 ↪reset_index(drop=True)
```

[ ]:

	director	repet	movie_count
0	Hsu Fu-chun	2	4
1	Aco Tenriyagelli	1	3
2	Abhishek Chaubey	1	2
3	Alastair Fothergill	1	2
4	Ehtesham Uddin	1	2
5	Han Qing	1	2
6	Jay Chandrasekhar	1	2
7	Shin Won-ho	1	2
8	Stan Lathan	1	2
9	Adrien Lagier	1	1
10	Adrián García Bogliano	1	1
11	Ahmet Katıksız	1	1
12	Alain Brunard	1	1
13	Cai Cong	1	1
14	Estela Renner	1	1
15	Everardo Gout	1	1
16	Gary Sing	1	1

```
[ ]: sns.boxplot(tv_directors, x='rating', y='tvshow_count', hue='genre')
plt.legend(bbox_to_anchor =(0.5,-0.2), loc='lower center', borderaxespad=0,␣
 ↪ncol=3)
plt.title('Relation of No of Directors with TV Show Rating & Genre ',␣
 ↪fontsize=14)
plt.xlabel('Rating of Movie', fontsize=12)
plt.ylabel('Number of Director', fontsize=12)
plt.show()
```



1.7.6

TV Show Insight

- `'TV-MA', 'TV-14', 'TV-PG'` rated TV Shows are most popular outof 9 unique rating.
- `'International TV Shows', 'TV-Dramas', 'TV-Comedies'` are most popular genre's outof 22 unique genre.
- Actors:
  - `Takahiro Sakurai', 'Jun Fukuyama', 'Yuki Kaji'` belong to 'TV-MA' & 'International TV Shows' which are Rank 1 Rating & Genre.

  - 'Tay Ping Hui' have 2 ranks with 17 TV Shows, who belongs to 'TV-14' Rating & 'International TV Shows', 'TV-Dramas' Genre.
- Directors:
  - 'Shin Won-ho', 'Abhishek Chaubey', 'Aco Tenriyagelli' belong to 'TV-MA' & 'International TV Shows' which are Rank 1 Rating & Genre.
  - 'Hsu Fu-chun'have 2 ranks with 10 TV Shows, who belongs to 'TV-14' Rating & 'International TV Shows', 'TV Comedies' Genre.

Business Insights * Higher number of Actors belongs to 'TV-MA' & 'International TV Shows'. * Popular Actors who belongs to 'TV-14' have higher number of TV Shows. * 'International TV Shows' have same number of Directors accross all TOP 3 Rating. Also 'TV Comedies' genre have same no of director with 'TV-MA' Rating. * Popular Directors who belongs to 'TV-14' have higher number of TV Shows.

Recommendations

- 'Takahiro Sakurai', 'Jun Fukuyama', 'Tay Ping Hui' are more popular Actors.
- 'Shin Won-ho', 'Abhishek Chaubey', 'Hsu Fu-chun' are more popular Director.
- TV Show with above Actor & Director combination might have more popularity.

1.7.7 Plot the Graph

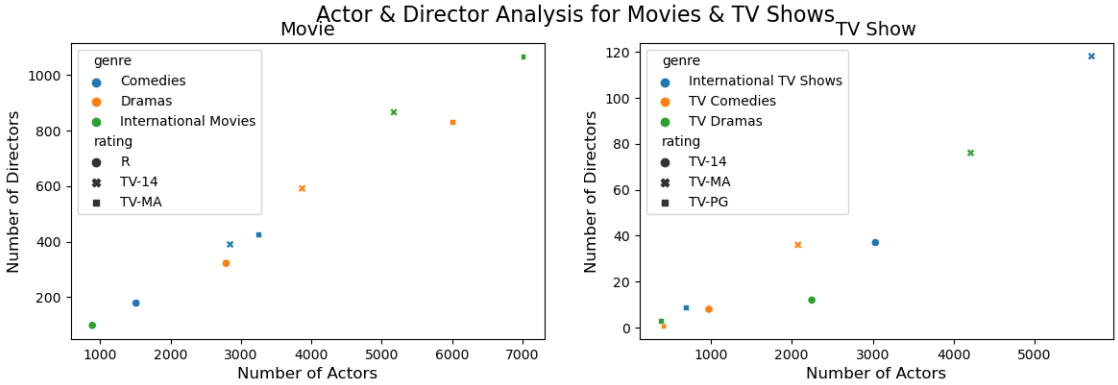
[ ]:
```
movies = actor_director.copy().loc[
    (actor_director['rating'].isin(top_movie_rating['rating'])) &
    (actor_director['genre'].isin(top_movie_genre['genre']))
    ].groupby(['type', 'rating', 'genre']).aggregate(
    actor_count = ('actor','nunique'),
    director_count = ('director','nunique'),
    ).reset_index(
    )
movies = movies.loc[(movies['actor_count']!=0) & (movies['director_count']!=0)]

