netflix-case-study-mohana-final

October 15, 2023

1 *NETFLIX CASE STUDY*

1.1 Import Libraries and load data

[349]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

from google.colab import drive
drive.mount('/content/drive')

data = pd.read_csv('/content/drive/MyDrive/Colab Notebooks/netflix.csv')
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call
drive.mount("/content/drive", force_remount=True).
```

1.2 Before Data Cleanup

[350]:
```
data.shape
```

[350]:
```
(8807, 12)
```

[351]:
```
data['type'].value_counts()
```

[351]:
```
Movie      6131
TV Show    2676
Name: type, dtype: int64
```

[352]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8807 entries, 0 to 8806
Data columns (total 12 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   show_id       8807 non-null   object
 1   type          8807 non-null   object
 2   title         8807 non-null   object
 3   director      6173 non-null   object
 4   cast          7982 non-null   object
 5   country       7976 non-null   object
 6   date_added    8797 non-null   object
 7   release_year  8807 non-null   int64
 8   rating        8803 non-null   object
 9   duration      8804 non-null   object
 10  listed_in     8807 non-null   object
 11  description   8807 non-null   object
dtypes: int64(1), object(11)
memory usage: 825.8+ KB
```

[353]:
```
data.isnull().sum()/len(data)*100
```

[353]:
```
show_id          0.000000
type             0.000000
title            0.000000
director        29.908028
cast             9.367549
country          9.435676
date_added       0.113546
release_year     0.000000
rating           0.045418
duration         0.034064
listed_in        0.000000
description      0.000000
dtype: float64
```

[354]:
```
data.describe()
```

[354]:
```
       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
```

[355]:
```
data.describe(include='object').T
```

[355]:
```
            count unique                                        top  \
show_id      8807   8807                                         s1
type         8807      2                                      Movie
title        8807   8807                       Dick Johnson Is Dead
```

```
director     6173   4528                                   Rajiv Chilaka
cast         7982   7692                              David Attenborough
country      7976    748                                   United States
date_added   8797   1767                                 January 1, 2020
rating       8803     17                                           TV-MA
duration     8804    220                                        1 Season
listed_in    8807    514                    Dramas, International Movies
description  8807   8775  Paranormal activity at a lush, abandoned prope…

             freq
show_id         1
type         6131
title           1
director       19
cast           19
country      2818
date_added    109
rating       3207
duration     1793
listed_in     362
description     4
```

[356]:
```
data.groupby(['type'])['show_id'].nunique()
```

[356]:
```
type
Movie      6131
TV Show    2676
Name: show_id, dtype: int64
```

[357]:
```
data.head()
```

[357]:
```
  show_id     type                  title         director  \
0      s1    Movie   Dick Johnson Is Dead  Kirsten Johnson
1      s2  TV Show          Blood & Water              NaN
2      s3  TV Show              Ganglands  Julien Leclercq
3      s4  TV Show  Jailbirds New Orleans              NaN
4      s5  TV Show           Kota Factory              NaN

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

           date_added  release_year rating   duration  \
0  September 25, 2021          2020  PG-13     90 min
```

```
1  September 24, 2021          2021  TV-MA  2 Seasons
2  September 24, 2021          2021  TV-MA   1 Season
3  September 24, 2021          2021  TV-MA   1 Season
4  September 24, 2021          2021  TV-MA  2 Seasons

                                            listed_in  \
0                                       Documentaries
1    International TV Shows, TV Dramas, TV Mysteries
2  Crime TV Shows, International TV Shows, TV Act…
3                              Docuseries, Reality TV
4  International TV Shows, Romantic TV Shows, TV …

                                          description
0  As her father nears the end of his life, filmm…
1  After crossing paths at a party, a Cape Town t…
2  To protect his family from a powerful drug lor…
3  Feuds, flirtations and toilet talk go down amo…
4  In a city of coaching centers known to train I…
```

1.3 Data Cleanup

[358]:
```
# Unnesting - Explode the columns with comma-separated values into separate rows
data['director'] = data['director'].str.split(', ')
data['cast'] = data['cast'].str.split(', ')
data['country'] = data['country'].str.split(', ')
data['listed_in'] = data['listed_in'].str.split(', ')
data = data.explode('director').explode('cast').explode('country').
 ↪explode('listed_in')

# Adjust Inconsistencies. For few records duration data is shifted and wrongly␣
 ↪noted under rating column
data.loc[data['rating'].str.contains('min', na=False), 'rating'] = pd.NA

# Convert duration to Float (Remove String part. Ex :- "90 min" -> "90.0", "3␣
 ↪Seasons" -> "3.0")
data['duration'] = data['duration'].str.extract('(\d+)').astype(float)

# Convert date_added field to datetime data type
data['date_added'] = pd.to_datetime(data['date_added'].str.strip(), format='%B␣
 ↪%d, %Y')

# Fill NAs
data.loc[data['type'] == 'TV Show', 'duration'] = data.loc[data['type'] == 'TV␣
 ↪Show', 'duration'].fillna(data.loc[data['type'] == 'TV Show', 'duration'].
 ↪mean())
```

```
data.loc[data['type'] == 'Movie', 'duration'] = data.loc[data['type'] ==␣
↪'Movie', 'duration'].fillna(data.loc[data['type'] == 'Movie', 'duration'].
↪mean())
data['rating'].fillna(data['rating'].mode()[0], inplace=True)
data['date_added'].fillna(data['date_added'].median() , inplace=True)
data['director'] = data['director'].fillna('unknown_director')
data['cast'] = data['cast'].fillna('unknown_cast')
data['country'] = data.groupby('director')['country'].transform(lambda x: x.
↪fillna(x.mode().iloc[0] if not x.mode().empty else 'Unknown'))
data['country'] = data['country'].replace('', 'Unknown')

#Extract month,week,day_of_week from date_added
data['month'] = data['date_added'].dt.month.astype(int)
data['week'] = data['date_added'].dt.isocalendar().week.astype(int)
data['day_of_week'] = data['date_added'].dt.dayofweek.astype(int)
```

1.4 After Data Cleanup

[359]:
```
data.shape
```

[359]:
```
(201991, 15)
```

[360]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 201991 entries, 0 to 8806
Data columns (total 15 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   show_id       201991 non-null  object
 1   type          201991 non-null  object
 2   title         201991 non-null  object
 3   director      201991 non-null  object
 4   cast          201991 non-null  object
 5   country       201991 non-null  object
 6   date_added    201991 non-null  datetime64[ns]
 7   release_year  201991 non-null  int64
 8   rating        201991 non-null  object
 9   duration      201991 non-null  float64
 10  listed_in     201991 non-null  object
 11  description   201991 non-null  object
 12  month         201991 non-null  int64
 13  week          201991 non-null  int64
 14  day_of_week   201991 non-null  int64
dtypes: datetime64[ns](1), float64(1), int64(4), object(9)
memory usage: 24.7+ MB
```

[361]:
```
data.isnull().sum()/len(data)*100
```

[361]:
```
show_id         0.0
type            0.0
title           0.0
director        0.0
cast            0.0
country         0.0
date_added      0.0
release_year    0.0
rating          0.0
duration        0.0
listed_in       0.0
description     0.0
month           0.0
week            0.0
day_of_week     0.0
dtype: float64
```

[362]:
```
data.describe()
```

[362]:
```
        release_year       duration          month           week  \
count  201991.000000  201991.000000  201991.000000  201991.000000
mean     2013.452891      77.689227       6.638167      26.703903
std         9.003933      51.488181       3.441703      15.048304
min      1925.000000       1.000000       1.000000       1.000000
25%      2012.000000       4.000000       4.000000      14.000000
50%      2016.000000      95.000000       7.000000      27.000000
75%      2019.000000     112.000000      10.000000      39.000000
max      2021.000000     312.000000      12.000000      53.000000

         day_of_week
count  201991.000000
mean        3.103450
std         1.728122
min         0.000000
25%         2.000000
50%         3.000000
75%         4.000000
max         6.000000
```

[363]:
```
data.describe(include='object').T
```

[363]:
```
              count unique                                top  \
show_id      201991   8807                              s7165
type         201991      2                              Movie
title        201991   8807        Kahlil Gibran's The Prophet
```

