```python
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

df = pd.read_csv("netflix_2_project.csv")
df
```

```
     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  
...      ...      ...                    ...              ...  
8802   s8803    Movie                 Zodiac    David Fincher  
8803   s8804  TV Show            Zombie Dumb              NaN  
8804   s8805    Movie             Zombieland  Ruben Fleischer  
8805   s8806    Movie                   Zoom     Peter Hewitt  
8806   s8807    Movie                 Zubaan      Mozez Singh  

                                                   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   

...                                                 ...            ...   

8802  Mark Ruffalo, Jake Gyllenhaal, Robert Downey J...  United States   

8803                                                NaN            NaN   

8804  Jesse Eisenberg, Woody Harrelson, Emma Stone, ...  United States   

8805  Tim Allen, Courteney Cox, Chevy Chase, Kate Ma...  United States   

8806  Vicky Kaushal, Sarah-Jane Dias, Raaghav Chanan...          India   


     date_added  release_year rating   duration  \
0     25-Sep-21          2020  PG-13     90 min  
1     24-Sep-21          2021  TV-MA  2 Seasons  
2     24-Sep-21          2021  TV-MA   1 Season  
3     24-Sep-21          2021  TV-MA   1 Season  
```

```
4     24-Sep-21          2021  TV-MA  2 Seasons
...         ...           ...    ...        ...
8802  20-Nov-19          2007      R    158 min
8803   1-Jul-19          2018  TV-Y7  2 Seasons
8804   1-Nov-19          2009      R     88 min
8805  11-Jan-20          2006     PG     88 min
8806   2-Mar-19          2015  TV-14    111 min

                                              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 ...
...                                                 ...
8802                     Cult Movies, Dramas, Thrillers
8803             Kids' TV, Korean TV Shows, TV Comedies
8804                            Comedies, Horror Movies
8805                  Children & Family Movies, Comedies
8806     Dramas, International Movies, Music & Musicals

                                            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...
...                                                 ...
8802  A political cartoonist, a crime reporter and a...
8803  While living alone in a spooky town, a young g...
8804  Looking to survive in a world taken over by zo...
8805  Dragged from civilian life, a former superhero...
8806  A scrappy but poor boy worms his way into a ty...

[8807 rows x 12 columns]
```

#Comments on the Range of Attributes: In our dataset, we have a diverse range of attributes, each providing different types of information about the movies and TV shows. Below, we describe the key attributes present in our dataset:

1. Title: This attribute represents the title or name of each movie or TV show. It serves as a unique identifier for each entry and is crucial for reference.

2. Type: This categorical attribute indicates whether the entry is a "Movie" or "TV Show." It helps us distinguish between different types of content.

3. Director: This categorical attribute contains the names of the directors responsible for the production of movies or TV shows. It allows us to analyze directorial patterns and identify top directors.

4. Cast: Similar to the director attribute, "Cast" is a categorical attribute that lists the names of actors and actresses involved in the production. It helps us understand the popularity and appearances of actors.

5. Release Year: This numerical attribute represents the year when the movie or TV show was released. It enables us to analyze temporal trends and patterns over time.

6. Country: This categorical attribute specifies the country or countries associated with the production of each entry. It allows us to explore geographic trends and preferences.

7. Date Added: This attribute records the date when the content was added to the Netflix platform. It helps us understand when movies or TV shows became available for streaming.

8. Rating: This categorical attribute indicates the content rating assigned to each entry, such as "TV-MA," "PG-13," etc. It helps viewers make informed choices based on content appropriateness.

9. Duration: This attribute specifies the duration or runtime of each movie or TV show in terms of minutes or seasons/episodes.

10. Listed In: This categorical attribute categorizes entries into genres, themes, or content types. It assists in content recommendation and categorization.

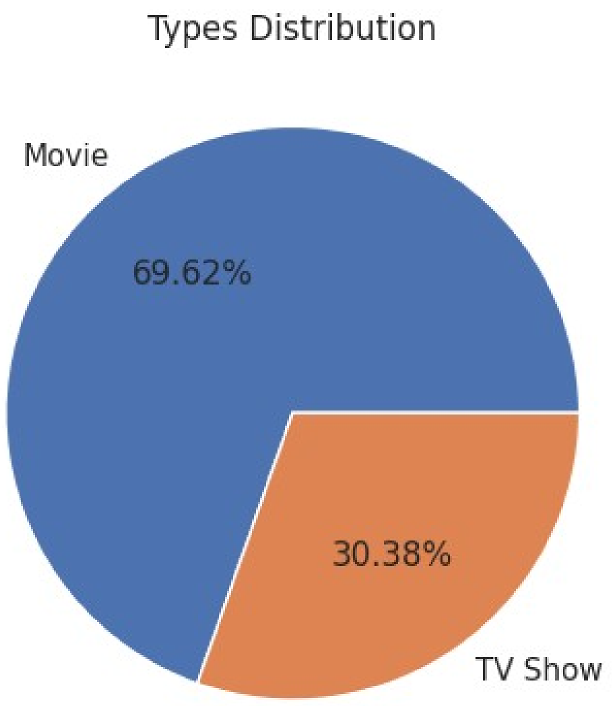
The range of attributes in our dataset provides a rich source of information, allowing us to perform various analyses, such as exploring trends in release years, identifying popular directors and actors, and understanding the distribution of content across countries and genres.

Basic Analysis

```python
# Calculate the counts of each type
type_counts = df['type'].value_counts(normalize=True)*100
type_counts
```

```
Movie      69.615079
TV Show    30.384921
Name: type, dtype: float64
```

```python
# Create a pie chart
plt.pie(type_counts, labels=type_counts.index, autopct="%.2f%%")
plt.title('Types Distribution')

# Show the pie chart
plt.show()
```



```
# Gives the overall information of all the columns
df.info()

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

df.shape

(8807, 12)
```

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

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

Statistical Summary

```
# This function provides summary statistics (count, mean, std, min,
25%, 50%, 75%, max)
# for numerical columns in the DataFrame, allowing us to understand
the central tendency,
# spread, and distribution of the data.
descriptive_stats = df.describe()

descriptive_stats
```

```
       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
```

```
# This command provides information about categorical data, including
count, unique categories,
# the most frequent category, and its frequency, for each categorical
column in the DataFrame.

# The .T attribute transposes the output for better readability.

categorical_stats = df.describe(include='object').T

categorical_stats
```

```
            count unique
top  \
show_id      8807   8807
s1
type         8807      2
Movie
title        8807   8804
15-Aug
director     6173   4528                                      Rajiv
Chilaka
cast         7982   7692                                 David
Attenborough
country      7976    748                                      United
States
date_added   8797   1767                                           1-
Jan-20
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           2
director       19
cast           19
country      2818
date_added    109
rating       3207
duration     1793
listed_in     362
description     4
```

Data Cleaning

Handling null values

a. For categorical variables with null values, update those rows as unknown_column_name. Example : Replace missing value with Unknown Actor for missing value in Actors column.

b. Replace with 0 for continuous variables having null values.

```python
# Replace NaN values in the 'cast' column with 'Unknown_Actor'
df['cast'].fillna('Unknown_Actor', inplace=True)
df.head()
```

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

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

  date_added  release_year rating   duration  \
0  25-Sep-21          2020  PG-13     90 min
1  24-Sep-21          2021  TV-MA  2 Seasons
2  24-Sep-21          2021  TV-MA   1 Season
3  24-Sep-21          2021  TV-MA   1 Season
4  24-Sep-21          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...
```

```python
# Replace NaN values in the 'director' column with 'Unknown_Director'
df['director'].fillna('Unknown_Director', inplace=True)
df.head()
```

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

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

  date_added  release_year rating   duration  \
0  25-Sep-21          2020  PG-13     90 min   
1  24-Sep-21          2021  TV-MA  2 Seasons   
2  24-Sep-21          2021  TV-MA   1 Season   
3  24-Sep-21          2021  TV-MA   1 Season   
4  24-Sep-21          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...  
```

```python
# Replace NaN values in the 'country' column with 'Unknown_Country'
df['country'].fillna('Unknown_Country', inplace=True)
df.head()
```

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

                                                cast          country
\
0                                      Unknown_Actor    United States

1  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...     South Africa

2  Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...  Unknown_Country

3                                      Unknown_Actor  Unknown_Country

4  Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...            India
```

```
  date_added  release_year rating   duration  \
0  25-Sep-21          2020  PG-13     90 min
1  24-Sep-21          2021  TV-MA  2 Seasons
2  24-Sep-21          2021  TV-MA   1 Season
3  24-Sep-21          2021  TV-MA   1 Season
4  24-Sep-21          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...
```

```python
# Remove leading spaces from the 'date_added' column and replace null
values with a default value
default_value = 'No Date'  # Replace null values with this value
df['date_added'] = df['date_added'].str.strip().fillna(default_value)

# Convert the 'date_added' column to datetime
df['date_added'] = pd.to_datetime(df['date_added'], errors='coerce')
df.head()
```

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

                                                cast          country
\
0                                      Unknown_Actor    United States

1  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...     South Africa

2  Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...  Unknown_Country

3                                      Unknown_Actor  Unknown_Country

4  Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...            India
```

```
  date_added  release_year rating   duration  \
0 2021-09-25          2020  PG-13     90 min
1 2021-09-24          2021  TV-MA  2 Seasons
2 2021-09-24          2021  TV-MA   1 Season
3 2021-09-24          2021  TV-MA   1 Season
4 2021-09-24          2021  TV-MA  2 Seasons

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

                                         description
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...
```

```
# Replace NaN values in the 'rating' column with a default value
default_value = 'Not Rated'  # Replace NaN values with this value
df['rating'] = df['rating'].fillna(default_value)
df.head()
```

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

                                                cast          country
\
0                                      Unknown_Actor    United States

1  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...     South Africa

2  Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...  Unknown_Country

3                                      Unknown_Actor  Unknown_Country

4  Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...            India


  date_added  release_year rating   duration  \
0 2021-09-25          2020  PG-13     90 min
1 2021-09-24          2021  TV-MA  2 Seasons
2 2021-09-24          2021  TV-MA   1 Season
3 2021-09-24          2021  TV-MA   1 Season
```

```
4 2021-09-24          2021  TV-MA  2 Seasons

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

                                         description  
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...  

# Replace NaN values in the 'duration' column with a default value
default_value = 'Not Available'  # Replace NaN values with this value
df['duration'] = df['duration'].fillna(default_value)
df.head()

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

                                                cast          country  
\
0                                      Unknown_Actor    United States   

1  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...     South Africa   

2  Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...  Unknown_Country   

3                                      Unknown_Actor  Unknown_Country   

4  Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...            India   


  date_added  release_year rating   duration  \
0 2021-09-25          2020  PG-13     90 min   
1 2021-09-24          2021  TV-MA  2 Seasons   
2 2021-09-24          2021  TV-MA   1 Season   
3 2021-09-24          2021  TV-MA   1 Season   
4 2021-09-24          2021  TV-MA  2 Seasons   

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

```
2  Crime TV Shows, International TV Shows, TV Act...
3                             Docuseries, Reality TV
4  International TV Shows, Romantic TV Shows, TV ...

                                         description
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...
```