tvshows = actor_director.copy().loc[
    (actor_director['rating'].isin(top_tv_rating['rating'])) &
    (actor_director['genre'].isin(top_tv_genre['genre']))
    ].groupby(['type', 'rating', 'genre']).aggregate(
    actor_count = ('actor','nunique'),
    director_count = ('director','nunique'),
    ).reset_index(
    )
tvshows = tvshows.loc[(tvshows['actor_count']!=0) & (tvshows['director_count']!
 ↪=0)]
```

[ ]:
```
print('Actors count for Movies among Top3 Rating & Genre Combination is',
      movies['actor_count'].min(), '-', movies['actor_count'].max())
print('Director count for Movies among Top3 Rating & Genre Combination is',
      movies['director_count'].min(), '-', movies['director_count'].max())
print('Actors count for TV Show among Top3 Rating & Genre Combination is',
      tvshows['actor_count'].min(), '-', tvshows['actor_count'].max())
```

```
print('Director count for TV Show among Top3 Rating & Genre Combination is',
      tvshows['director_count'].min(), '-', tvshows['director_count'].max())
```

```
Actors count for Movies among Top3 Rating & Genre Combination is 888 - 7007
Director count for Movies among Top3 Rating & Genre Combination is 99 - 1066
Actors count for TV Show among Top3 Rating & Genre Combination is 384 - 5703
Director count for TV Show among Top3 Rating & Genre Combination is 1 - 118
```

[ ]:
```
plt.figure(figsize=(14,4)).suptitle("Actor & Director Analysis for Movies & TV␣
 ↪Shows",fontsize=16)

plt.subplot(1, 2, 1)
sns.scatterplot(movies, y='director_count', x='actor_count', hue='genre',␣
 ↪style='rating')
plt.title('Movie', fontsize=14)
plt.xlabel('Number of Actors', fontsize=12)
plt.ylabel('Number of Directors', fontsize=12)

plt.subplot(1, 2, 2)
# plt.grid()
sns.scatterplot(tvshows, y='director_count', x='actor_count', hue='genre',␣
 ↪style='rating')
plt.title('TV Show', fontsize=14)
plt.xlabel('Number of Actors', fontsize=12)
plt.ylabel('Number of Directors', fontsize=12)

plt.show()
```



1.7.8

Insight

- In `Movie` for each unique combination `Actor` count ranges between `888 to 7007` & `Director` count ranges between `99 - 1066`.

- In `TV Show` for each unique combination `Actor` count ranges between `384 - 5703` & `Director` count ranges between `1 - 118`.
- 'TV-MA' with 'International Movies' Genre have highest number of Actors & Directors in `Movie` Category.
- 'TV-MA' with 'International TV Show' Genre have highest number of Actors & Directors in `TV Show` Category.

  Business Insights * Overall, There is a `positive` Co-Relation between No of Actor & No of Director in both Movie & TV Show. * Number of Actor for TV Shows are far less than Movie i.e. 10x less, but for Directors the differance of 1300

  Recommendations

- Movie or TV Show with International Genre are Mostly Popular.

1.8 Q5. Does Netflix has more focus on TV Shows than Movies in recent years

Problem Statement

- We need to find out `Percentage of change number of Movie vs TV Show added` to Netflix per year.
- If Rate of Change in TV Show is higher then Movie's then, It states that Netflix has more focus on TV Shows than Movies

Basic Matrics

- Need to group the `netflix_consolidated` data set with `type` and `add_year`.
- We will consider from `2014-Latest` and analyze rate of change.

[ ]:
```
type_year = netflix_consolidated.copy()
type_year = type_year.groupby(['type', 'add_year'])
type_year
```

[ ]:
```
<pandas.core.groupby.generic.DataFrameGroupBy object at 0x000002662782A020>
```

1.8.1

Pre Processing

- `Group the Data set` with 'type','add_year' & aggregate as unique title count for each Combinations & store that in to '`change_in_content_per_year`'.
- Group the `change_in_content_per_year` with 'type'.
- Add a new column '`rate_of_change`' to `change_in_content_per_year` as `differance of content count` from previos year to current year for Movie & TV Show.
- Add a new column '`pct_change`' to `change_in_content_per_year` as `percentage differance of content count` from previos year to current year for Movie & TV Show.
- Replace Null valus for `rate_of_change & pct_change` column & sort it as descending order.
- Plot the graph for add_year vs pct_change for both Movie & TV Show.

1.8.2 Create the Dataset with Rate of Change & Percentage Change Column

[ ]:
```
change_in_content_per_year = type_year.aggregate(
    title_count = ('title','nunique'),
    ).reset_index().sort_values('title_count', ascending=False).
 ↪reset_index(drop=True) # type: ignore
change_in_content_per_year.sort_values(['type', 'add_year'], inplace=True)
change_in_content_per_year.reset_index(drop=True, inplace=True)