```
director     201991   4994                                   unknown_director
cast         201991  36440                                       unknown_cast
country      201991    127                                      United States
rating       201991     14                                              TV-MA
listed_in    201991     42                                             Dramas
description  201991   8775  A troubled young girl and her mother find sola…

               freq
show_id         700
type         145843
title           700
director      50643
cast           2146
country       64632
rating        73937
listed_in     29775
description     700
```

[364]:
```
data.groupby(['type'])['show_id'].nunique()
```

[364]:
```
type
Movie      6131
TV Show    2676
Name: show_id, dtype: int64
```

[365]:
```
data.groupby(['listed_in'])['show_id'].nunique().sort_values(ascending=False)
```

[365]:
```
listed_in
International Movies            2752
Dramas                          2427
Comedies                        1674
International TV Shows          1351
Documentaries                    869
Action & Adventure               859
TV Dramas                        763
Independent Movies               756
Children & Family Movies         641
Romantic Movies                  616
TV Comedies                      581
Thrillers                        577
Crime TV Shows                   470
Kids' TV                         451
Docuseries                       395
Music & Musicals                 375
Romantic TV Shows                370
Horror Movies                    357
Stand-Up Comedy                  343
```

```
Reality TV                       255
British TV Shows                 253
Sci-Fi & Fantasy                 243
Sports Movies                    219
Anime Series                     176
Spanish-Language TV Shows        174
TV Action & Adventure            168
Korean TV Shows                  151
Classic Movies                   116
LGBTQ Movies                     102
TV Mysteries                      98
Science & Nature TV               92
TV Sci-Fi & Fantasy               84
TV Horror                         75
Anime Features                    71
Cult Movies                       71
Teen TV Shows                     69
Faith & Spirituality              65
TV Thrillers                      57
Movies                            57
Stand-Up Comedy & Talk Shows      56
Classic & Cult TV                 28
TV Shows                          16
Name: show_id, dtype: int64
```

[366]:
```python
data.groupby(['country'])['show_id'].nunique().sort_values(ascending=False)
```

[366]:
```
country
United States     4132
India             1116
United Kingdom     809
Canada             448
France             396
                  …
Somalia              1
Nicaragua            1
Ethiopia             1
Ecuador              1
Afghanistan          1
Name: show_id, Length: 127, dtype: int64
```

[367]:
```python
data.groupby(['rating'])['show_id'].nunique().sort_values(ascending=False)
```

[367]:
```
rating
TV-MA       3214
TV-14       2160
TV-PG        863
```

```
R            799
PG-13        490
TV-Y7        334
TV-Y         307
PG           287
TV-G         220
NR            80
G             41
TV-Y7-FV       6
NC-17          3
UR             3
Name: show_id, dtype: int64
```

[368]:
```
data.groupby(['release_year'])['show_id'].nunique().sort_values(ascending=False)
```

[368]:
```
release_year
2018    1147
2017    1032
2019    1030
2020     953
2016     902
        …
1959       1
1961       1
1947       1
1966       1
1925       1
Name: show_id, Length: 74, dtype: int64
```

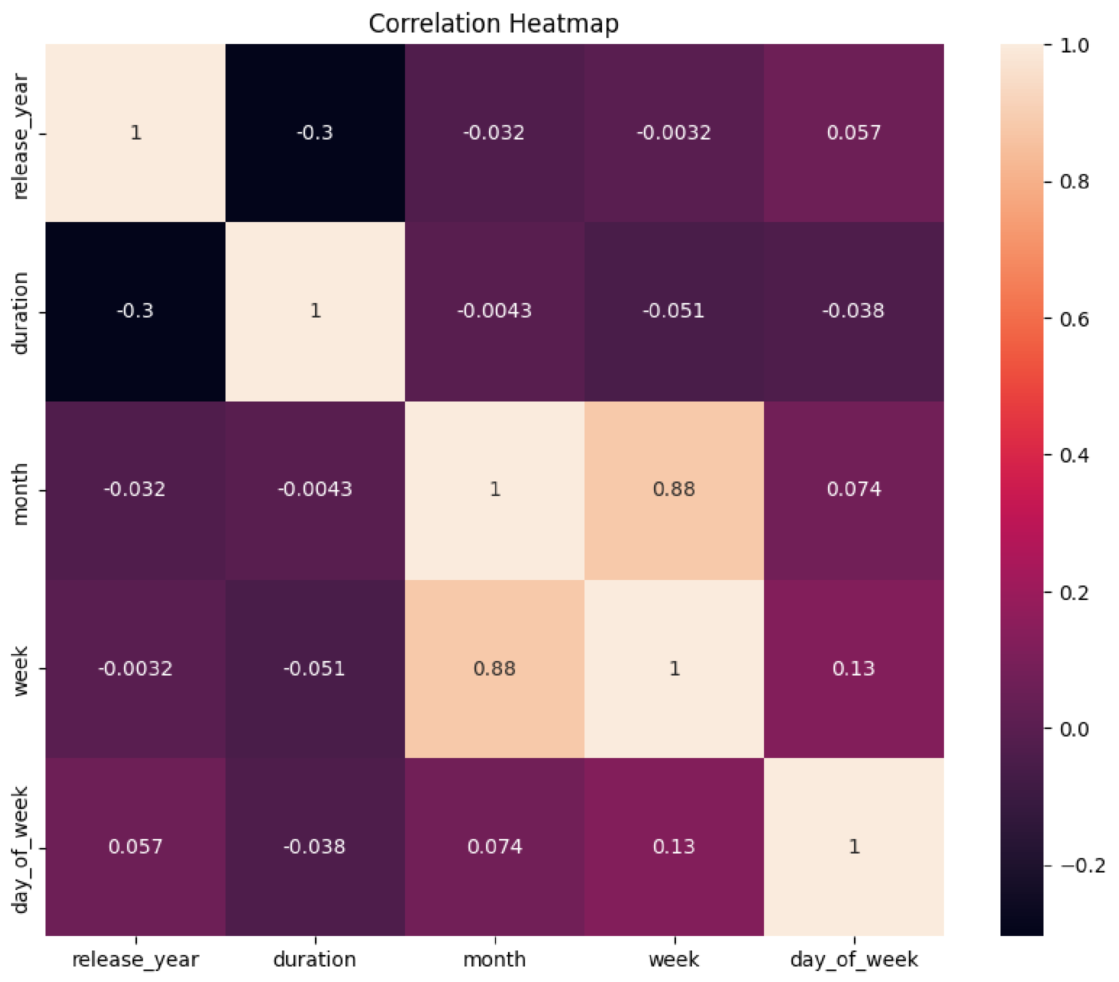
[369]:
```
data.head()
```

[369]:
```
  show_id     type                 title           director          cast  \
0      s1    Movie  Dick Johnson Is Dead    Kirsten Johnson  unknown_cast
1      s2  TV Show         Blood & Water  unknown_director    Ama Qamata
1      s2  TV Show         Blood & Water  unknown_director    Ama Qamata
1      s2  TV Show         Blood & Water  unknown_director    Ama Qamata
1      s2  TV Show         Blood & Water  unknown_director   Khosi Ngema

         country date_added  release_year rating  duration  \
0  United States 2021-09-25          2020  PG-13      90.0
1   South Africa 2021-09-24          2021  TV-MA       2.0
1   South Africa 2021-09-24          2021  TV-MA       2.0
1   South Africa 2021-09-24          2021  TV-MA       2.0
1   South Africa 2021-09-24          2021  TV-MA       2.0