Unnest the columns

a. Un-nest the columns those have cells with multiple comma separated values by creating multiple rows

```
# Step 1: Create a DataFrame 'df_new' from the 'cast' column of
DataFrame 'df'
constraint = df['cast'].apply(lambda x: str(x).split(', ')).tolist()
# Split the 'cast' column by ', ' and convert to a list
df_new = pd.DataFrame(constraint, index=df['title'])  # Create a
DataFrame with the split values, using 'title' as the index

# Step 2: Stack the DataFrame to transform it from wide to long format
df_new = df_new.stack()  # Stack the DataFrame, turning columns into a
multi-index

# Step 3: Convert the stacked DataFrame to a regular DataFrame and
reset the index
df_new = pd.DataFrame(df_new)  # Convert the stacked DataFrame to a
regular DataFrame
df_new.reset_index(inplace=True)  # Reset the index to numeric values

# Step 4: Select and rename columns to have 'title' and 'cast' columns
df_new = df_new[['title', 0]]  # Select only the 'title' and the
stacked 'cast' column
df_new.columns = ['title', 'cast']  # Rename the columns to 'title'
and 'cast'

# Display the final DataFrame 'df_new'
df_new.head()

                  title            cast
0  Dick Johnson Is Dead   Unknown_Actor
1         Blood & Water      Ama Qamata
2         Blood & Water     Khosi Ngema
3         Blood & Water   Gail Mabalane
4         Blood & Water  Thabang Molaba
```

```
# Step 1: Create a DataFrame 'df_new_2' from the 'director' column of
DataFrame 'df'
constraint_2 = df['director'].apply(lambda x: str(x).split(',
')).tolist()  # Split the 'director' column by ', ' and convert to a
list
df_new_2 = pd.DataFrame(constraint_2, index=df['title'])  # Create a
DataFrame with the split values, using 'title' as the index

# Step 2: Stack the DataFrame to transform it from wide to long format
df_new_2 = df_new_2.stack()  # Stack the DataFrame, turning columns
into a multi-index

# Step 3: Convert the stacked DataFrame to a regular DataFrame and
reset the index
df_new_2 = pd.DataFrame(df_new_2)  # Convert the stacked DataFrame to
a regular DataFrame
df_new_2.reset_index(inplace=True)  # Reset the index to numeric
values

# Step 4: Select and rename columns to have 'title' and 'director'
columns
df_new_2 = df_new_2[['title', 0]]  # Select only the 'title' and the
stacked 'director' column
df_new_2.columns = ['title', 'director']  # Rename the columns to
'title' and 'director'

# Display the final DataFrame 'df_new_2'
df_new_2.head()
```

```
                   title          director
0   Dick Johnson Is Dead   Kirsten Johnson
1          Blood & Water  Unknown_Director
2              Ganglands   Julien Leclercq
3  Jailbirds New Orleans  Unknown_Director
4           Kota Factory  Unknown_Director
```

```
# Step 1: Create a DataFrame 'df_new_3' from the 'country' column of
DataFrame 'df'
constraint_3 = df['country'].apply(lambda x: str(x).split(',
')).tolist()  # Split the 'country' column by ', ' and convert to a
list
df_new_3 = pd.DataFrame(constraint_3, index=df['title'])  # Create a
DataFrame with the split values, using 'title' as the index

# Step 2: Stack the DataFrame to transform it from wide to long format
df_new_3 = df_new_3.stack()  # Stack the DataFrame, turning columns
into a multi-index

# Step 3: Convert the stacked DataFrame to a regular DataFrame and
reset the index
```

```
df_new_3 = pd.DataFrame(df_new_3)  # Convert the stacked DataFrame to a regular DataFrame
df_new_3.reset_index(inplace=True)  # Reset the index to numeric values

# Step 4: Select and rename columns to have 'title' and 'country' columns
df_new_3 = df_new_3[['title', 0]]  # Select only the 'title' and the stacked 'country' column
df_new_3.columns = ['title', 'country']  # Rename the columns to 'title' and 'country'

# Display the final DataFrame 'df_new_3'
df_new_3.head()
```

```
                   title          country
0   Dick Johnson Is Dead    United States
1          Blood & Water     South Africa
2              Ganglands  Unknown_Country
3  Jailbirds New Orleans  Unknown_Country
4           Kota Factory            India
```

```
# Step 1: Create a DataFrame 'df_new_4' from the 'listed_in' column of DataFrame 'df'
constraint_4 = df['listed_in'].apply(lambda x: str(x).split(', ')).tolist()  # Split the 'listed_in' column by ', ' and convert to a list
df_new_4 = pd.DataFrame(constraint_4, index=df['title'])  # Create a DataFrame with the split values, using 'title' as the index

# Step 2: Stack the DataFrame to transform it from wide to long format
df_new_4 = df_new_4.stack()  # Stack the DataFrame, turning columns into a multi-index

# Step 3: Convert the stacked DataFrame to a regular DataFrame and reset the index
df_new_4 = pd.DataFrame(df_new_4)  # Convert the stacked DataFrame to a regular DataFrame
df_new_4.reset_index(inplace=True)  # Reset the index to numeric values

# Step 4: Select and rename columns to have 'title' and 'listed_in' columns
df_new_4 = df_new_4[['title', 0]]  # Select only the 'title' and the stacked 'listed_in' column
df_new_4.columns = ['title', 'listed_in']  # Rename the columns to 'title' and 'listed_in'

# Display the final DataFrame 'df_new_4'
df_new_4.head()
```

```
                  title               listed_in
0  Dick Johnson Is Dead           Documentaries
1         Blood & Water  International TV Shows
2         Blood & Water               TV Dramas
3         Blood & Water            TV Mysteries
4             Ganglands          Crime TV Shows
```

Merge nested columns

```
# Step 1: Merge df_new_4 with df_new_3 based on the 'title' column
merge_df_3_4 = df_new_3.merge(df_new_4, on='title')

# Step 2: Merge df_new_2 with the result of step 1 based on the
'title' column
merge_df_2_3_4 = df_new_2.merge(merge_df_3_4, on='title')

# Step 3: Merge df_new with the result of step 2 based on the 'title'
column
merge1 = df_new.merge(merge_df_2_3_4, on='title')

# Step 4: Merge the original DataFrame df with the result of step 3
based on the 'title' column
data = df.merge(merge1, on='title')

# Display the final merged DataFrame 'data'
data.head()
```

```
  show_id     type                 title        director_x  \
0      s1    Movie  Dick Johnson Is Dead   Kirsten Johnson
1      s2  TV Show         Blood & Water  Unknown_Director
2      s2  TV Show         Blood & Water  Unknown_Director
3      s2  TV Show         Blood & Water  Unknown_Director
4      s2  TV Show         Blood & Water  Unknown_Director

                                              cast_x      country_x  \
0                                      Unknown_Actor  United States
1  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...   South Africa
2  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...   South Africa
3  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...   South Africa
4  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...   South Africa

  date_added  release_year rating   duration  \
0 2021-09-25          2020  PG-13     90 min
1 2021-09-24          2021  TV-MA  2 Seasons
2 2021-09-24          2021  TV-MA  2 Seasons
3 2021-09-24          2021  TV-MA  2 Seasons
4 2021-09-24          2021  TV-MA  2 Seasons
```

```
                                       listed_in_x  \
0                                    Documentaries   
1  International TV Shows, TV Dramas, TV Mysteries   
2  International TV Shows, TV Dramas, TV Mysteries   
3  International TV Shows, TV Dramas, TV Mysteries   
4  International TV Shows, TV Dramas, TV Mysteries   

                                         description         cast_y  \
0  As her father nears the end of his life, filmm...  Unknown_Actor   
1  After crossing paths at a party, a Cape Town t...     Ama Qamata   
2  After crossing paths at a party, a Cape Town t...     Ama Qamata   
3  After crossing paths at a party, a Cape Town t...     Ama Qamata   
4  After crossing paths at a party, a Cape Town t...    Khosi Ngema   

         director_y      country_y             listed_in_y  
0   Kirsten Johnson  United States           Documentaries  
1  Unknown_Director   South Africa  International TV Shows  
2  Unknown_Director   South Africa               TV Dramas  
3  Unknown_Director   South Africa             TV Mysteries  
4  Unknown_Director   South Africa  International TV Shows  
```

Dropping the duplicate columns

Approach 1

```
# Drop one or more columns by specifying their names in a list
data.drop(columns=['director_x','cast_x','country_x','listed_in_x'],
inplace=True)
data.head()
```

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

    duration                                        description  \
0     90 min  As her father nears the end of his life, filmm...   
1  2 Seasons  After crossing paths at a party, a Cape Town t...   
2  2 Seasons  After crossing paths at a party, a Cape Town t...   
3  2 Seasons  After crossing paths at a party, a Cape Town t...   
```

```
4  2 Seasons  After crossing paths at a party, a Cape Town t...

          cast_y        director_y      country_y  
listed_in_y
0  Unknown_Actor   Kirsten Johnson  United States  
Documentaries
1     Ama Qamata  Unknown_Director   South Africa  International TV 
Shows
2     Ama Qamata  Unknown_Director   South Africa               TV 
Dramas
3     Ama Qamata  Unknown_Director   South Africa            TV 
Mysteries
4    Khosi Ngema  Unknown_Director   South Africa  International TV 
Shows
```

Rename the columns

```
rename_column = {
    'cast_y': 'cast',
    'director_y': 'director',
    'country_y': 'country',
    'listed_in_y': 'listed_in'
}

# Use the rename() method to rename multiple columns
data.rename(columns=rename_column, inplace=True)

data.head()

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

    duration                                        description  \
0     90 min  As her father nears the end of his life, filmm...
1  2 Seasons  After crossing paths at a party, a Cape Town t...
2  2 Seasons  After crossing paths at a party, a Cape Town t...
3  2 Seasons  After crossing paths at a party, a Cape Town t...
4  2 Seasons  After crossing paths at a party, a Cape Town t...
```

```
            cast          director        country
listed_in
0  Unknown_Actor   Kirsten Johnson  United States
Documentaries
1     Ama Qamata  Unknown_Director   South Africa  International TV
Shows
2     Ama Qamata  Unknown_Director   South Africa                TV
Dramas
3     Ama Qamata  Unknown_Director   South Africa             TV
Mysteries
4    Khosi Ngema  Unknown_Director   South Africa  International TV
Shows
```

```
data['release_year'] = data['release_year'].astype(str)
data.head()
```

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

    duration                                        description  \
0     90 min  As her father nears the end of his life, filmm...
1  2 Seasons  After crossing paths at a party, a Cape Town t...
2  2 Seasons  After crossing paths at a party, a Cape Town t...
3  2 Seasons  After crossing paths at a party, a Cape Town t...
4  2 Seasons  After crossing paths at a party, a Cape Town t...

            cast          director        country
listed_in
0  Unknown_Actor   Kirsten Johnson  United States
Documentaries
1     Ama Qamata  Unknown_Director   South Africa  International TV
Shows
2     Ama Qamata  Unknown_Director   South Africa                TV
Dramas
3     Ama Qamata  Unknown_Director   South Africa             TV
Mysteries
4    Khosi Ngema  Unknown_Director   South Africa  International TV
Shows
```

```
data['date_added'] = pd.to_datetime(data['date_added'])
data.head(2)

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

    duration                                        description  \
0     90 min  As her father nears the end of his life, filmm...
1  2 Seasons  After crossing paths at a party, a Cape Town t...

            cast          director        country
listed_in
0  Unknown_Actor   Kirsten Johnson  United States
Documentaries
1      Ama Qamata  Unknown_Director   South Africa  International TV
Shows

data.info()

<class 'pandas.core.frame.DataFrame'>
Int64Index: 204571 entries, 0 to 204570
Data columns (total 12 columns):
 #   Column         Non-Null Count   Dtype
---  ------         --------------   -----
 0   show_id        204571 non-null  object
 1   type           204571 non-null  object
 2   title          204571 non-null  object
 3   date_added     204413 non-null  datetime64[ns]
 4   release_year   204571 non-null  object
 5   rating         204571 non-null  object
 6   duration       204571 non-null  object
 7   description    204571 non-null  object
 8   cast           204571 non-null  object
 9   director       204571 non-null  object
 10  country        204571 non-null  object
 11  listed_in      204571 non-null  object
dtypes: datetime64[ns](1), object(11)
memory usage: 20.3+ MB
```

#1 : Find the counts of each categorical variable both using graphical and non-graphical analysis.

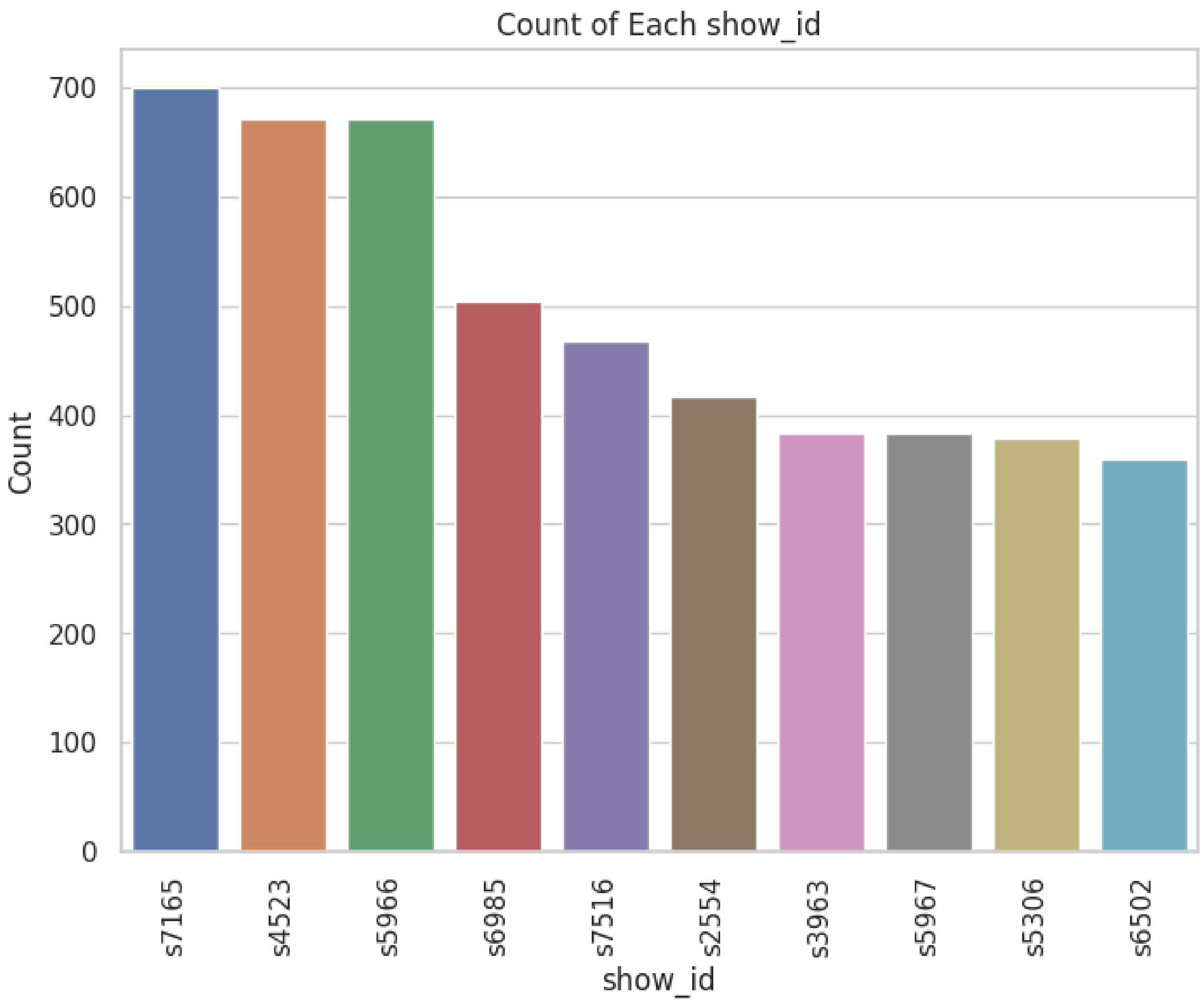
Non graphical analysis

```
# Get the count of each value in the 'show_id' column
show_id_counts = data['show_id'].value_counts()
show_id_counts.head(10)
```

```
s7165    700
s4523    672
s5966    672
s6985    504
s7516    468
s2554    416
s3963    384
s5967    384
s5306    378
s6502    360
Name: show_id, dtype: int64
```