grouped = change_in_content_per_year.groupby('type')
change_in_content_per_year['rate_of_change'] = grouped['title_count'].diff()
change_in_content_per_year['pct_change'] = round(grouped['title_count'].
 ↪pct_change(),4)
change_in_content_per_year['rate_of_change'].fillna(0, inplace=True)
change_in_content_per_year['pct_change'].fillna(0, inplace=True)

change_in_content_per_year
```

[ ]:

	type	add_year	title_count	rate_of_change	pct_change
0	Movie	2008.0	1	0.0	0.0000
1	Movie	2009.0	2	1.0	1.0000
2	Movie	2010.0	1	-1.0	-0.5000
3	Movie	2011.0	13	12.0	12.0000
4	Movie	2012.0	3	-10.0	-0.7692
5	Movie	2013.0	6	3.0	1.0000
6	Movie	2014.0	19	13.0	2.1667
7	Movie	2015.0	56	37.0	1.9474
8	Movie	2016.0	253	197.0	3.5179
9	Movie	2017.0	839	586.0	2.3162
10	Movie	2018.0	1237	398.0	0.4744
11	Movie	2019.0	1424	187.0	0.1512
12	Movie	2020.0	1284	-140.0	-0.0983
13	Movie	2021.0	993	-291.0	-0.2266
14	TV Show	2008.0	1	0.0	0.0000
15	TV Show	2009.0	0	-1.0	-1.0000
16	TV Show	2010.0	0	0.0	0.0000
17	TV Show	2011.0	0	0.0	0.0000
18	TV Show	2012.0	0	0.0	0.0000
19	TV Show	2013.0	5	5.0	inf
20	TV Show	2014.0	5	0.0	0.0000
21	TV Show	2015.0	26	21.0	4.2000
22	TV Show	2016.0	176	150.0	5.7692
23	TV Show	2017.0	349	173.0	0.9830
24	TV Show	2018.0	412	63.0	0.1805
25	TV Show	2019.0	592	180.0	0.4369
26	TV Show	2020.0	595	3.0	0.0051
27	TV Show	2021.0	505	-90.0	-0.1513

1.8.3 Understanding of Data Set

[ ]:
```
change_in_content_per_year.shape
```

[ ]:
```
(28, 5)
```

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

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 28 entries, 0 to 27
Data columns (total 5 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   type            28 non-null     category
 1   add_year        28 non-null     float64
 2   title_count     28 non-null     int64
 3   rate_of_change  28 non-null     float64
 4   pct_change      28 non-null     float64
dtypes: category(1), float64(3), int64(1)
memory usage: 1.1 KB
```

[ ]:
```
change_in_content_per_year.describe()
```

[ ]:

	add_year	title_count	rate_of_change	pct_change
count	28.000000	28.000000	28.000000	28.000000
mean	2014.500000	314.178571	53.428571	inf
std	4.105101	450.646865	160.911392	NaN
min	2008.000000	0.000000	-291.000000	-1.000000
25%	2011.000000	1.750000	0.000000	0.000000
50%	2014.500000	22.500000	3.000000	0.165850
75%	2018.000000	526.750000	84.750000	2.002225
max	2021.000000	1424.000000	586.000000	inf