               listed_in                                        description  \
0          Documentaries  As her father nears the end of his life, filmm…
```

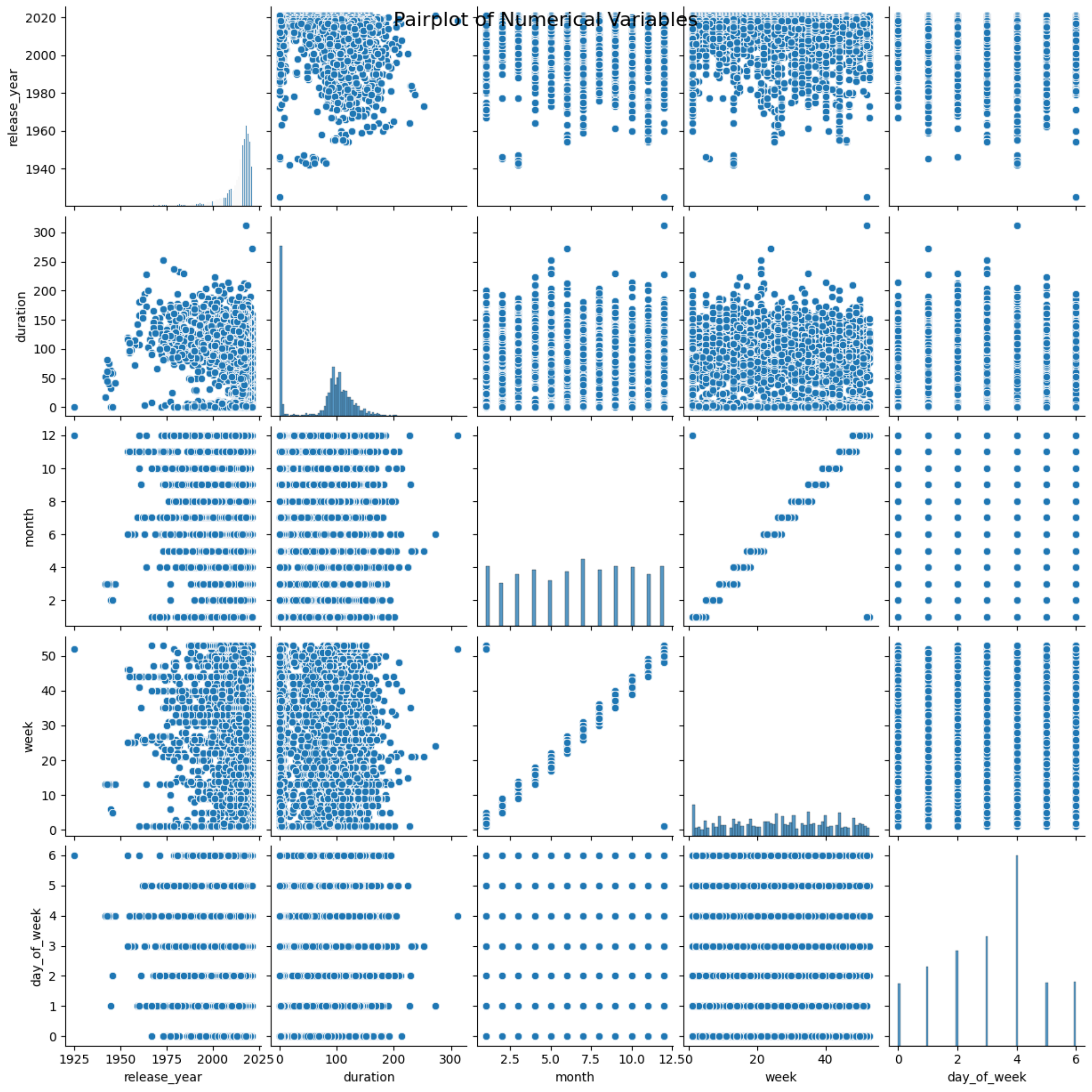
```
1  International TV Shows  After crossing paths at a party, a Cape Town t…
1               TV Dramas  After crossing paths at a party, a Cape Town t…
1            TV Mysteries  After crossing paths at a party, a Cape Town t…
1  International TV Shows  After crossing paths at a party, a Cape Town t…

   month  week  day_of_week
0      9    38            5
1      9    38            4
1      9    38            4
1      9    38            4
1      9    38            4
```

[370]:
```python
# Calculate correlation matrix
correlation_matrix = data.corr()

# Plotting the heatmap
plt.figure(figsize=(10, 8))
sns.heatmap(correlation_matrix, annot=True)
plt.title('Correlation Heatmap')
plt.show()
```

```
<ipython-input-370-ceaf52d99663>:2: FutureWarning: The default value of
numeric_only in DataFrame.corr is deprecated. In a future version, it will
default to False. Select only valid columns or specify the value of numeric_only
to silence this warning.
  correlation_matrix = data.corr()
```

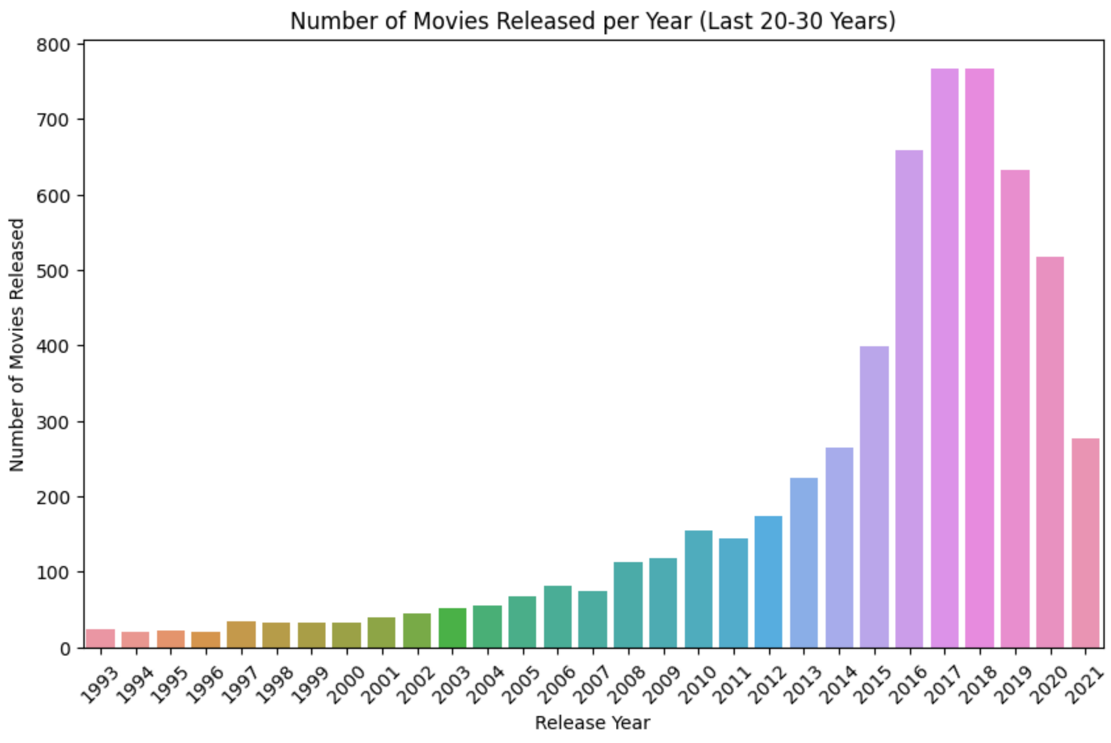


```
[371]: # Select numerical columns for the pairplot
numerical_cols = data.select_dtypes(include=['float64', 'int64'])

# Plotting the pairplot
sns.pairplot(numerical_cols)
plt.suptitle('Pairplot of Numerical Variables', fontsize=16)
plt.show()
```

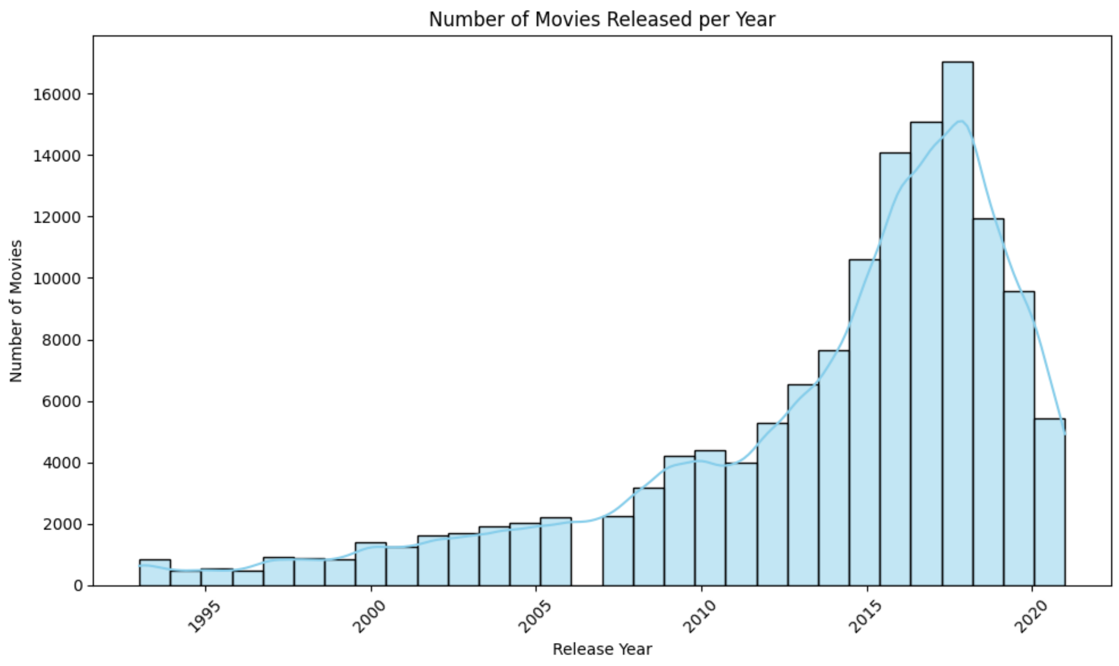


##1. **How has the number of movies released per year changed over the last 20-30 years?**

[372]:
```
movies_count_20_30_years = data.loc[(data['type'] == 'Movie') &␣
↪(data['release_year'].isin(range(1993,2024)))].
↪drop_duplicates(subset='show_id').groupby('release_year')['show_id'].
↪nunique()