Graphical Analysis

```
# Create a count plot

# Set the style with gridlines
sns.set(style="whitegrid")

plt.figure(figsize=(8, 6))
sns.countplot(data=data, x='show_id', order =
show_id_counts.head(10).index)
plt.xticks(rotation=90)
plt.xlabel('show_id')
plt.ylabel('Count')
plt.title('Count of Each show_id')
plt.show()
```



Non graphical analysis

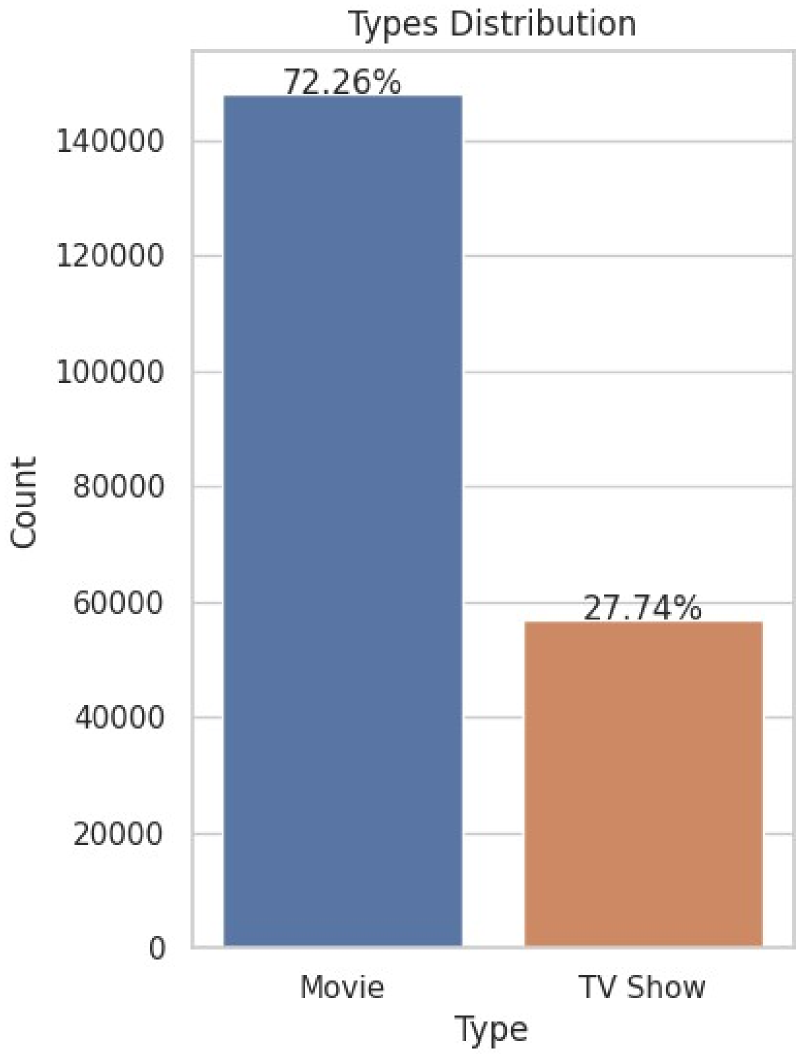
```
# Calculate the counts of each type
type_counts = data['type'].value_counts(normalize=True)*100
type_counts

Movie      72.259998
TV Show    27.740002
Name: type, dtype: float64
```

Graphical analysis

Approach 1 countplot

```
plt.figure(figsize=(4, 6))  # Adjust the figure size if needed
ax = sns.countplot(data=data, x='type')
plt.title('Types Distribution')
plt.xlabel('Type')
plt.ylabel('Count')
```

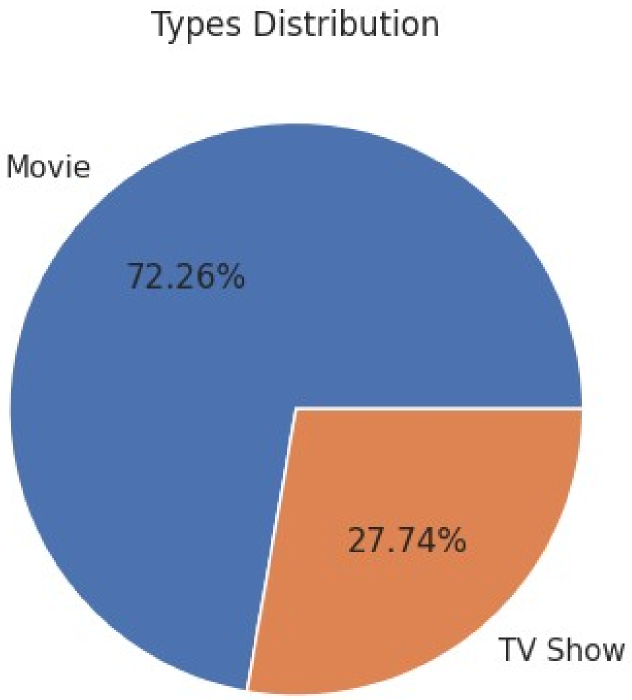
```
# Annotate the bars with percentages
total_count = len(data)
for p in ax.patches:
    percentage = '{:.2f}%'.format(100 * p.get_height() / total_count)
    x = p.get_x() + p.get_width() / 2
    y = p.get_height()
    ax.annotate(percentage, (x, y), ha='center')

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



approach 2 pie chart

```
# Create a pie chart
plt.pie(type_counts, labels=type_counts.index, autopct="%.2f%%")
plt.title('Types Distribution')
```

```
# Show the pie chart
plt.show()
```

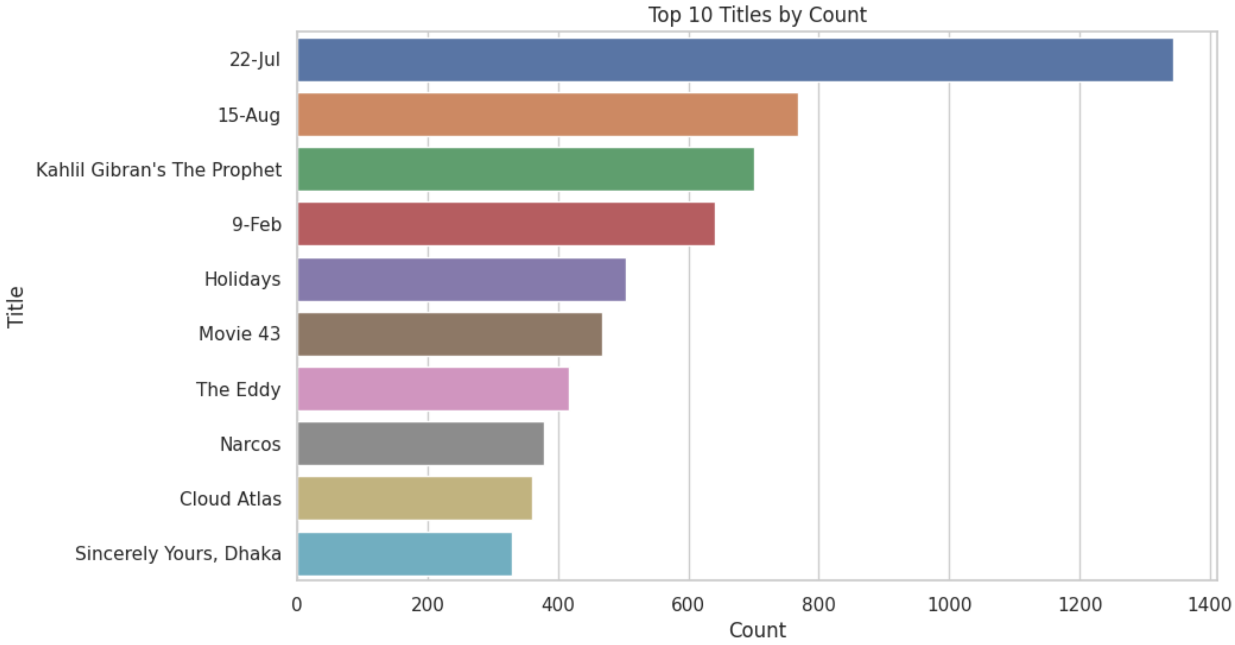


```
# Get the count of each value in the 'title' column
title_counts = data['title'].value_counts()
title_counts.head(10)
```

```
22-Jul                             1344
15-Aug                              768
Kahlil Gibran's The Prophet         700
9-Feb                               640
Holidays                            504
Movie 43                            468
The Eddy                            416
Narcos                              378
Cloud Atlas                         360
Sincerely Yours, Dhaka              330
Name: title, dtype: int64
```

```
# Create a count plot for the 'title' column

# Set the style with gridlines
sns.set(style="whitegrid")
```

```
plt.figure(figsize=(10, 6))
sns.countplot(data=data, y='title', order=title_counts.index[:10])  # Adjust the number of displayed items as needed
plt.xlabel('Count')
plt.ylabel('Title')
plt.title('Top 10 Titles by Count')
plt.show()
```

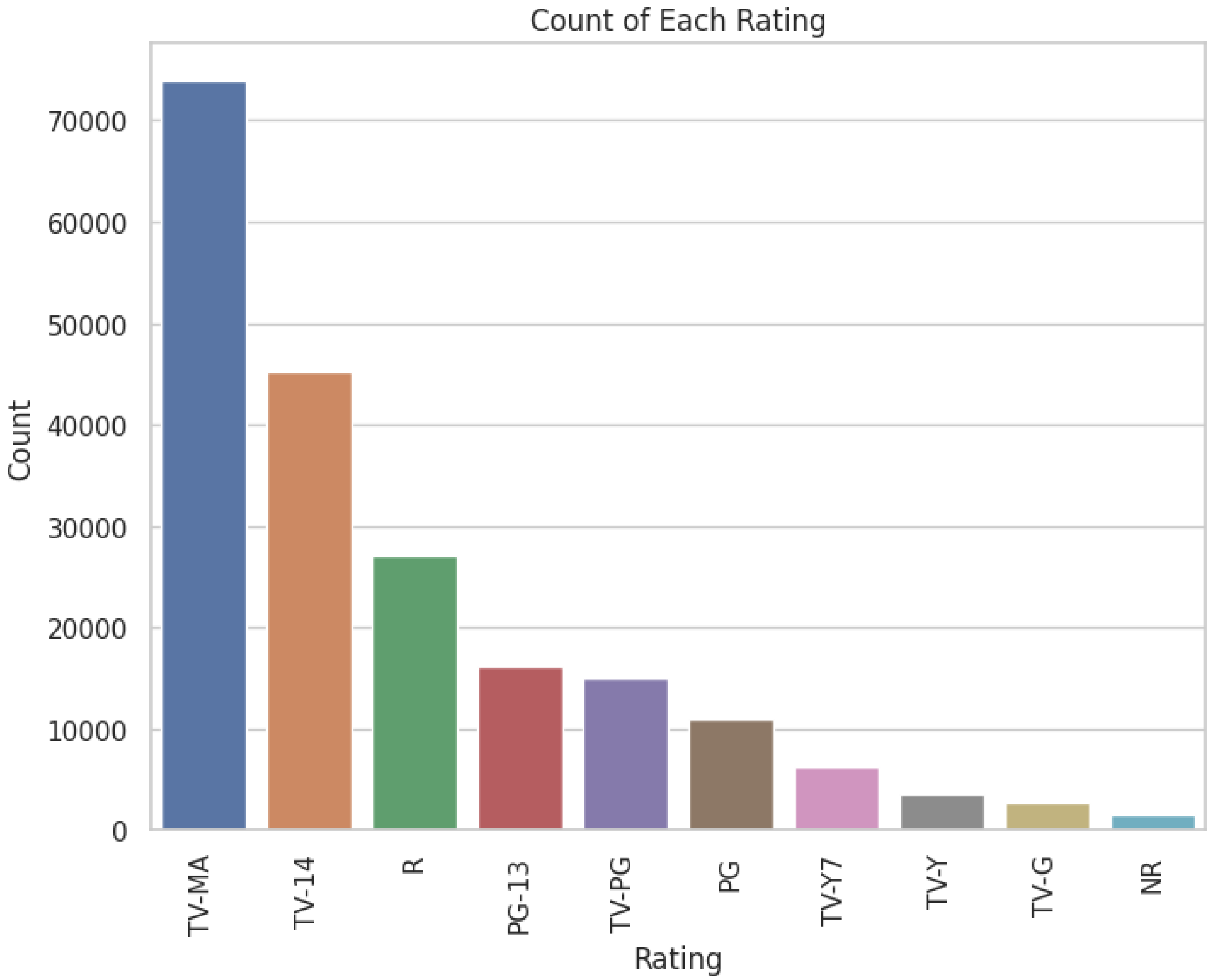