[ ]:
```
change_in_content_per_year['add_year'].nunique()
```

[ ]:
```
14
```

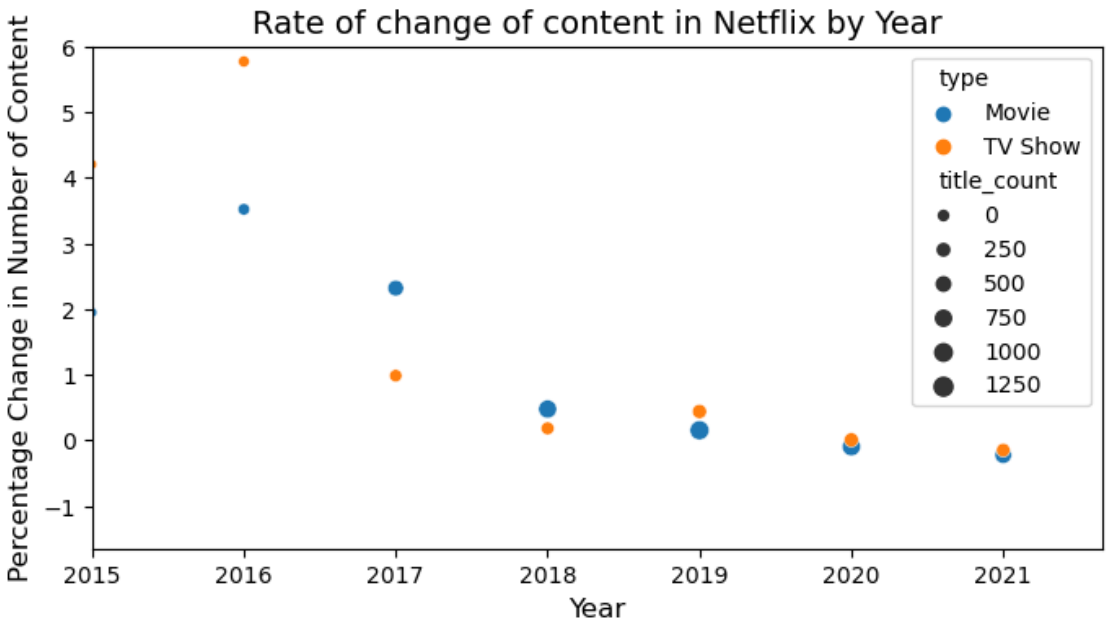
[ ]:
```
change_in_content_per_year['add_year'].value_counts()
```

[ ]:
```
2008.0    2
2009.0    2
2010.0    2
2011.0    2
2012.0    2
2013.0    2
2014.0    2
2015.0    2
2016.0    2
2017.0    2
```

```
2018.0    2
2019.0    2
2020.0    2
2021.0    2
Name: add_year, dtype: int64
```

1.8.4 Plot the Graph

[ ]:
```
plt.figure(figsize=(8,4))

sns.scatterplot(change_in_content_per_year, x='add_year', y='pct_change',␣
↪hue='type', size='title_count')
plt.title('Rate of change of content in Netflix by Year', fontsize=14)
plt.xlabel('Year', fontsize=12)
plt.ylabel('Percentage Change in Number of Content', fontsize=12)
plt.xlim(left=2015)
plt.ylim(top=6)

plt.show()
```



1.8.5

Insight

- On year 2016 Maximum number of Movie & TV Shows Added to Netflix.
- Though number of TV Show added each doesnot increases highly, but'Percentage change in Number of content Added' is higher since 2019.

- Also It is observed that between `2016-2018` huge reduction in 'Percentage change in Number of content Added' is observed, though number of Content Added increases.
- From `2018` upto `2021 (Latest year)` 'Percentage change in Number of content Added' Decreases gradually, but each year 'Percentage change in Number of content Added' for `TV Show`is higher then `Movie`.

Business Insights * Considering `2019` to `2021` 'Percentage change in Number of content Added' is less then `1` for both Movie & TV Show. * But during these year more TV Show added in terms of Percentage then last year is higher than the Movie. * ALso during these year more Movies added then TV Show.

Recommendations

- Here the `Higher 'Percentage change in Number of TV Show Added' Than the Movie` means Netflix is more focused about TV Shows in recent years.
- But `Number of Movies Added is higher than TV Shows` indicated, Market of Movie and TV Shows are different.