plt.figure(figsize=(10, 6))
sns.barplot(x=movies_count_20_30_years.index, y=movies_count_20_30_years.values)
plt.xlabel('Release Year')
plt.ylabel('Number of Movies Released')
plt.title('Number of Movies Released per Year (Last 20-30 Years)')
plt.xticks(rotation=45)
plt.show()
```



[373]:
```
plt.figure(figsize=(10, 6))
sns.histplot(data=data.loc[(data['type'] == 'Movie') & (data['release_year'].
 ↪isin(range(1993,2024)))], x='release_year', bins=30, kde=True,␣
 ↪color='skyblue')
plt.xlabel('Release Year')
plt.ylabel('Number of Movies')
plt.title('Number of Movies Released per Year')
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```



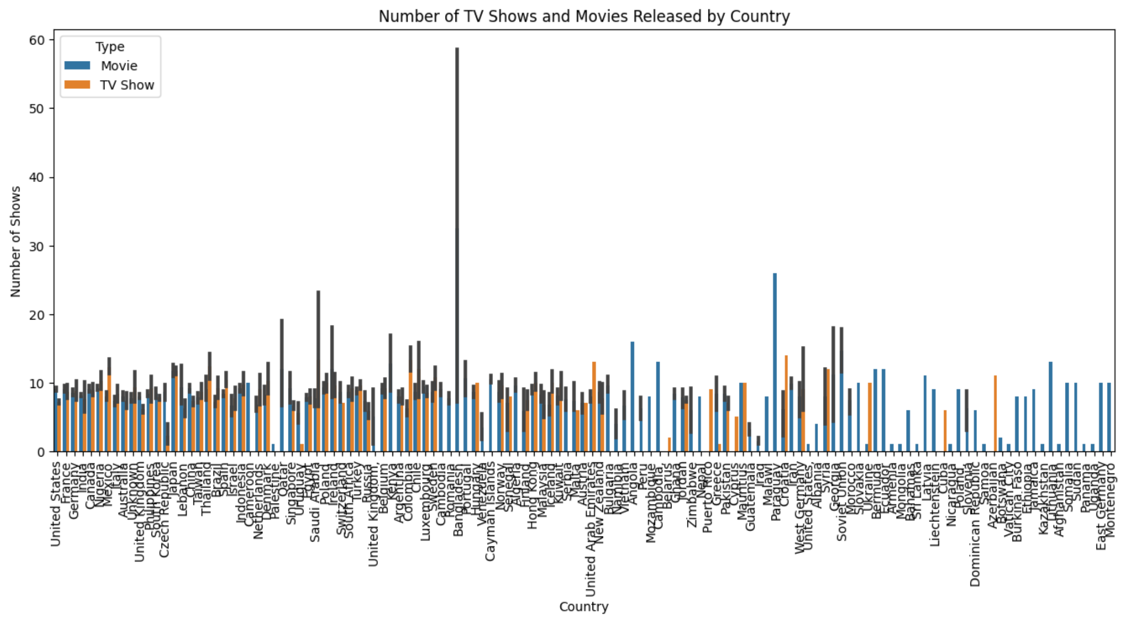
1.4.1 Insights :-

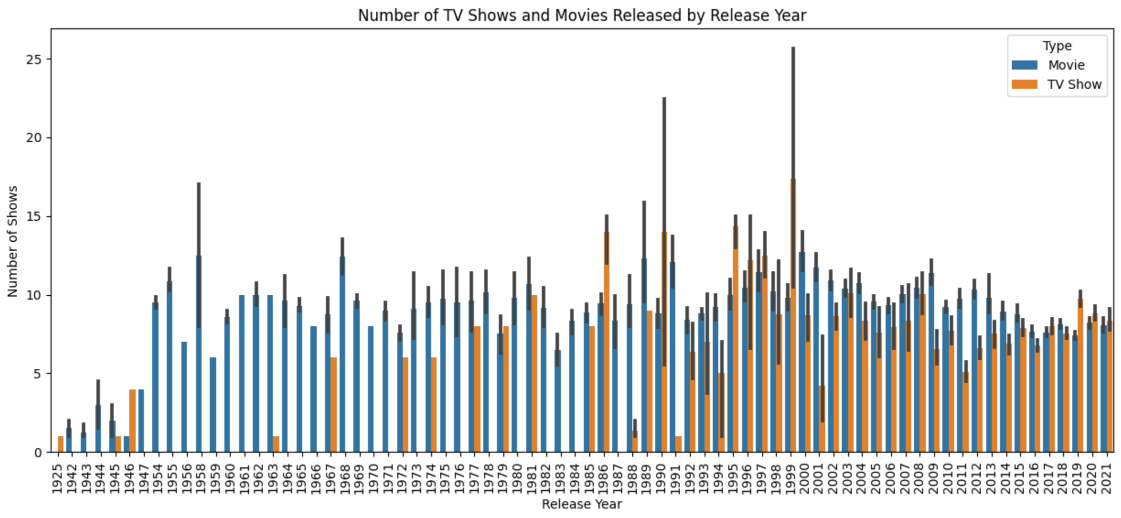
- The number of movies released per year increased exponentially over the time period from 1993 to 2018
- There was a sudden drop in the number of movies released per year from 2019 to 2021 which might be due to Covid-19

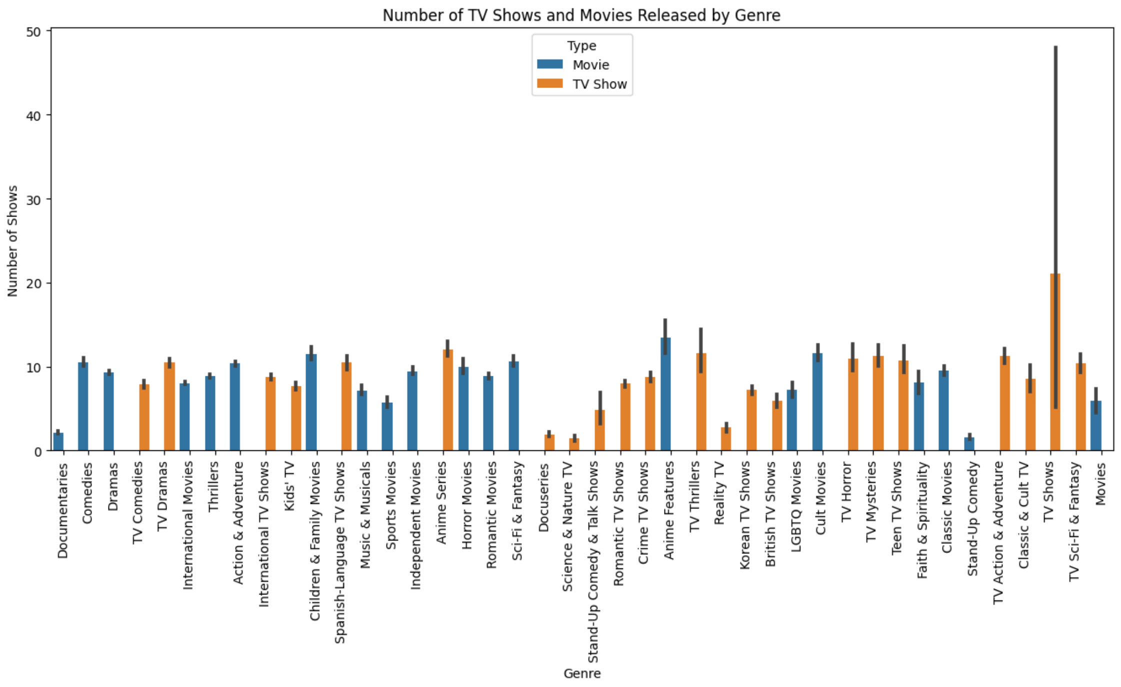
1.5 2. Comparison of tv shows vs. movies.