```
# Get the count of each  value in the 'rating' column
rating_counts = data['rating'].value_counts()
rating_counts.head(10)
```

```
TV-MA    73867
TV-14    45251
R        27120
PG-13    16246
TV-PG    14926
PG       10919
TV-Y7     6304
TV-Y      3665
TV-G      2779
NR        1573
Name: rating, dtype: int64
```

```
# Create a count plot for the 'rating' column

# Set the style with gridlines
sns.set(style="whitegrid")
```

```
plt.figure(figsize=(8, 6))
sns.countplot(data=data, x='rating', order=rating_counts.index[:10])
plt.xticks(rotation=90)
plt.xlabel('Rating')
plt.ylabel('Count')
plt.title('Count of Each Rating')
plt.show()
```

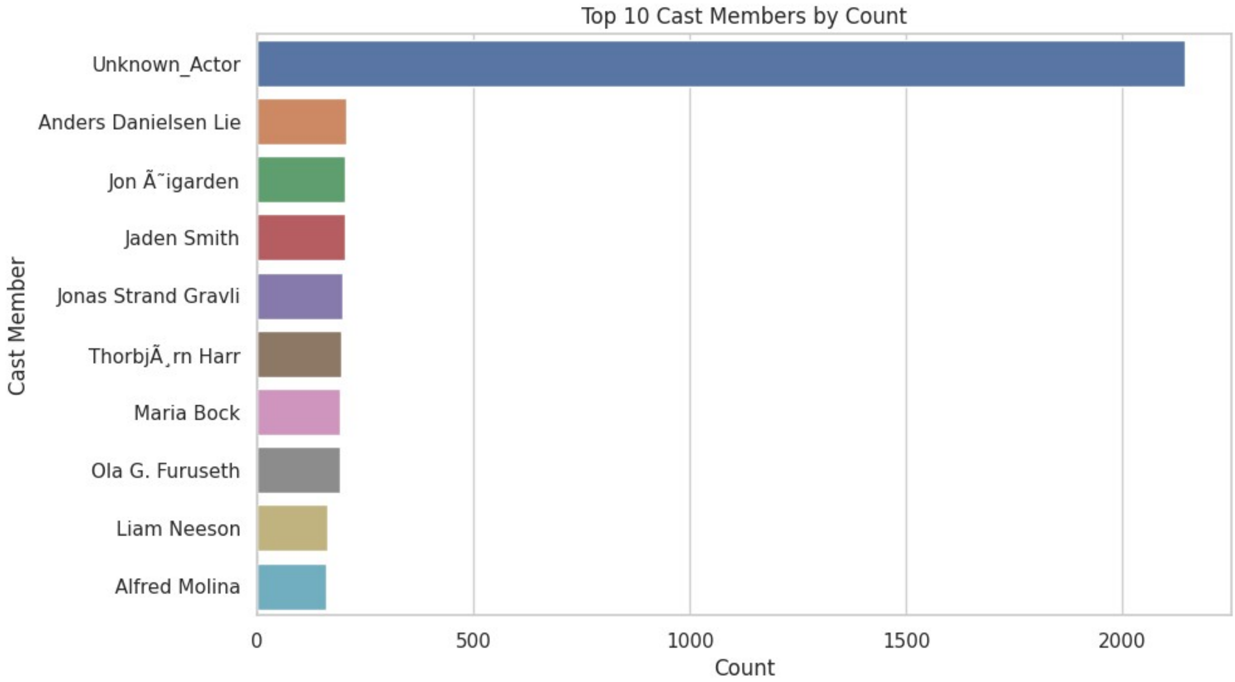


```
# Get the count of each  value in the 'cast' column
cast_counts = data['cast'].value_counts()
cast_counts
```

```
Unknown_Actor            2146
Anders Danielsen Lie      207
Jon Ã˜igarden             203
Jaden Smith               202
Jonas Strand Gravli       198
                         ...
Dario Yazbek                1
```

```
Corinne Foxx              1
Jacob Craner              1
Laila Berzins             1
Richard Ryan              1
Name: cast, Length: 36440, dtype: int64
```

```
sns.set(style="whitegrid")

plt.figure(figsize=(10, 6))
sns.countplot(data=data, y='cast', order=cast_counts.index[:10])  # 
Adjust the number of displayed items as needed
plt.xlabel('Count')
plt.ylabel('Cast Member')
plt.title('Top 10 Cast Members by Count')
plt.show()
```

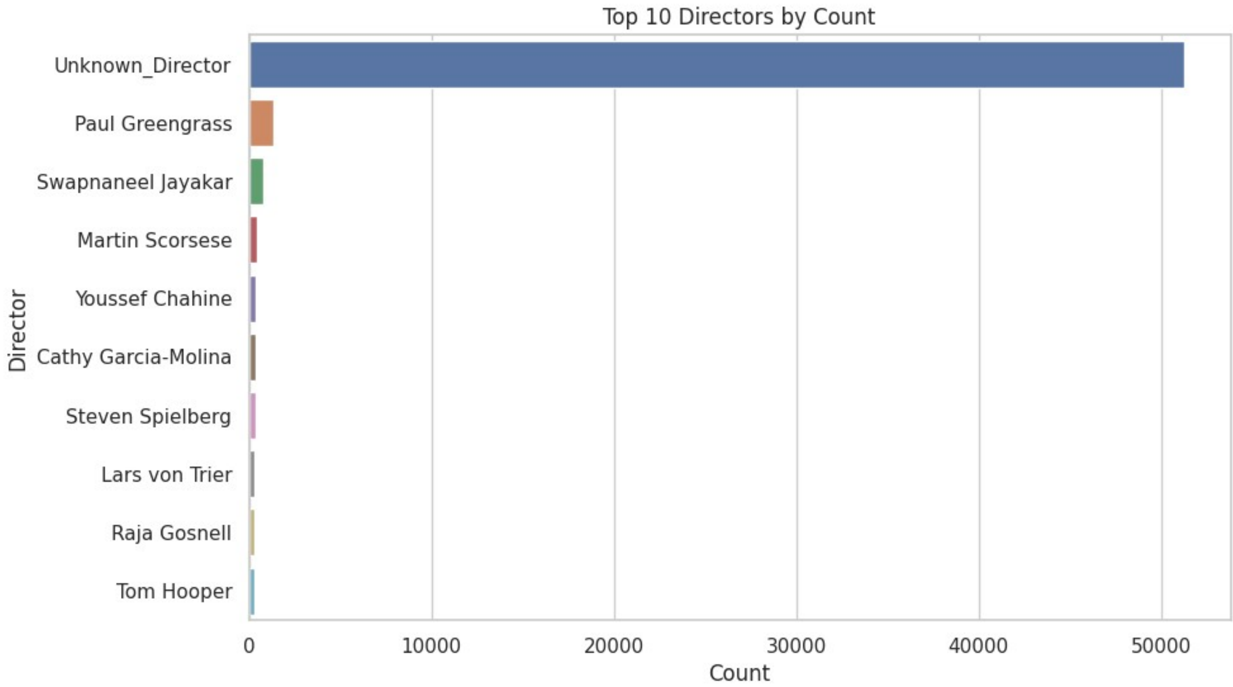


```
# Get the count of each  value in the 'director_y' column
director_counts = data['director'].value_counts()
director_counts.head(10)
```

```
Unknown_Director      51243
Paul Greengrass        1384
Swapnaneel Jayakar      768
Martin Scorsese         419
Youssef Chahine         409
Cathy Garcia-Molina     356
Steven Spielberg        355
Lars von Trier          336
```

```
Raja Gosnell             308
Tom Hooper               306
Name: director, dtype: int64
```

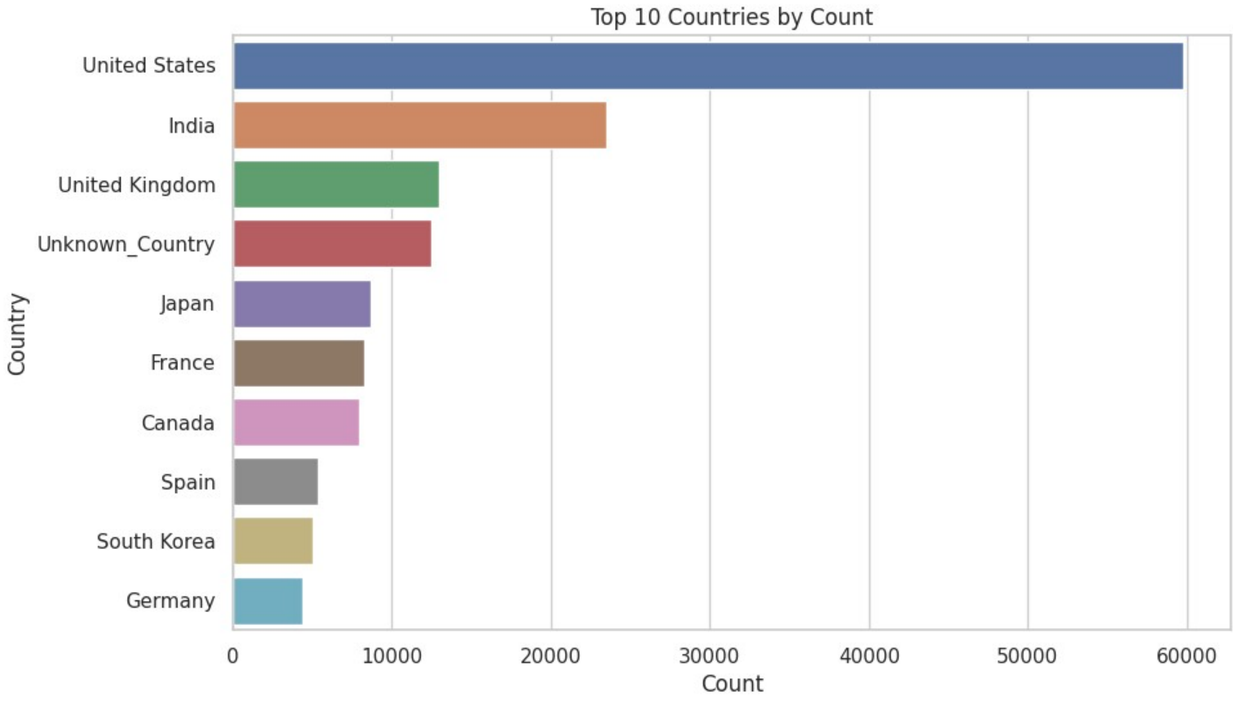
```
# Set the style with gridlines
sns.set(style="whitegrid")

# Create a count plot for the 'director' column
plt.figure(figsize=(10, 6))
sns.countplot(data=data, y='director',
order=director_counts.index[:10])  # Adjust the number of displayed
items as needed
plt.xlabel('Count')
plt.ylabel('Director')
plt.title('Top 10 Directors by Count')
plt.show()
```