1.9 Q6. What content is available in different countries?

Problem Statement

- Here we need to analyze that Number of content available in contries by 'Type', 'Rating' & 'Genre'.
- We will consider only `Top 10` 'Contries' where Number of content produced is `Higher`.
- Similarly, `Top 10` 'Rating' and 'Genre' are taken in to Consideration.

Basic Matrics

- Remove records where `Rating is Unknown` and convert 'Rating', 'Genre' and 'Country' to Object type.
- Group it with `'country', 'rating', 'genre', 'type'` and find the count of Contents as 'title_count'. Than sort it in same order.
- Remove records where `Rating is Unknown` and convert 'Rating', 'Genre' and 'Country' to Object type.
- Filter out and keep where 'title_count' is grater then '0' and with valid 'country'.

[ ]:
```
country_content_raw = netflix_consolidated.copy().
 ↪loc[netflix_consolidated['rating']!='Unknown Rating']
country_content_raw['rating'] = country_content_raw['rating'].astype(object)
country_content_raw['genre'] = country_content_raw['genre'].astype(object)
country_content_raw['country'] = country_content_raw['country'].astype(object)
```

[ ]:
```
country_content = country_content_raw.groupby(['country', 'rating', 'genre',␣
 ↪'type']).aggregate(
    title_count = ('title','nunique'),
    ).reset_index().sort_values(['country', 'rating', 'genre', 'type'],␣
 ↪ascending=False)
country_content = country_content.loc[(country_content['title_count']>0) &␣
 ↪(country_content.country!="")].reset_index(drop=True)
country_content
```

[ ]:

	country	rating	genre	type	title_count
0	Zimbabwe	TV-MA	International Movies	Movie	1
1	Zimbabwe	TV-MA	Documentaries	Movie	1
2	Zimbabwe	TV-G	Romantic Movies	Movie	1
3	Zimbabwe	TV-G	International Movies	Movie	1
4	Zimbabwe	TV-G	Comedies	Movie	1
…	…	…	…	…	…
3423	Algeria	TV-14	Dramas	Movie	1
3424	Albania	TV-MA	International Movies	Movie	1
3425	Albania	TV-MA	Dramas	Movie	1
3426	Afghanistan	TV-MA	International Movies	Movie	1
3427	Afghanistan	TV-MA	Documentaries	Movie	1

[3428 rows x 5 columns]

1.9.1 Understaing of Data Set

[ ]:
```
country_content.shape
```

[ ]: (3428, 5)

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

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3428 entries, 0 to 3427
Data columns (total 5 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   country      3428 non-null   object
 1   rating       3428 non-null   object
 2   genre        3428 non-null   object
 3   type         3428 non-null   category
 4   title_count  3428 non-null   int64
dtypes: category(1), int64(1), object(3)
memory usage: 110.7+ KB
```

[ ]:
```
country_content.describe()
```

[ ]:

	title_count
count	3428.000000
mean	6.424154
std	19.793383
min	1.000000
25%	1.000000
50%	2.000000
75%	4.000000
max	508.000000

Hence, Title contains Outliers.

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

[ ]:
```
122
```

[ ]:
```
country_content['country'].value_counts()
```

[ ]:
```
United States     259
United Kingdom    173
Canada            158
India             134
France            128
                  …
Nicaragua           1
Bahamas             1
Bermuda             1
Botswana            1
Ecuador             1
Name: country, Length: 122, dtype: int64
```

[ ]:
```
country_content['type'].nunique()
```

[ ]:
```
2
```

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

[ ]:
```
Movie      2428
TV Show    1000
Name: type, dtype: int64
```

[ ]:
```
country_content['rating'].nunique()
```

[ ]:
```
17
```

[ ]:
```
country_content['rating'].value_counts()
```

[ ]:
```
TV-MA       972
TV-14       681
TV-PG       460
R           301
PG-13       260
TV-G        174
PG          157
NR          121
TV-Y7       116
TV-Y         98
G            51
NC-17        13
TV-Y7-FV     13
```