[374]:
```
# Group data by 'show_id', 'type', 'country', 'release_year', and 'listed_in'␣
↪and count the number of shows
grouped_data = data.groupby(['show_id', 'type', 'country', 'release_year',␣
↪'listed_in']).size().reset_index(name='count')

# Plotting by Country
plt.figure(figsize=(15, 6))
sns.barplot(x='country', y='count', hue='type', data=grouped_data)
plt.title('Number of TV Shows and Movies Released by Country')
plt.xlabel('Country')
plt.ylabel('Number of Shows')
plt.xticks(rotation=90)
plt.legend(title='Type')
plt.show()

# Plotting by Release Year
```

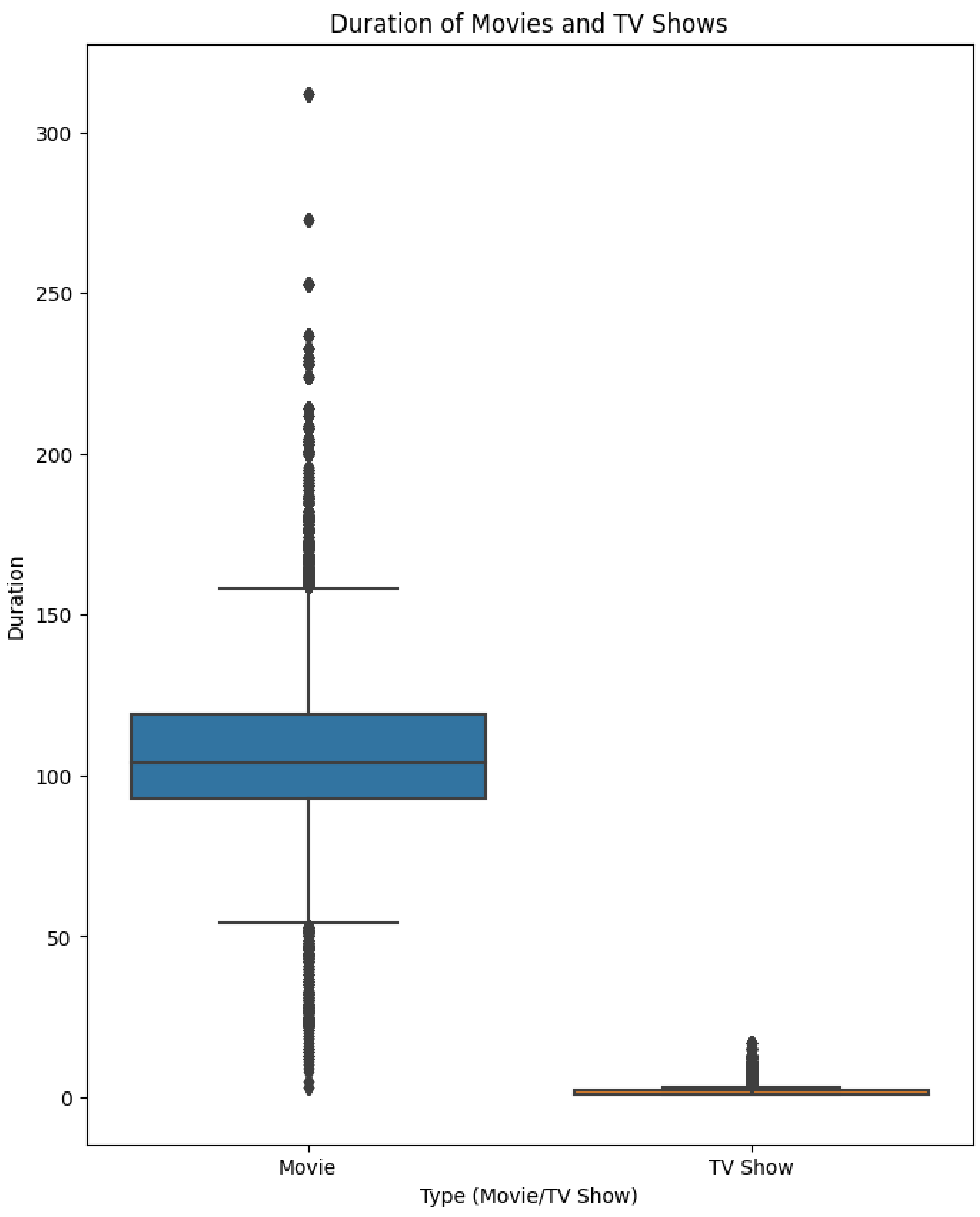
```python
plt.figure(figsize=(15, 6))
sns.barplot(x='release_year', y='count', hue='type', data=grouped_data)
plt.title('Number of TV Shows and Movies Released by Release Year')
plt.xlabel('Release Year')
plt.ylabel('Number of Shows')
plt.xticks(rotation=90)
plt.legend(title='Type')
plt.show()

# Plotting by Genre
plt.figure(figsize=(15, 6))
sns.barplot(x='listed_in', y='count', hue='type', data=grouped_data)
plt.title('Number of TV Shows and Movies Released by Genre')
plt.xlabel('Genre')
plt.ylabel('Number of Shows')
plt.xticks(rotation=90)
plt.legend(title='Type')
plt.show()
```





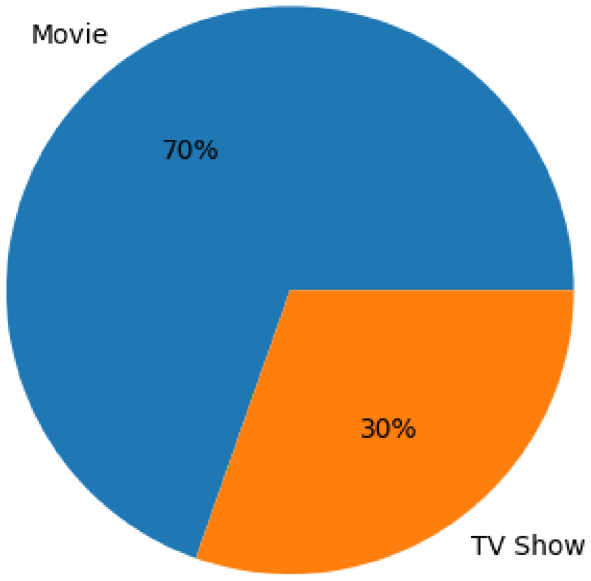


[375]:
```
# Boxplot: Comparing the duration of movies and TV shows
plt.figure(figsize=(8, 10))
sns.boxplot(x='type', y='duration', data=data)
plt.xlabel('Type (Movie/TV Show)')
plt.ylabel('Duration')
plt.title('Duration of Movies and TV Shows')
plt.show()
```



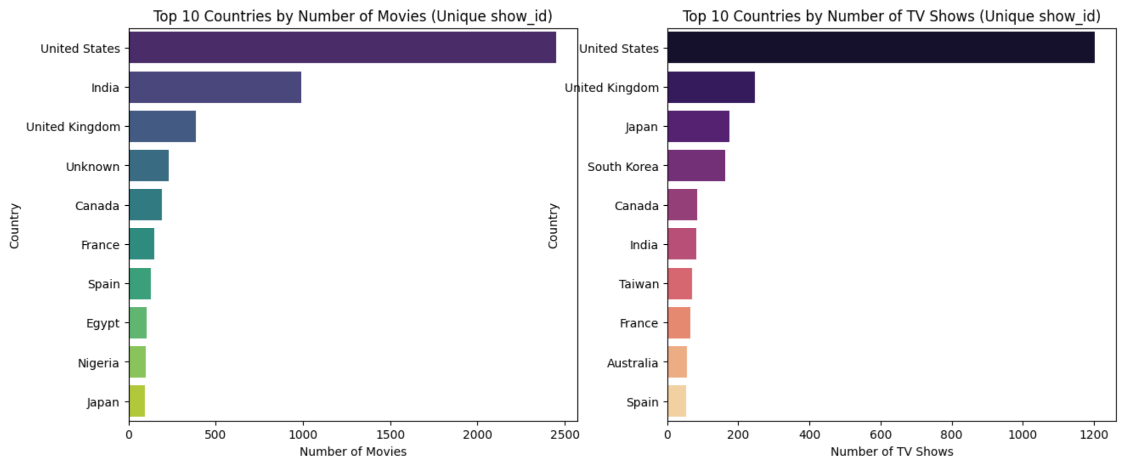
[376]:
```
type_count=data.drop_duplicates(subset='show_id').groupby('type')['show_id'].
↪nunique()
plt.pie(type_count.values,labels=type_count.index, autopct='%.0f%%')
```