```
# Get the count of each  value in the 'country' column
country_counts = data['country'].value_counts()
country_counts.head(10)
```

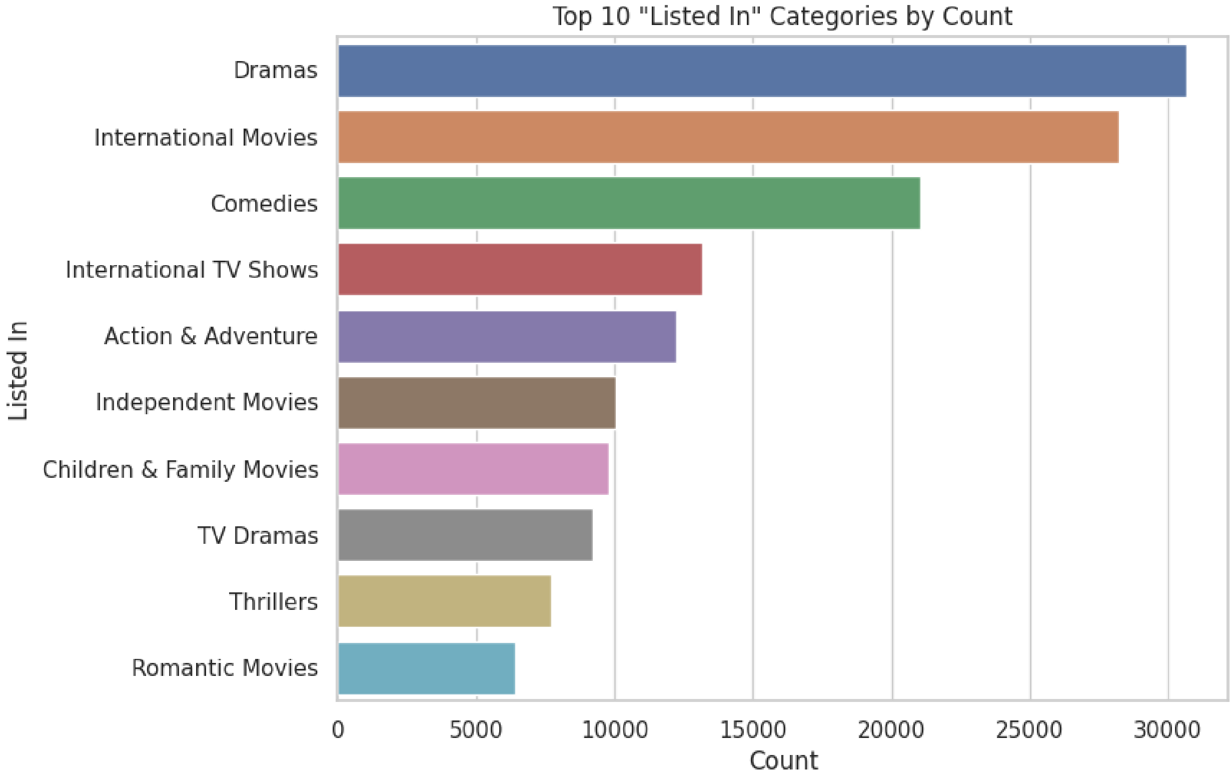
```
United States      59769
India              23534
United Kingdom     12945
Unknown_Country    12497
Japan               8679
France              8254
Canada              7915
```

```
Spain                    5315
South Korea              5043
Germany                  4383
Name: country, dtype: int64

# Set the style with gridlines
sns.set(style="whitegrid")

# Create a count plot for the 'country' column
plt.figure(figsize=(10, 6))
sns.countplot(data=data, y='country', order=country_counts.index[:10])
# Adjust the number of displayed items as needed
plt.xlabel('Count')
plt.ylabel('Country')
plt.title('Top 10 Countries by Count')
plt.show()
```



```
# Get the count of each  value in the 'listed_in' column
listed_in_counts = data['listed_in'].value_counts()
listed_in_counts.head()

Dramas                      30645
International Movies        28211
Comedies                    21069
International TV Shows      13145
Action & Adventure          12216
Name: listed_in, dtype: int64
```

```python
# Set the style with gridlines
sns.set(style="whitegrid")

# Create a count plot for the 'listed_in' column
plt.figure(figsize=(8, 6))
sns.countplot(data=data, y='listed_in',
order=listed_in_counts.index[:10])  # Adjust the number of displayed
items as needed
plt.xlabel('Count')
plt.ylabel('Listed In')
plt.title('Top 10 "Listed In" Categories by Count')
plt.show()
```



##2. Comparison of tv shows vs. movies.

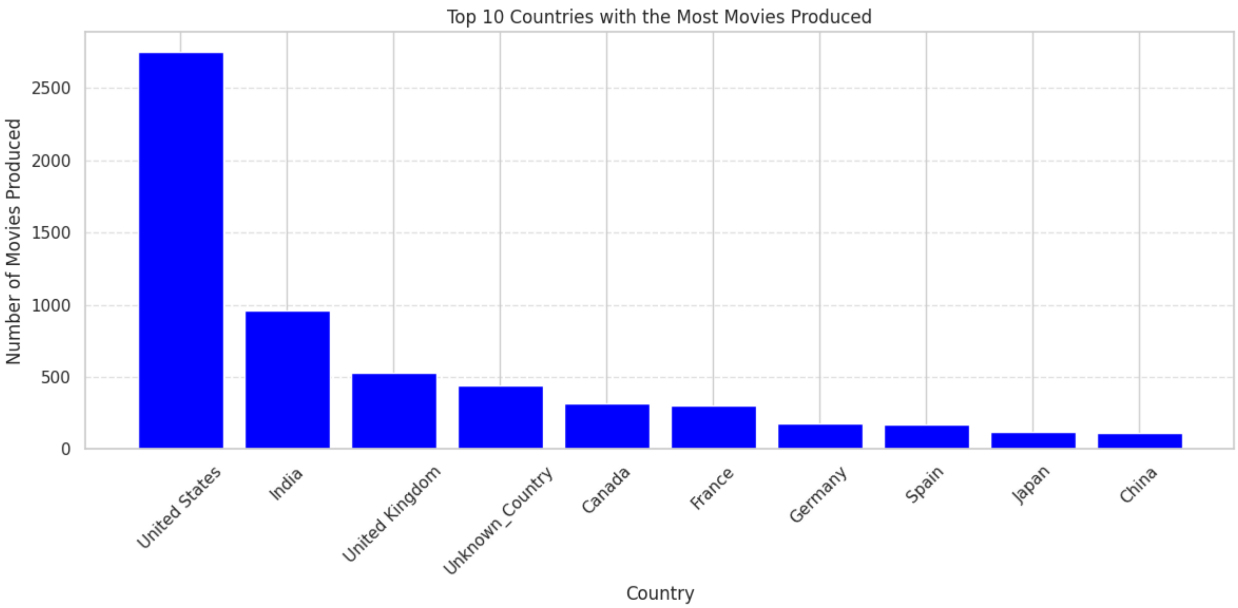
a. Find the number of movies produced in each country and pick the top 10 countries.

```python
# Filter the DataFrame to include only movies
movies_data = data[data['type'] == 'Movie']

# Group by country and count the number of unique titles of movies for
each country
country_movie_counts = movies_data.groupby('country')
['title'].nunique().reset_index()
```

```python
# Rename the columns for clarity
country_movie_counts.columns = ['Country',
'Number_of_Movies_Produced']

# Sort the DataFrame by the number of movies produced in descending
order
country_movie_counts =
country_movie_counts.sort_values(by='Number_of_Movies_Produced',
ascending=False)

# Select the top 10 countries
top_10_countries = country_movie_counts.head(10)

top_10_countries
```

```
             Country  Number_of_Movies_Produced
114    United States                       2750
43             India                        961
112   United Kingdom                        532
116  Unknown_Country                        440
20            Canada                        319
34            France                        303
36           Germany                        182
100            Spain                        171
51             Japan                        119
23             China                        114
```

```python
# Create a bar plot for the top 10 countries
plt.figure(figsize=(12, 6))
plt.bar(top_10_countries['Country'],
top_10_countries['Number_of_Movies_Produced'], color='blue')
plt.xlabel('Country')
plt.ylabel('Number of Movies Produced')
plt.title('Top 10 Countries with the Most Movies Produced')