```
UR            8
84 min        1
74 min        1
66 min        1
Name: rating, dtype: int64
```

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

[ ]:
```
42
```

[ ]:
```
country_content['genre'].value_counts()
```

[ ]:
```
International Movies            357
Dramas                          322
Comedies                        234
Documentaries                   191
Independent Movies              176
Action & Adventure              154
Romantic Movies                 141
Children & Family Movies        137
International TV Shows          131
Thrillers                       122
TV Dramas                       103
TV Comedies                     102
Music & Musicals                 97
Sci-Fi & Fantasy                 94
Horror Movies                    90
Sports Movies                    89
Crime TV Shows                   79
Kids' TV                         69
Romantic TV Shows                62
Docuseries                       55
TV Action & Adventure            50
Classic Movies                   46
Reality TV                       43
Faith & Spirituality             42
British TV Shows                 42
LGBTQ Movies                     38
TV Mysteries                     36
TV Sci-Fi & Fantasy              32
TV Thrillers                     31
Stand-Up Comedy                  30
Cult Movies                      29
TV Horror                        28
Movies                           26
Spanish-Language TV Shows        25
Teen TV Shows                    22
```

```
Science & Nature TV              22
Stand-Up Comedy & Talk Shows     18
Anime Series                     17
Korean TV Shows                  14
Anime Features                   13
Classic & Cult TV                13
TV Shows                          6
Name: genre, dtype: int64
```

1.9.2

Pre Processing

- Find Top 10 Country, Rating & Genre.
- Than filter the 'country_content' with 'country', 'rating', 'genre' which are belongs to TOP 10 and store as 'top_country_content'.
- Than find out Content count for Top 10 country for each Type, Rating and Genre.
- Then Plot the Graph represting count of Content for each type, rating & genre.

1.9.3 Find Top Country, Rating and Genre

[ ]:
```
top_country = country_content.groupby('country').aggregate(
    title_count = ('title_count','sum'),
    ).reset_index().sort_values(['title_count'], ascending=False).
 ↪reset_index(drop=True
    ).head(10)
```

[ ]:
```
top_rating = country_content.groupby('rating').aggregate(
    title_count = ('title_count','sum'),
    ).reset_index().sort_values(['title_count'], ascending=False).
 ↪reset_index(drop=True
    ).head(10)
```

[ ]:
```
top_genre = country_content.groupby('genre').aggregate(
    title_count = ('title_count','sum'),
    ).reset_index().sort_values(['title_count'], ascending=False).
 ↪reset_index(drop=True
    ).head(10)
```

1.9.4 Find combination of Top Country, Rating, Genre

[ ]:
```
top_country_content =  country_content.loc[
    (country_content['country'].isin(top_country['country'])) &
    (country_content['rating'].isin(top_rating['rating'])) &
    (country_content['genre'].isin(top_genre['genre']))
    ].reset_index(drop=True)
top_country_content
```

[ ]:
```
           country rating                     genre   type  title_count
0    United States  TV-Y7                  Comedies  Movie           19
1    United States  TV-Y7  Children & Family Movies  Movie           50
2    United States   TV-Y                    Dramas  Movie            2
3    United States   TV-Y                  Comedies  Movie           15
4    United States   TV-Y  Children & Family Movies  Movie           47
..             …    …                        …    …          …
529         Canada     NR      International Movies  Movie            2
530         Canada     NR        Independent Movies  Movie            1
531         Canada     NR                    Dramas  Movie            1
532         Canada     NR             Documentaries  Movie            1
533         Canada     NR                  Comedies  Movie            1