[376]:
```
([<matplotlib.patches.Wedge at 0x7a5e5ce45750>,
  <matplotlib.patches.Wedge at 0x7a5e5ce46710>],
 [Text(-0.6357552620136555, 0.897672126570692, 'Movie'),
  Text(0.6357552620136554, -0.8976721265706921, 'TV Show')],
 [Text(-0.3467755974619939, 0.4896393417658319, '70%'),
  Text(0.3467755974619938, -0.48963934176583196, '30%')])
```



[377]:
```
# a. Number of movies produced in each country (Top 10)
movies_by_country = data[data['type'] == 'Movie'].
  ↪drop_duplicates(subset='show_id').groupby('country')['show_id'].count().
  ↪reset_index()
top_10_movies_countries = movies_by_country.sort_values(by='show_id',␣
  ↪ascending=False).head(10)

# b. Number of TV-Shows produced in each country (Top 10)
tv_shows_by_country = data[data['type'] == 'TV Show'].
  ↪drop_duplicates(subset='show_id').groupby('country')['show_id'].count().
  ↪reset_index()
top_10_tv_shows_countries = tv_shows_by_country.sort_values(by='show_id',␣
  ↪ascending=False).head(10)

# Plotting
plt.figure(figsize=(15, 6))
```

```
# Plotting a.
plt.subplot(1, 2, 1)
sns.barplot(x='show_id', y='country', data=top_10_movies_countries,␣
 ↪palette='viridis')
plt.title('Top 10 Countries by Number of Movies (Unique show_id)')
plt.xlabel('Number of Movies')
plt.ylabel('Country')

# Plotting b.
plt.subplot(1, 2, 2)
sns.barplot(x='show_id', y='country', data=top_10_tv_shows_countries,␣
 ↪palette='magma')
plt.title('Top 10 Countries by Number of TV Shows (Unique show_id)')
plt.xlabel('Number of TV Shows')
plt.ylabel('Country')

plt.show()
```

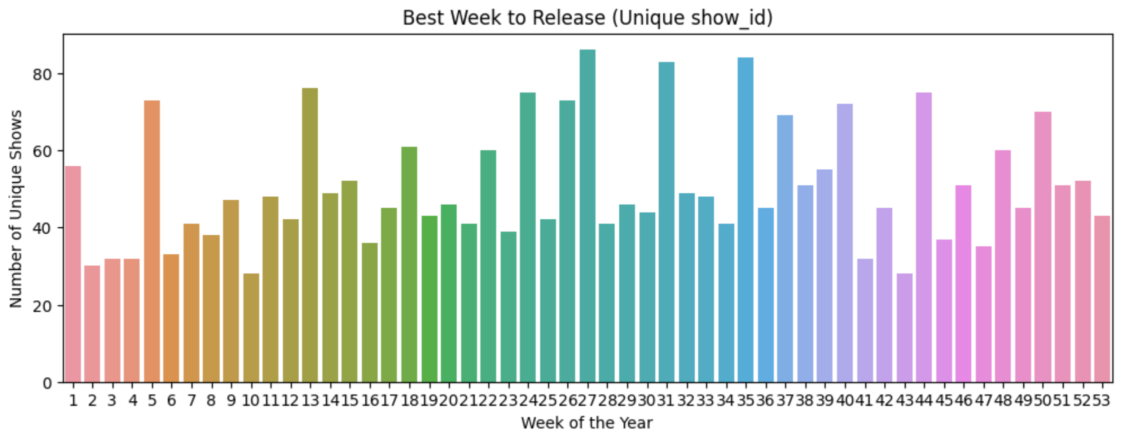


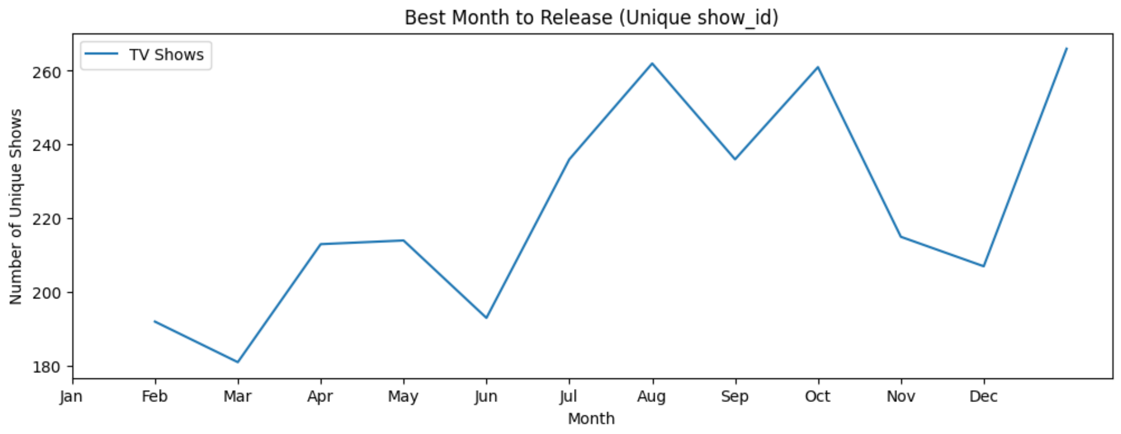
1.5.1 Insights :-

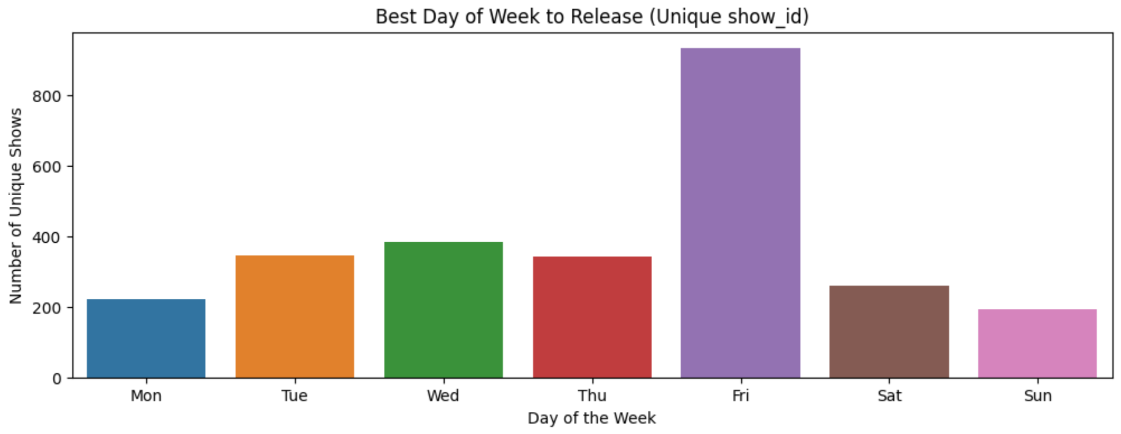
- In the overall Dataset, there are 70% of movies and only 30% are TV Shows
- Among all the countries United States has produced more number of Movies and TV Shows
- After United States, India produced more number of movies, while United Kingdom produced more number of TV Shows. The top 10 Countries wrt TV Shows and Movies are shown above
- Seeing the bar chart of Number of TV Shows and Movies released per year above, we can say that before 1990 the TV Shows shows are produced very less compared with later 1990

1.6 3. What is the best time to launch a TV show?