# Rotate x-axis labels for better readability
plt.xticks(rotation=45)

# Add gridlines
plt.grid(axis='y', linestyle='--', alpha=0.6)

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

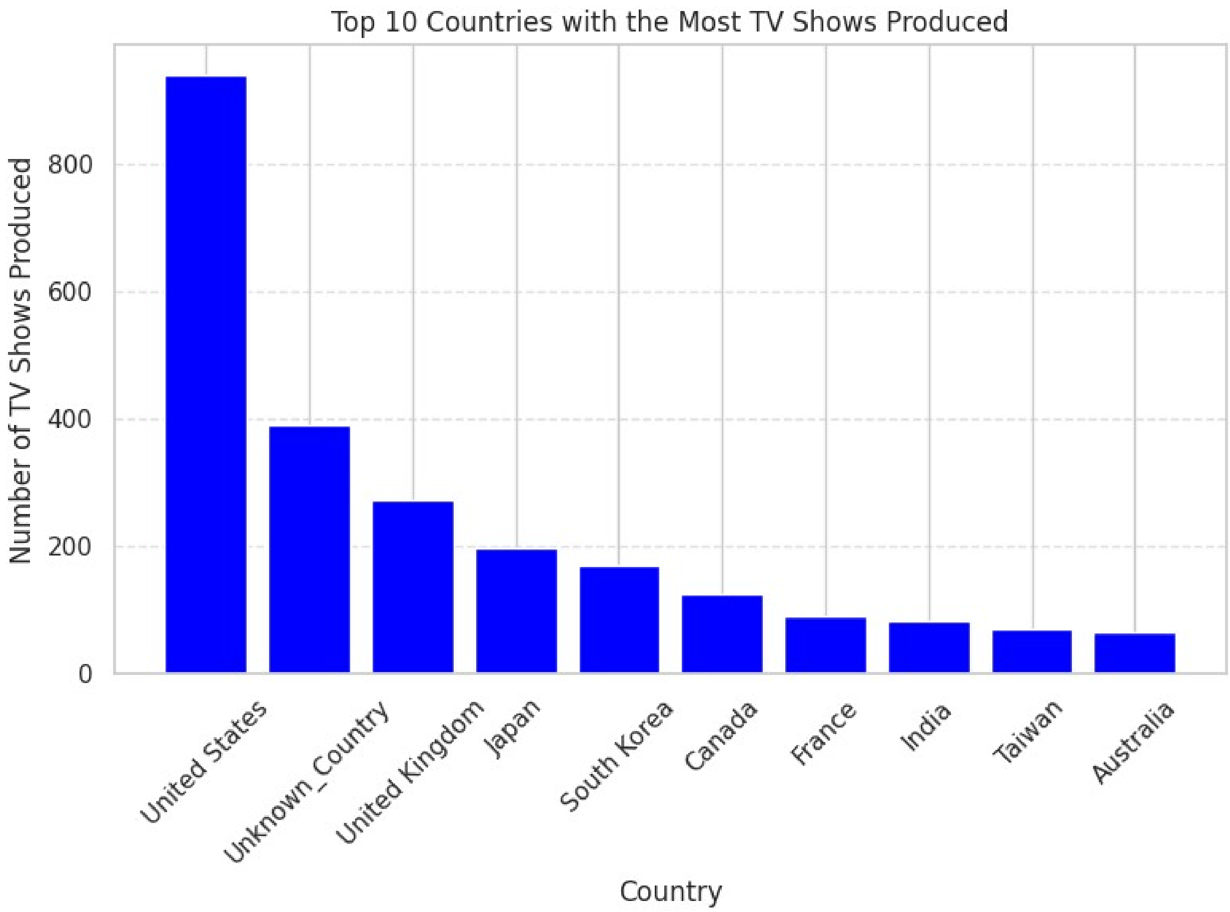


b. Find the number of Tv-Shows produced in each country and pick the top 10 countries.

```
# Filter the DataFrame to include only TV shows
tv_shows_data = data[data['type'] == 'TV Show']

# Group by country and count the number of unique titles of TV shows
for each country
country_tv_show_counts = tv_shows_data.groupby('country')
['title'].nunique().reset_index()

# Rename the columns for clarity
country_tv_show_counts.columns = ['Country',
'Number_of_TV_Shows_Produced']

# Sort the DataFrame by the number of TV shows produced in descending
order
country_tv_show_counts =
country_tv_show_counts.sort_values(by='Number_of_TV_Shows_Produced',
ascending=False)

# Select the top 10 countries
top_10_countries = country_tv_show_counts.head(10)

top_10_countries
```

```
            Country  Number_of_TV_Shows_Produced
63    United States                          938
64  Unknown_Country                          390
```

```
62   United Kingdom                             272
30            Japan                             199
52      South Korea                             170
8            Canada                             126
19           France                              90
25            India                              84
57           Taiwan                              70
2         Australia                              66

# Create a bar plot for the top 10 countries
plt.figure(figsize=(8, 6))
plt.bar(top_10_countries['Country'],
top_10_countries['Number_of_TV_Shows_Produced'], color='blue')
plt.xlabel('Country')
plt.ylabel('Number of TV Shows Produced')
plt.title('Top 10 Countries with the Most TV Shows Produced')

# Rotate x-axis labels for better readability
plt.xticks(rotation=45)

# Add gridlines
plt.grid(axis='y', linestyle='--', alpha=0.6)

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



##3. What is the best time to launch a TV show or the Movie ?

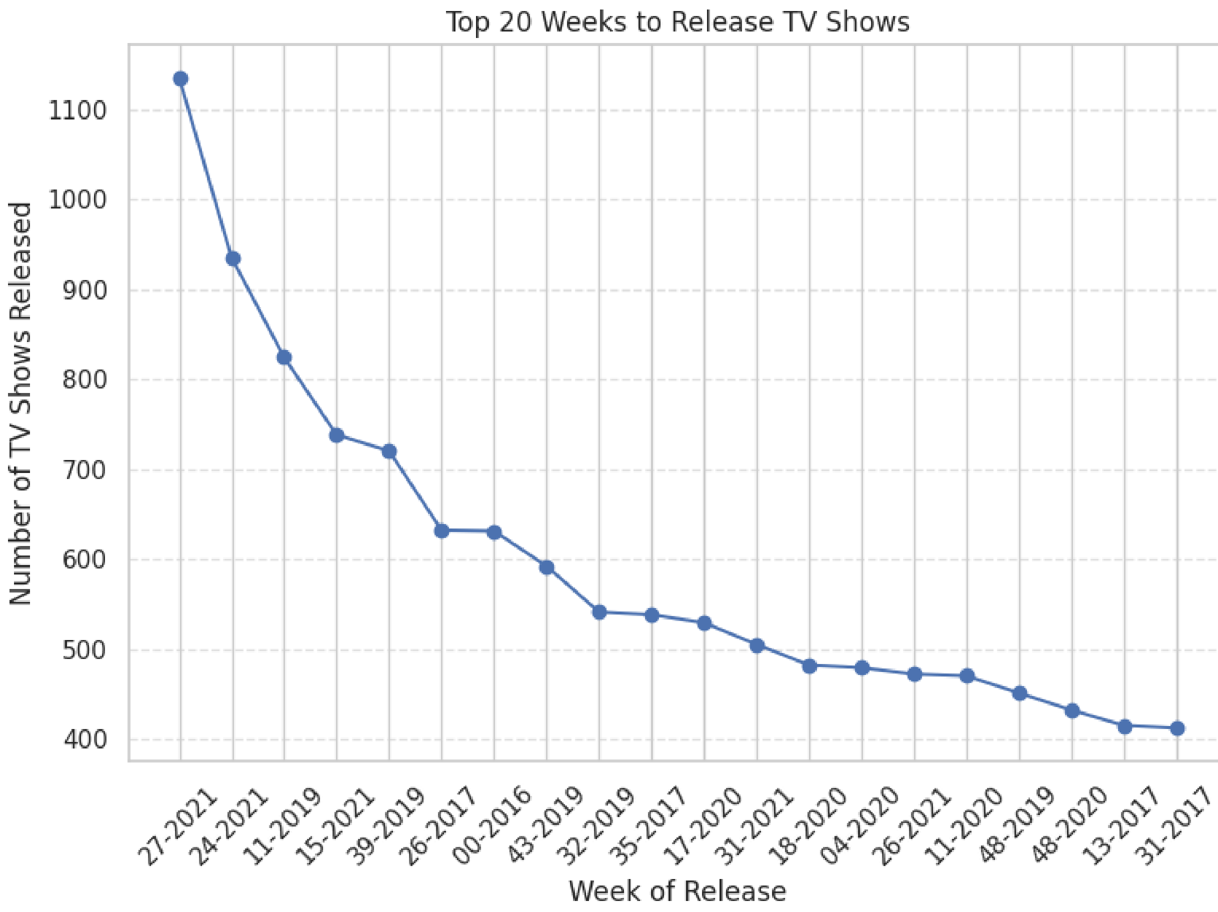
a. Find which is the best week to release the Tv-show or the movie. Do the analysis separately for Tv-shows and Movies

find which is the best week to release the tv-show

```
# Create a new column for week of release
data['week_of_release'] = data['date_added'].dt.strftime('%U-%Y')

# Separate data into TV shows
tv_shows_data = data[data['type'] == 'TV Show']

# Group by week of release and count the number of TV shows and movies
tv_show_release_counts =
tv_shows_data.groupby('week_of_release').size().reset_index(name='Coun
t')

# Sort by count in descending order for TV shows
tv_show_release_counts =
tv_show_release_counts.sort_values(by='Count', ascending=False)
tv_show_release_counts.head()
```

```
    week_of_release  Count
169         27-2021   1135
150         24-2021    935
70          11-2019    824
98          15-2021    738
242         39-2019    720
```

```
# Select the top 20 weeks for TV shows
top_20_tv_show_weeks = tv_show_release_counts.head(20)

# Create a line plot for top 20 TV show release weeks
plt.figure(figsize=(8, 6))
plt.plot(top_20_tv_show_weeks['week_of_release'],
top_20_tv_show_weeks['Count'], marker='o', linestyle='-')
plt.title('Top 20 Weeks to Release TV Shows')
plt.xlabel('Week of Release')
plt.ylabel('Number of TV Shows Released')
plt.grid(axis='y', linestyle='--', alpha=0.6)
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```



#From the data showing the number of TV shows added to Netflix for different weeks and years, here are some insights and comments:

1. Week 27-2021 (1135 TV Shows): This week had the highest number of TV show additions to Netflix. It's possible that Netflix was making a concerted effort to provide fresh content during this period, which falls in the mid-year.

2. Week 24-2021 (935 TV Shows): Week 24 of 2021 follows closely with a substantial number of TV show additions. This may have been part of Netflix's strategy to cater to viewers during the early summer months.

3. Week 15-2021 (738 TV Shows): Week 15 of 2021 recorded a notable number of TV show additions. It's likely that Netflix was responding to viewer demand as the year progressed.

4. Week 39-2019 (720 TV Shows): In Week 39 of 2019, Netflix added a considerable number of TV shows, possibly to enhance its library before the holiday season.

5. Week 26-2017 (632 TV Shows): Week 26 of 2017 had a high count of TV show additions, indicating Netflix's ongoing efforts to expand its content offering.

6. Week 00-2016 (631 TV Shows): The beginning of 2016 saw a substantial number of TV show additions, potentially aiming to attract new subscribers at the start of the year.

7. Week 43-2019 (592 TV Shows): Week 43 of 2019 featured a notable number of TV show additions, suggesting that Netflix continued to invest in content throughout the year.

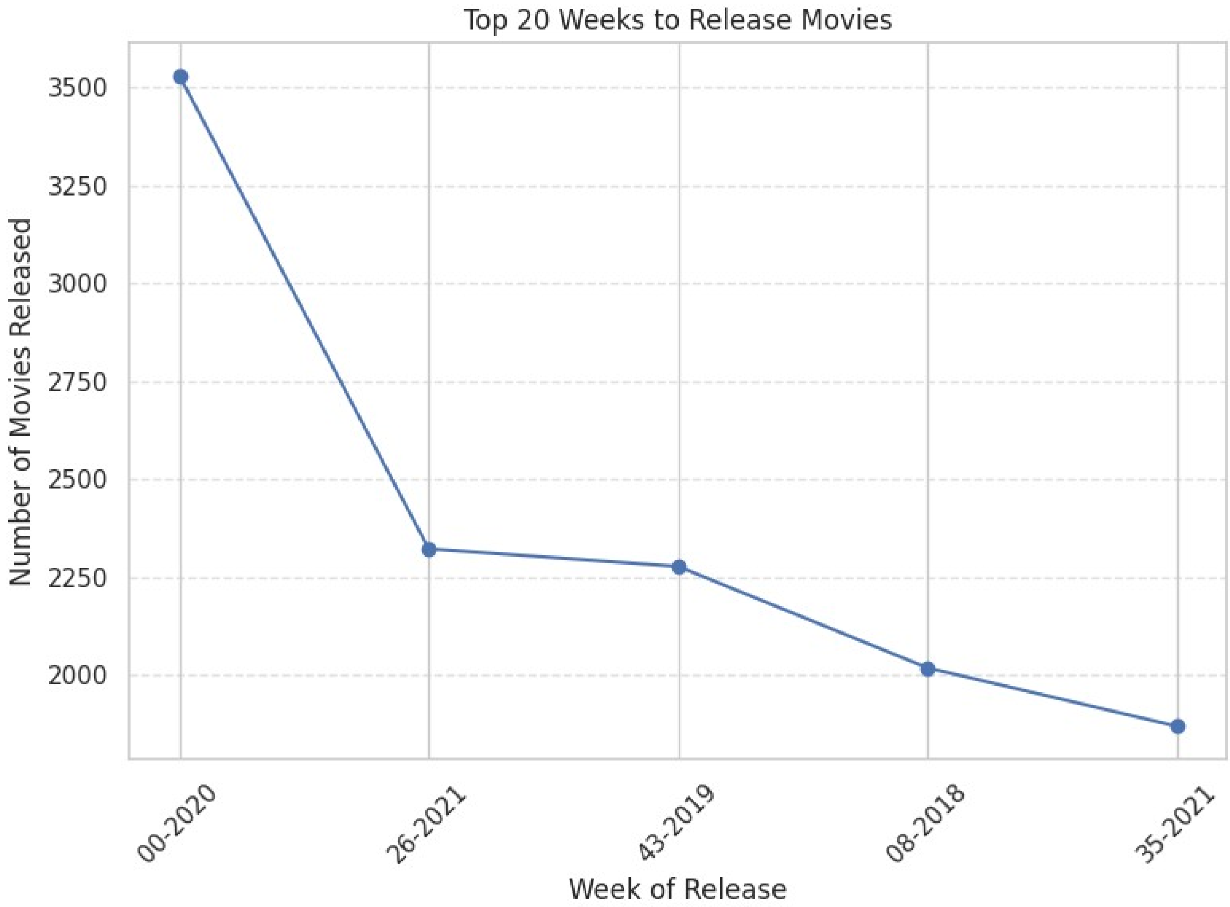
8. Week 32-2019 (541 TV Shows): Week 32 of 2019 recorded a significant number of TV show additions, indicating a consistent approach to content distribution.

9. Week 35-2017 (538 TV Shows): Week 35 of 2017 also had a high count of TV show additions, aligning with Netflix's strategy to keep viewers engaged.

10. Week 17-2020 (529 TV Shows): In Week 17 of 2020, Netflix added a substantial number of TV shows, potentially targeting viewers during the early spring period.

```
# Separate data into movies
movies_data = data[data['type'] == 'Movie']

# Group by week of release and count the number of movies
movie_release_counts =
movies_data.groupby('week_of_release').size().reset_index(name='Count'
)

# Sort by count in descending order for movies
movie_release_counts = movie_release_counts.sort_values(by='Count',
ascending=False)

movie_release_counts.head()

    week_of_release  Count
4           00-2020   3531
180         26-2021   2322
299         43-2019   2277
57          08-2018   2018
242         35-2021   1869

# Select the top 20 weeks for movie releases
top_20_movie_weeks = movie_release_counts.head()

# Create a line plot for top 20 movie release weeks
plt.figure(figsize=(8, 6))
plt.plot(top_20_movie_weeks['week_of_release'],
top_20_movie_weeks['Count'], marker='o', linestyle='-')
plt.title('Top 20 Weeks to Release Movies')
plt.xlabel('Week of Release')
plt.ylabel('Number of Movies Released')
plt.grid(axis='y', linestyle='--', alpha=0.6)
```

```
# Rotate x-axis labels for better readability
plt.xticks(rotation=45)

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



#From the data showing the number of movies added to Netflix for different weeks and years, here are some insights and comments:

1. Week 00-2020 (3531 Movies): This week, at the beginning of 2020, had the highest number of movie additions to Netflix. It's likely that Netflix aimed to start the year with a substantial collection of movies to attract viewers.

2. Week 26-2021 (2322 Movies): In Week 26 of 2021, there was a significant number of movie additions, possibly aligned with summer releases and the expectation of higher viewership during this season.

3. Week 43-2019 (2277 Movies): Week 43 of 2019 recorded a notable number of movie additions, possibly as part of Netflix's strategy to provide diverse content throughout the year.

4. Week 08-2018 (2018 Movies): In Week 08 of 2018, there were a substantial number of movie additions, indicating a consistent effort by Netflix to expand its movie library.

5. Week 35-2021 (1869 Movies): Week 35 of 2021 featured a significant number of movie additions, likely catering to viewers' preferences during late summer and early fall.

6. Week 39-2018 (1856 Movies): In Week 39 of 2018, there was a high count of movie additions, possibly coinciding with the back-to-school season.

7. Week 40-2017 (1841 Movies): Week 40 of 2017 recorded a substantial number of movie additions, indicating a focus on content diversity and viewer engagement.

8. Week 08-2019 (1637 Movies): In Week 08 of 2019, Netflix added a significant number of movies, potentially targeting viewers during the early spring period.

9. Week 52-2019 (1579 Movies): In Week 52 of 2019, there was a notable number of movie additions, possibly aligned with the holiday season.

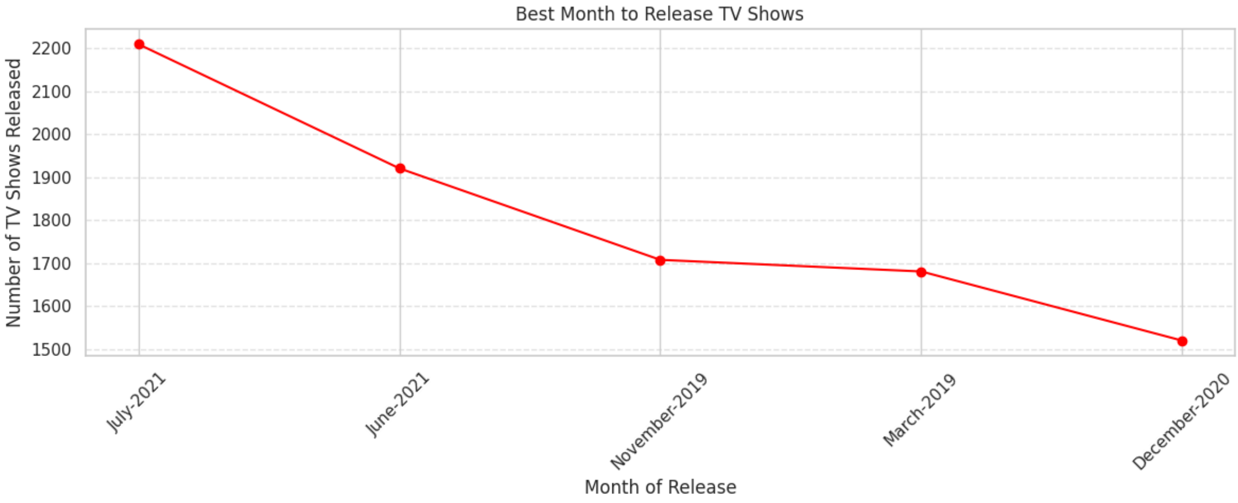
10. Week 30-2018 (1572 Movies): Week 30 of 2018 featured a high count of movie additions, indicating Netflix's consistent approach to content distribution.

b. Find which is the best month to release the Tv-show or the movie. Do the analysis separately for Tv-shows and Movies

TV-show Analysis