[534 rows x 5 columns]
```

1.9.5 Find Content count for Top 10 Country by Type, Rating & Genre

[ ]:
```
country_type = top_country_content.groupby(['type', 'country']).aggregate(
    title_count = ('title_count','sum'),
    ).reset_index().sort_values(['title_count'], ascending=False).
 ↪reset_index(drop=True
    )
```

[ ]:
```
country_rating = top_country_content.groupby(['rating', 'country']).aggregate(
    title_count = ('title_count','sum'),
    ).reset_index().sort_values(['title_count'], ascending=False).
 ↪reset_index(drop=True
    )
```

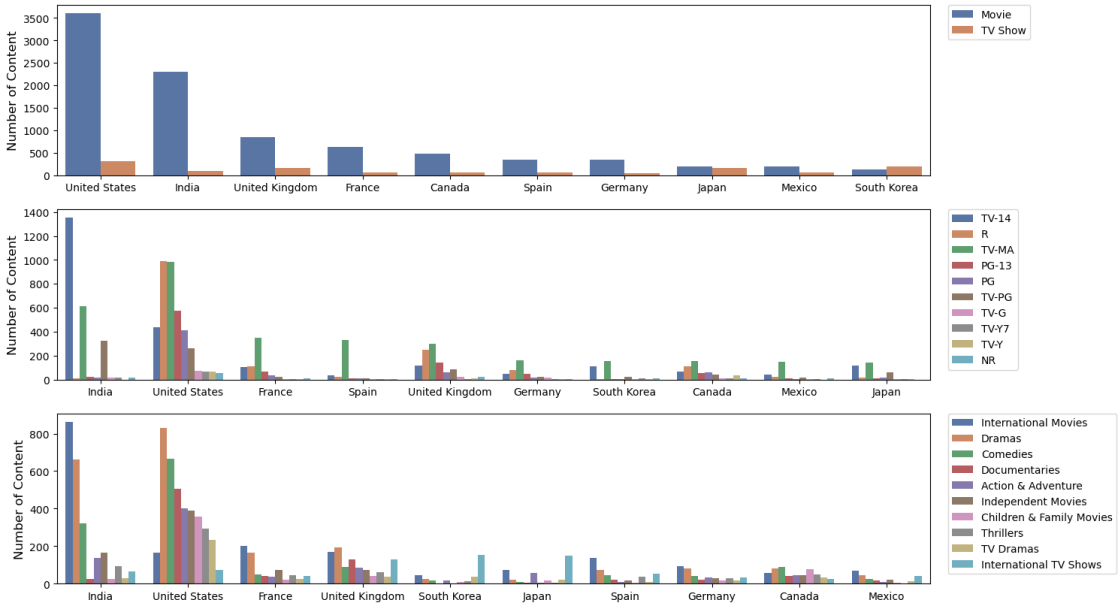
[ ]:
```
country_genre = top_country_content.groupby(['genre', 'country']).aggregate(
    title_count = ('title_count','sum'),
    ).reset_index().sort_values(['title_count'], ascending=False).
 ↪reset_index(drop=True
    )
```

1.9.6 Plot the Graph

[ ]:
```
plt.figure(figsize=(15,10)).suptitle("Type of content is available in different␣
 ↪Countries",fontsize=16)

plt.subplot(3, 1, 1)
sns.barplot(country_type, x='country', y='title_count', hue='type', dodge=True,␣
 ↪palette="deep")
plt.legend(bbox_to_anchor=(1.02, 1), loc='upper left', borderaxespad=0)
plt.xlabel('', fontsize=12)
plt.ylabel('Number of Content', fontsize=12)
```

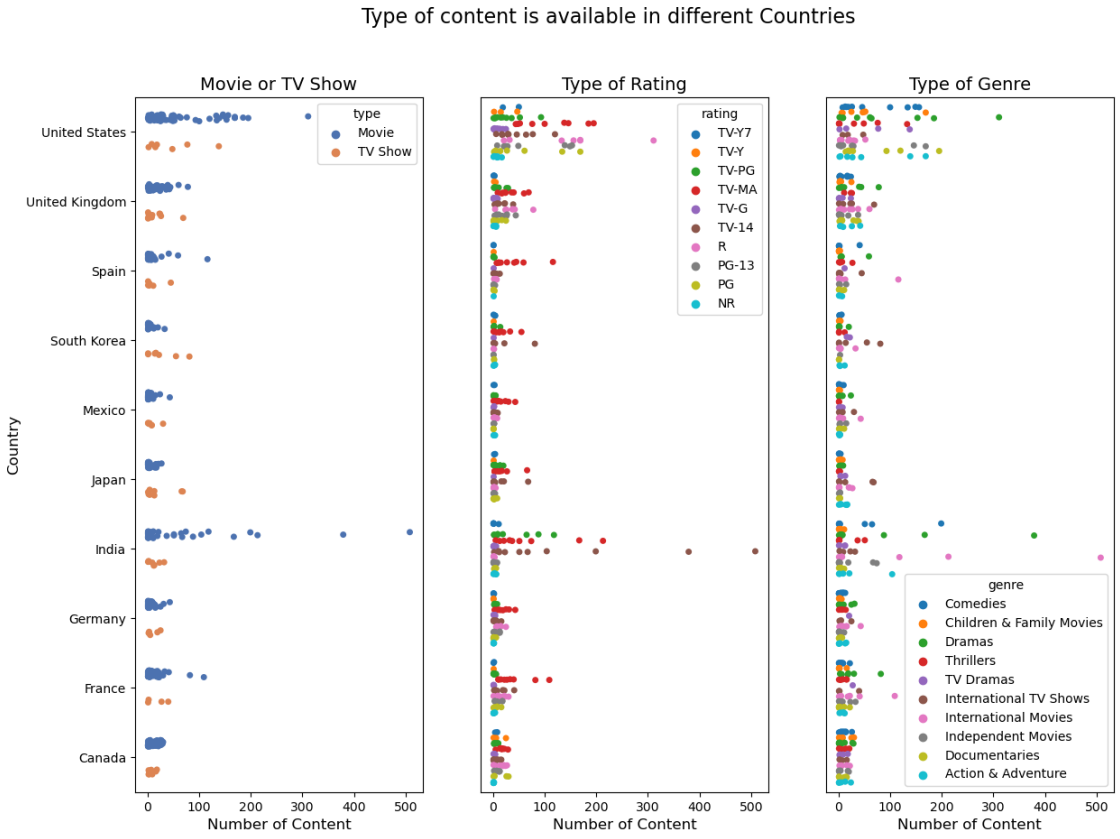
```
plt.subplot(3, 1, 2)
sns.barplot(country_rating, x='country', y='title_count', hue='rating',␣
 ↪dodge=True, palette="deep")
plt.legend(bbox_to_anchor=(1.02, 1), loc='upper left', borderaxespad=0)
plt.xlabel('', fontsize=12)
plt.ylabel('Number of Content', fontsize=12)