[378]:
```python
# Group by week for TV shows
tv_shows_by_week = data[data['type'] == 'TV Show'].
  ↪drop_duplicates(subset='show_id').groupby('week')['show_id'].nunique()

# Group by month for TV shows
tv_shows_by_month = data[data['type'] == 'TV Show'].
  ↪drop_duplicates(subset='show_id').groupby('month')['show_id'].nunique()

# Group by day of week for TV shows
tv_shows_by_day_of_week = data[data['type'] == 'TV Show'].
  ↪drop_duplicates(subset='show_id').groupby('day_of_week')['show_id'].nunique()

# Plotting
plt.figure(figsize=(12, 4))
sns.barplot(x=tv_shows_by_week.index, y=tv_shows_by_week.values, label='TV␣
  ↪Shows')
plt.title('Best Week to Release (Unique show_id)')
plt.xlabel('Week of the Year')
plt.ylabel('Number of Unique Shows')

plt.figure(figsize=(12, 4))
sns.lineplot(x=tv_shows_by_month.index, y=tv_shows_by_month.values, label='TV␣
  ↪Shows')
plt.title('Best Month to Release (Unique show_id)')
plt.xlabel('Month')
plt.ylabel('Number of Unique Shows')
plt.xticks(ticks=range(0, 12), labels=['Jan', 'Feb', 'Mar', 'Apr', 'May',␣
  ↪'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec'])

plt.figure(figsize=(12, 4))
sns.barplot(x=tv_shows_by_day_of_week.index, y=tv_shows_by_day_of_week.values,␣
  ↪label='TV Shows')
plt.title('Best Day of Week to Release (Unique show_id)')
plt.xlabel('Day of the Week')
plt.ylabel('Number of Unique Shows')
plt.xticks(ticks=range(0, 7), labels=['Mon', 'Tue', 'Wed', 'Thu', 'Fri', 'Sat',␣
  ↪'Sun'])

plt.show()
```


Best Week to Release (Unique show_id)
Number of Unique Shows
Week of the Year
0
20
40
60
80
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53


Best Month to Release (Unique show_id)
TV Shows
Number of Unique Shows
Month
180
200
220
240
260
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

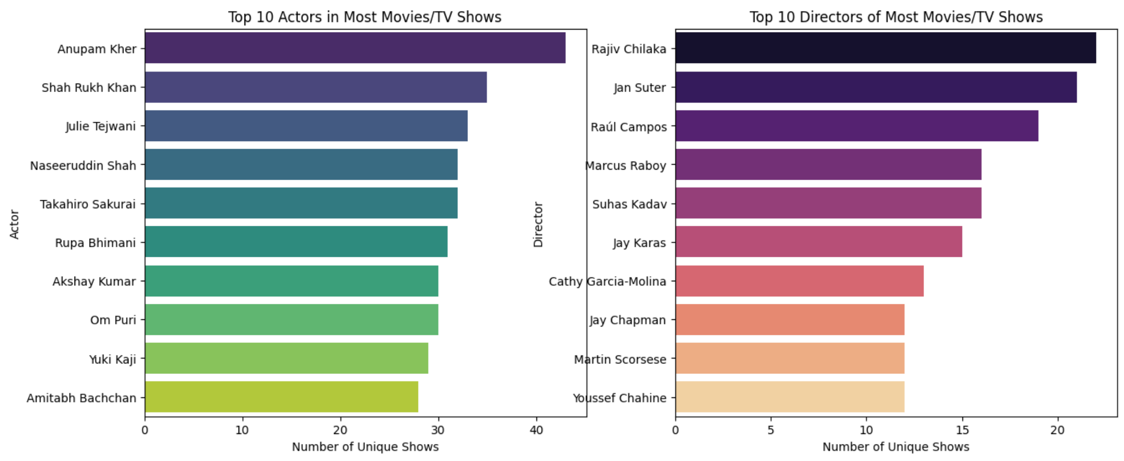

Best Day of Week to Release (Unique show_id)
Number of Unique Shows
Day of the Week
0
200
400
600
800
Mon
Tue
Wed
Thu
Fri
Sat
Sun

1.6.1 Insights :-

- Seeing the above data, we can say that Friday is the best day of the week to release a TV Show as most releases are happened on Friday
- The first quarter of the year doesn't seems like a good time to release a TV Show as most releases are happened during June-Sep and December end, which might be beacuse of Christmas eve

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

[379]:
```
# a. Identify top 10 actors who have appeared in most movies or TV shows
top_actors = data.loc[data['cast']!='unknown_cast'].
 ↪drop_duplicates(subset=['show_id', 'cast']).groupby('cast')['show_id'].
 ↪nunique().nlargest(10)

# b. Identify top 10 directors who have directed most movies or TV shows
top_directors = data.loc[data['director']!='unknown_director'].
 ↪drop_duplicates(subset=['show_id', 'director']).
 ↪groupby('director')['show_id'].nunique().nlargest(10)

# Plotting
plt.figure(figsize=(15, 6))

# Plotting a.
plt.subplot(1, 2, 1)
sns.barplot(x=top_actors.values, y=top_actors.index, palette='viridis')
plt.title('Top 10 Actors in Most Movies/TV Shows')
plt.xlabel('Number of Unique Shows')
plt.ylabel('Actor')

# Plotting b.
plt.subplot(1, 2, 2)
sns.barplot(x=top_directors.values, y=top_directors.index, palette='magma')
plt.title('Top 10 Directors of Most Movies/TV Shows')
plt.xlabel('Number of Unique Shows')
plt.ylabel('Director')

plt.show()
```

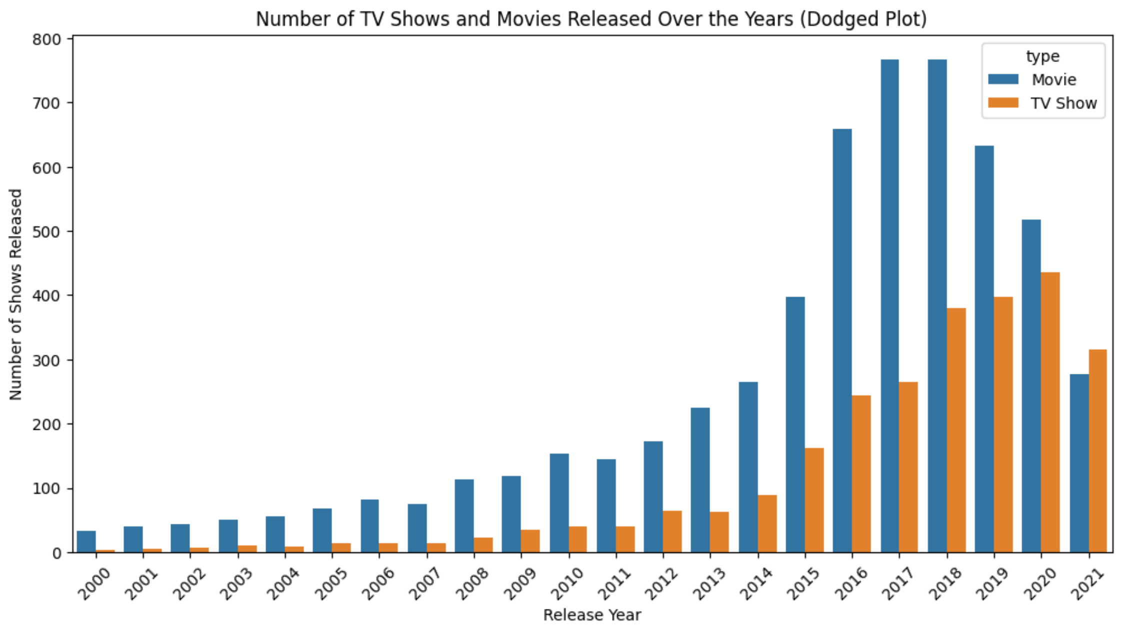


1.7.1 Insights :-

- From the above plots, Anupam Kher and SRK seems the top 2 actors with most number of shows acted
- From the above plots, Rajiv Chilaka and Jan Suter seems the top 2 directors with most number of shows directed
- Top 10 Actors and Directors from the dataset are plotted above

1.8 5. Does Netflix has more focus on TV Shows than movies in recent years

[380]:
```python
# Group by 'show_id' and 'release_year', count the number of TV shows and␣
↪movies released each year from 2000 (recent years)
shows_by_year = data.loc[data['release_year']>=2000].groupby(['show_id',␣
↪'release_year', 'type']).size().reset_index(name='count')

# Plotting the dodged bar plot
plt.figure(figsize=(12, 6))
sns.countplot(data=shows_by_year, x='release_year', hue='type', dodge=True)
plt.xlabel('Release Year')
plt.ylabel('Number of Shows Released')
plt.title('Number of TV Shows and Movies Released Over the Years (Dodged Plot)')
plt.xticks(rotation=45)
plt.show()
```