```python
# Create a new column for month of release
data['month_of_release'] = data['date_added'].dt.strftime('%B-%Y')

# Separate data into TV shows
tv_shows_data = data[data['type'] == 'TV Show']

# Group by month of release and count the number of TV shows
tv_show_release_counts =
tv_shows_data.groupby('month_of_release').size().reset_index(name='Count')

# Sort by count in descending order for TV shows
tv_show_release_counts =
tv_show_release_counts.sort_values(by='Count', ascending=False)

tv_show_release_counts.head()
```

```
   month_of_release  Count
43        July-2021   2210
50        June-2021   1921
71    November-2019   1708
56       March-2019   1681
21    December-2020   1520

# Select the best month for TV show releases
best_month_tv_show = tv_show_release_counts.head()

# Create a line plot for the best month to release TV shows
plt.figure(figsize=(12, 5))
plt.plot(best_month_tv_show['month_of_release'],
best_month_tv_show['Count'],color = 'red', marker='o', linestyle='-')
plt.title('Best Month to Release TV Shows')
plt.xlabel('Month of Release')
plt.ylabel('Number of TV Shows Released')
plt.grid(axis='y', linestyle='--', alpha=0.6)

# Rotate x-axis labels for better readability
plt.xticks(rotation=45)

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



#The data provided represents the count of TV shows added to Netflix for various months and years. Here are some insights and comments based on this data:

1. July-2021 (2210 TV Shows): July 2021 had the highest number of TV shows added to Netflix. This suggests that Netflix strategically planned a significant TV show addition during the summer season, likely to attract a larger viewership.

2. June-2021 (1921 TV Shows): June 2021 closely follows as one of the months with a substantial number of TV show additions. This aligns with the approach of providing fresh content during the peak of the summer season.

3. November-2019 (1708 TV Shows): November 2019 recorded a notable number of TV show additions. This could be linked to holiday season planning, as many people tend to watch more TV shows during the holiday period.

4. December-2020 (1520 TV Shows): December 2020 shows a significant number of TV show additions, indicating that Netflix recognizes the holiday season as an opportunity to launch new content, catering to viewers' increased leisure time.

5. May-2020 (1416 TV Shows): May 2020 had a substantial number of TV show additions. This might be connected to viewership trends during the spring season when people spend more time indoors.

6. October-2019 (1348 TV Shows): October 2019 reflects a high count of TV show additions, suggesting Netflix's commitment to expanding its content library and keeping viewers engaged.

7. August-2021 (1297 TV Shows): August 2021 also had a notable number of TV show additions, possibly targeting late summer audiences with new content offerings.

8. August-2019 (1292 TV Shows): August 2019 recorded a high count of TV show additions, similar to August 2021. This suggests that August might be strategically important for content launches.

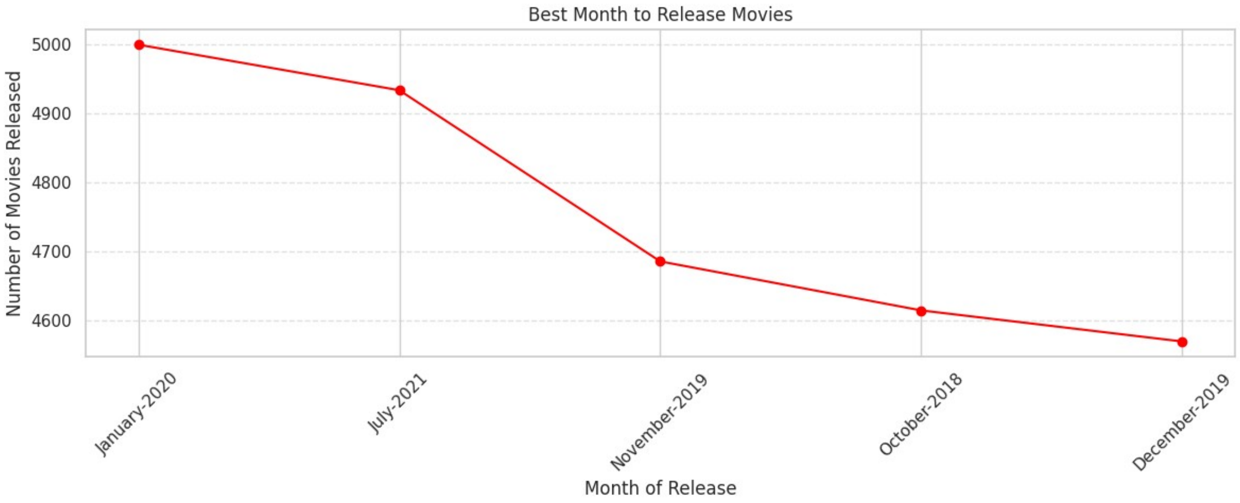
9. October-2020 (1254 TV Shows): October 2020 had a considerable number of TV show additions, likely related to the fall season and content themed around Halloween.

10. February-2020 (1238 TV Shows): February 2020 witnessed a substantial number of TV show additions. This might be associated with Valentine's Day-themed content releases to cater to a romantic audience.

Movie Analysis

```
# Create a new column for month of release
data['month_of_release'] = data['date_added'].dt.strftime('%B-%Y')

# Separate data into  movies
movies_data = data[data['type'] == 'Movie']

# Group by month of release and count the number of  movies
movie_release_counts = 
movies_data.groupby('month_of_release').size().reset_index(name='Count
')

# Sort by count in descending order for  and movies
```

```
movie_release_counts = movie_release_counts.sort_values(by='Count',
ascending=False)

movie_release_counts.head()

   month_of_release  Count
41     January-2020   5000
50        July-2021   4934
84    November-2019   4686
92     October-2018   4615
23    December-2019   4570

# Select the best month for movie releases
best_month_movie = movie_release_counts.head()

# Create a line plot for the best month to release movies
plt.figure(figsize=(12, 5))
plt.plot(best_month_movie['month_of_release'],
best_month_movie['Count'],color = 'red', marker='o', linestyle='-')
plt.title('Best Month to Release Movies')
plt.xlabel('Month of Release')
plt.ylabel('Number of Movies Released')
plt.grid(axis='y', linestyle='--', alpha=0.6)

# Rotate x-axis labels for better readability
plt.xticks(rotation=45)

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



#Based on the provided data for the number of movies added to Netflix for various months and years, here are some insights and comments:

1. January-2020 (5000 Movies): January 2020 had the highest number of movie additions to Netflix. This suggests that the beginning of the year is a strategic time to release movies, possibly capitalizing on the holiday season and New Year's resolutions.

2. July-2021 (4934 Movies): July 2021 closely follows with a significant number of movie additions. Summer months often witness increased streaming activity, making it an opportune time to launch new movies.

3. November-2019 (4686 Movies): November 2019 recorded a substantial number of movie additions, indicating Netflix's commitment to expanding its movie library, especially in the lead-up to the holiday season.

4. December-2019 (4570 Movies): December 2019 shows a high count of movie additions, likely in preparation for the holiday season when viewers have more leisure time.

5. April-2021 (3414 Movies): April 2021 witnessed a notable number of movie additions. This could be associated with the spring season when viewers may be looking for fresh content.

6. September-2021 (3356 Movies): September 2021 also had a substantial number of movie additions, possibly targeting viewers returning from summer vacations.

7. October-2018 (3355 Movies): October 2018 reflects a high count of movie additions, suggesting Netflix's consistent effort to provide diverse content throughout the year.

8. July-2018 (3207 Movies): July 2018 shows a considerable number of movie additions, possibly aligning with summer blockbuster releases.

9. June-2020 (3188 Movies): June 2020 had a notable number of movie additions. This might be related to viewership trends during the early summer months.

10. August-2021 (3164 Movies): August 2021 also recorded a significant number of movie additions, likely aiming to engage viewers during the late summer period.

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

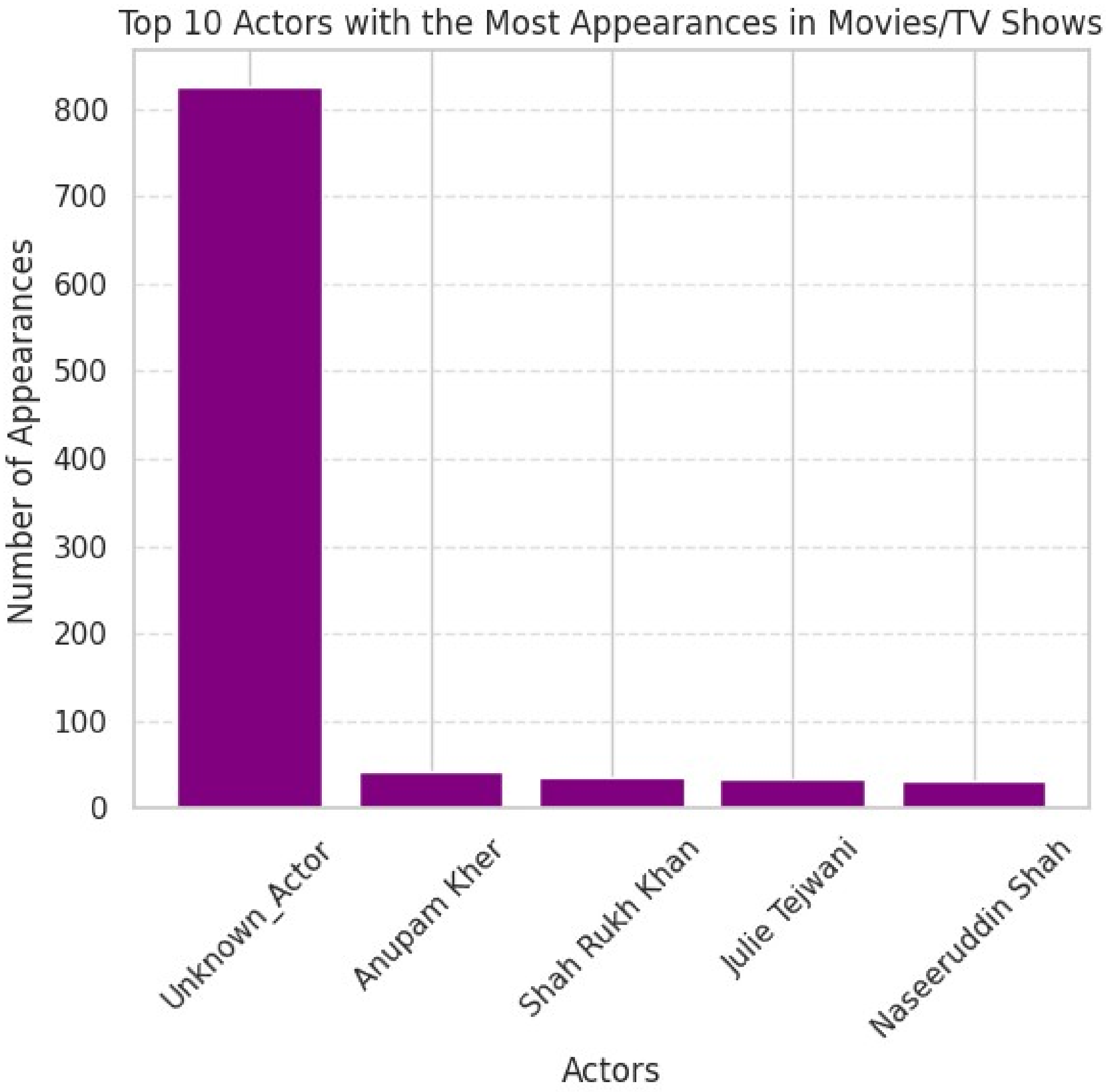
a. Identify the top 10 directors who have appeared in most movies or TV shows.