plt.subplot(3, 1, 3)
sns.barplot(country_genre, x='country', y='title_count', hue='genre',␣
 ↪dodge=True, palette="deep")
plt.legend(bbox_to_anchor=(1.02, 1), loc='upper left', borderaxespad=0)
plt.xlabel('', fontsize=12)
plt.ylabel('Number of Content', fontsize=12)


plt.show()
```

Type of content is available in different Countries



[ ]:
```
plt.figure(figsize=(14,10)).suptitle("Type of content is available in different␣
 ↪Countries",fontsize=16)

plt.subplot(1, 3, 1)
sns.stripplot(top_country_content, y='country', x='title_count', hue='type',␣
 ↪s=5, dodge=True, palette="deep")
plt.title('Movie or TV Show', fontsize=14)
```

```
plt.xlabel('Number of Content', fontsize=12)
plt.ylabel('Country', fontsize=12)

plt.subplot(1, 3, 2)
sns.stripplot(top_country_content, y='country', x='title_count', hue='rating',␣
 ↪s=5, dodge=True)
plt.title('Type of Rating', fontsize=14)
plt.xlabel('Number of Content', fontsize=12)
plt.ylabel('', fontsize=12)
plt.yticks([])

plt.subplot(1, 3, 3)
sns.stripplot(top_country_content, y='country', x='title_count', hue='genre',␣
 ↪s=5, dodge=True)
plt.title('Type of Genre', fontsize=14)
plt.xlabel('Number of Content', fontsize=12)
plt.ylabel('', fontsize=12)
plt.yticks([])

plt.show()
```



1.9.7

Insight

- `'South Korea'` have higher number of TV Show then Movie.
- ‘United States’ and ‘India’ have higher number of Movies then the TV Show.
- `'United States'` have equivalent number of `'TV-MA' & 'R'` rated Contents.
- ‘India’ have highest number of `'TV-14'` Content.
- ‘France’, ‘Spain’ & ‘United Kingdom’ have equivalent number of `'TV-MA'` Content.
- ‘India’ have highest number of ’`International Movies'`.
- ‘United States’ have higher number of `'Dramas'`.
- ‘United Kingdom’, ‘South Korea’ & ‘Japan’ have equivalent number of `'International TV Shows'`.

Business Insights * `'United States'` have higher popularity for TV-MA & R rated Movies, which are belongs to Drama & Comedies Genre. * `'India'` have higher popularity for TV-14 & V-MA rated Movies, which are belongs to International Movies & Dramas Genre. * `'United Kingdom'` have higher popularity for TV-MA & R rated Movies, which are belongs to International Movies & Dramas Genre. * `'South Korea'` have higher popularity for TV-MA & TV-14 rated TV Shows, which are belongs to International TV Shows Genre. * India & United States have higer outliers.

Recommendations

- TV shows from South Korea & Japan are more popular.
- Movies from United States and India are more popular.

1.10 END