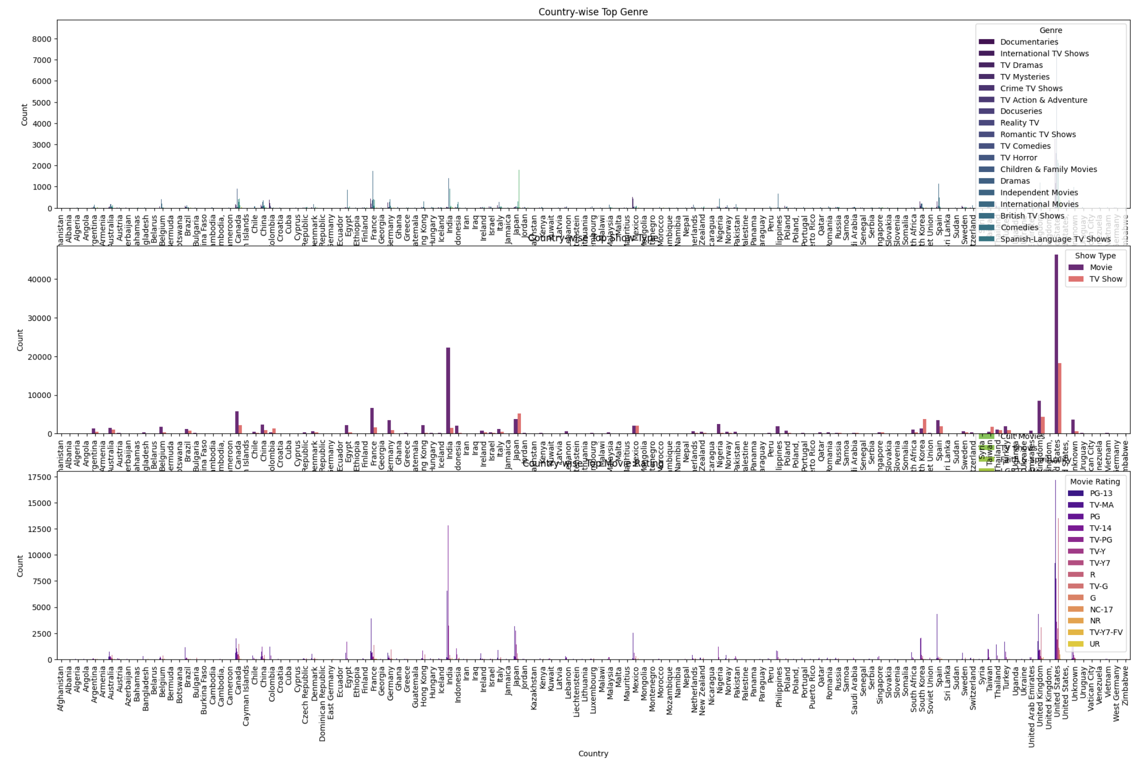
1.8.1 Insights :-

- Till the year 2020, the number of Movies produced are higher than the number of TV Shows. Also the rate of production/release of TV Shows gradually increased over the years from 2000 to 2021
- In the year 2021, the number of TV Shows produced surpassed the no. of Movies made.
- Since the data is limited till 2021, we cannot surely tell whether Netflix has focussed more on TV Shows than movies. But surely, we can tell the the content has been exponentially increased over the years

1.9 6. Understanding what content is available in different countries

[381]:
```
# Country-wise top genre (Top 1 genre for each country)
top_genre_by_country = data.drop_duplicates(subset=['show_id', 'country',␣
 ↪'listed_in']).groupby('country')['listed_in'].apply(lambda x: x.
 ↪value_counts().idxmax())

# Country-wise top show type (TV Show/Movie)
top_show_type_by_country = data.drop_duplicates(subset=['show_id', 'country',␣
 ↪'type']).groupby('country')['type'].apply(lambda x: x.value_counts().
 ↪idxmax())

# Country-wise top movie rating
top_rating_by_country = data.drop_duplicates(subset=['show_id', 'country',␣
 ↪'rating']).groupby('country')['rating'].apply(lambda x: x.value_counts().
 ↪idxmax())
```

```python
# Plotting
plt.figure(figsize=(25, 15))

# Plotting 1: Country-wise top genre
plt.subplot(3, 1, 1)
sns.countplot(data=data, x='country', hue='listed_in',␣
 ↪order=top_genre_by_country.index, palette='viridis')
plt.ylabel('Count')
plt.xlabel('Country')
plt.title('Country-wise Top Genre')
plt.legend(title='Genre', loc='upper right')
plt.xticks(rotation=90)

# Plotting 2: Country-wise top show type
plt.subplot(3, 1, 2)
sns.countplot(data=data, x='country', hue='type',␣
 ↪order=top_show_type_by_country.index, palette='magma')
plt.ylabel('Count')
plt.xlabel('Country')
plt.title('Country-wise Top Show Type')
plt.legend(title='Show Type', loc='upper right')
plt.xticks(rotation=90)

# Plotting 3: Country-wise top movie rating
plt.subplot(3, 1, 3)
sns.countplot(data=data, x='country', hue='rating', order=top_rating_by_country.
 ↪index, palette='plasma')
plt.ylabel('Count')
plt.xlabel('Country')
plt.title('Country-wise Top Movie Rating')
plt.legend(title='Movie Rating', loc='upper right')
plt.xticks(rotation=90)

plt.show()
```



```
[382]: pd.DataFrame({"country": top_genre_by_country.index,"top_genre":␣
        ↪top_genre_by_country.values})
```

```
[382]:           country              top_genre
       0     Afghanistan          Documentaries
       1         Albania                 Dramas
       2         Algeria                 Dramas
       3          Angola    Action & Adventure
       4       Argentina  International Movies
       ..            …                     …
       122  Vatican City          Documentaries
       123     Venezuela  International Movies
       124       Vietnam  International Movies
       125  West Germany  International Movies
       126      Zimbabwe  International Movies

       [127 rows x 2 columns]
```

```
[383]: pd.DataFrame({"country": top_show_type_by_country.index,"top_show_type":␣
        ↪top_show_type_by_country.values})
```

```
[383]:           country top_show_type
       0     Afghanistan         Movie
```

```
1          Albania         Movie
2          Algeria         Movie
3           Angola         Movie
4        Argentina         Movie
..             …           …
122   Vatican City         Movie
123      Venezuela         Movie
124        Vietnam         Movie
125   West Germany         Movie
126       Zimbabwe         Movie

[127 rows x 2 columns]
```

[384]:
```
pd.DataFrame({"country": top_rating_by_country.index,"max_rating_shows":␣
↪top_rating_by_country.values})
```

[384]:
```
           country max_rating_shows
0      Afghanistan            TV-MA
1          Albania            TV-MA
2          Algeria            TV-MA
3           Angola            TV-MA
4        Argentina            TV-MA
..             …              …
122   Vatican City               PG
123      Venezuela            TV-14
124        Vietnam            TV-14
125   West Germany            TV-MA
126       Zimbabwe             TV-G

[127 rows x 2 columns]
```

1.9.1 Insights :-

- The above data shows the best/top genre,show type,rating with respect to individual country

##**Overall Insights & Recommendations**

- The given data is in between year 1925 and 2021
- During Data clean, columns - country, cast, director, listed_in found to be nested and so unnested. Also found some inconsistent data where for few rows, duration values are shifted to rating column. Most of the columns which are improper data type format are converted to proper data format. Ex : date_added to date format. Duration to float etc. Empty/NA values are found in most of the columns and are replaced with proper data like Mean, Mode etc.
- In the given data, 70% of the shows are Movies and 30% are TV Shows
- The below mentioned are the top 5 Genres among which the shows are distributed : International Movies, Dramas, Comedies, International TV Shows, Documentaries

- United States and India are top 2 countries to produce the most shows
- Anupam Kher and SRK are the top 2 actors with most number of shows acted
- Rajiv Chilaka and Jan Suter are the top 2 directors with most number of shows directed
- 106 Minutes is the mean duration of Movie Shows from the given dataset
- 2 Seasons is the mean duration of TV Shows from the given dataset
- The year 2018 has the most number of releases
- Most TV Shows are released on Fridays
- Most shows are rated with rating TV-MA
- Create diverse content in popular genres, emphasizing international shows and movies to attract a broader audience.
- Collaborate with renowned actors and directors for exclusive, high-quality productions
- Schedule new releases on Fridays to maximize viewership during the weekend.
- Utilize data analysis to guide content decisions, focusing on trends, viewer preferences, and personalized recommendations