```
# Filter out rows where 'cast' is not null (i.e., movies/TV shows with
known directors)
actors_data = data[data['cast'].notnull()]

# Group by cast and count the number of unique titles they have worked
actors_counts = actors_data.groupby('cast')
['title'].nunique().reset_index()

# Rename the columns for clarity
actors_counts.columns = ['Actors', 'Appearances']
```

```
# Sort the cast by the number of appearances in descending order
top_10_actors = actors_counts.sort_values(by='Appearances',
ascending=False).head()

top_10_actors
```

```
                 Actors  Appearances
34214     Unknown_Actor          825
2833        Anupam Kher           43
30489    Shah Rukh Khan           35
16697     Julie Tejwani           33
24215  Naseeruddin Shah           32
```

```
# Create a bar plot for the top 10 actors
plt.figure(figsize=(6, 6))
plt.bar(top_10_actors['Actors'], top_10_actors['Appearances'],
color='purple')
plt.xlabel('Actors')
plt.ylabel('Number of Appearances')
plt.title('Top 10 Actors with the Most Appearances in Movies/TV
Shows')

# Rotate x-axis labels for better readability
plt.xticks(rotation=45)

# Add gridlines
plt.grid(axis='y', linestyle='--', alpha=0.6)

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



#The data provided contains information about actors and the number of appearances they have made in Netflix content.

##Here are some observations and comments based on the data:

1. Unknown Artist (825 Appearances): The category "Unknown_Artist" stands out with a remarkably high number of appearances (825). This category likely includes instances where specific actor information is not available or is not credited.

2. Anupam Kher (43 Appearances): Anupam Kher is one of the top actors on Netflix with 43 appearances. This suggests a prolific career in Netflix content.

3. Shah Rukh Khan (35 Appearances): Shah Rukh Khan, a prominent Bollywood actor, has made 35 appearances on Netflix. His presence indicates the popularity of Indian content on the platform.

4. Julie Tejwani (33 Appearances): Julie Tejwani has appeared in 33 titles on Netflix, indicating a significant contribution to the platform.

5. Naseeruddin Shah (32 Appearances): Naseeruddin Shah, a respected Indian actor, has 32 appearances on Netflix. His association adds to the diversity of content.

6. Takahiro Sakurai (32 Appearances): Takahiro Sakurai is known for voice acting in anime and has appeared in 32 titles, suggesting a presence in anime content.

7. Rupa Bhimani (31 Appearances): Rupa Bhimani has made 31 appearances on Netflix, showcasing a substantial body of work.

8. Om Puri (30 Appearances): The late Om Puri, a celebrated Indian actor, has 30 appearances on the platform, contributing to Netflix's library.

9. Akshay Kumar (30 Appearances): Akshay Kumar, a popular Bollywood actor known for his versatile roles, has 30 appearances on Netflix.

10. Yuki Kaji (29 Appearances): Yuki Kaji's 29 appearances indicate a strong presence in anime and animated content on Netflix.

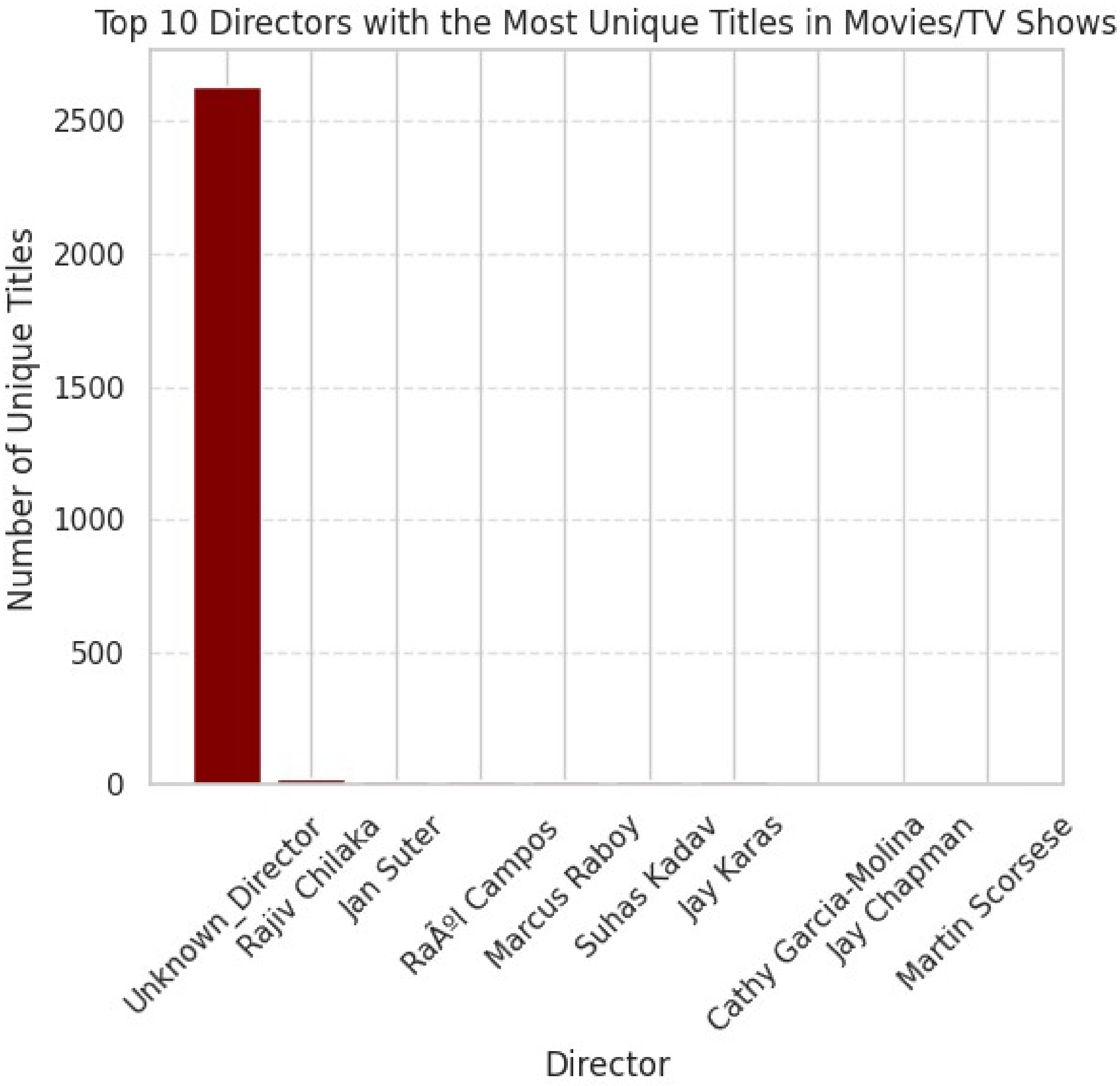
b. Identify the top 10 directors who have appeared in most movies or TV shows.

```
# Filter out rows where 'director' is not null (i.e., movies/TV shows
with known directors)
directors_data = data[data['director'].notnull()]

# Group by director and count the number of unique titles they have
directed
director_counts = directors_data.groupby('director')
['title'].nunique().reset_index()

# Rename the columns for clarity
director_counts.columns = ['Director', 'Unique_Titles']

# Sort the directors by the number of unique titles in descending
order
top_10_directors = director_counts.sort_values(by='Unique_Titles',
ascending=False).head(10)

top_10_directors
```

```
                Director  Unique_Titles
4744    Unknown_Director           2633
3749       Rajiv Chilaka             22
1906           Jan Suter             21
3800         RaÃºl Campos             19
2866        Marcus Raboy             16
4457         Suhas Kadav             16
1954           Jay Karas             15
```

```
755   Cathy Garcia-Molina                13
1951          Jay Chapman                12
2945     Martin Scorsese                 12
```

```python
# Create a bar plot for the top 10 directors
plt.figure(figsize=(6, 6))
plt.bar(top_10_directors['Director'],
top_10_directors['Unique_Titles'], color='maroon')
plt.xlabel('Director')
plt.ylabel('Number of Unique Titles')
plt.title('Top 10 Directors with the Most Unique Titles in Movies/TV
Shows')

# Rotate x-axis labels for better readability
plt.xticks(rotation=45)

# Add gridlines
plt.grid(axis='y', linestyle='--', alpha=0.6)

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



#The data provided represents a list of directors along with the number of

#unique titles they have worked on. Here are some observations and comments:

1. Unknown Director (4744 Unique Titles): The "Unknown_Director" category stands out with a significantly high number of unique titles (2634). This category likely includes content where the director's information is missing or not available.

2. Rajiv Chilaka (22 Unique Titles): Rajiv Chilaka has worked on 22 unique titles. This could indicate a prolific director with a notable contribution to the platform.

3. Jan Suter (21 Unique Titles): Jan Suter is another director with a substantial number of unique titles (21). Their work appears to be well-represented on Netflix.

4. Raúl Campos (19 Unique Titles): Raúl Campos has directed 19 unique titles, suggesting a diverse range of projects.

5. Marcus Raboy (16 Unique Titles): Marcus Raboy has worked on 16 unique titles, indicating a consistent presence on the platform.

6. Suhas Kadav (16 Unique Titles): Suhas Kadav also has 16 unique titles to their name, which may include animated content.

7. Jay Karas (15 Unique Titles): Jay Karas has directed 15 unique titles, showcasing their contribution to Netflix's content library.

8. Cathy Garcia-Molina (13 Unique Titles): Cathy Garcia-Molina is associated with 13 unique titles, suggesting a significant body of work.

9. Jay Chapman (12 Unique Titles): Jay Chapman has directed 12 unique titles, indicating a noteworthy presence on the platform.

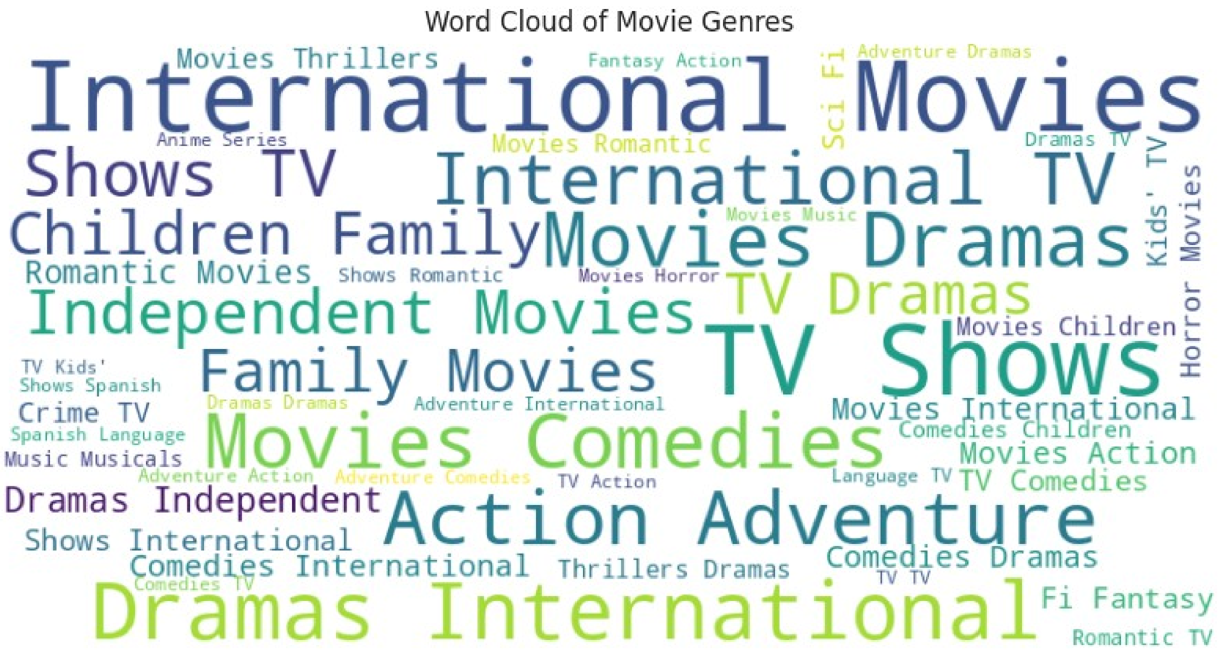
10. Martin Scorsese (12 Unique Titles): Even a renowned director like Martin Scorsese has 12 unique titles on Netflix, which demonstrates the diversity of content available.

5 . Which genre movies are more popular or produced more

```
# Import the WordCloud class from the wordcloud library
from wordcloud import WordCloud

# Concatenate all genre values into a single string
genre_text = ' '.join(data['listed_in'].dropna())

# Create a WordCloud object
wordcloud = WordCloud(width=800, height=400, background_color='white',
colormap='viridis', max_words=50).generate(genre_text)

wordcloud
```

```
<wordcloud.wordcloud.WordCloud at 0x7b982a33f7f0>
```

```
# Create a figure for the word cloud
plt.figure(figsize=(10, 6))
plt.imshow(wordcloud, interpolation='bilinear')
plt.title('Word Cloud of Movie Genres')
plt.axis('off')  # Turn off axis labels

# Display the word cloud
plt.show()
```



6. Find After how many days the movie will be added to Netflix after the release of the movie

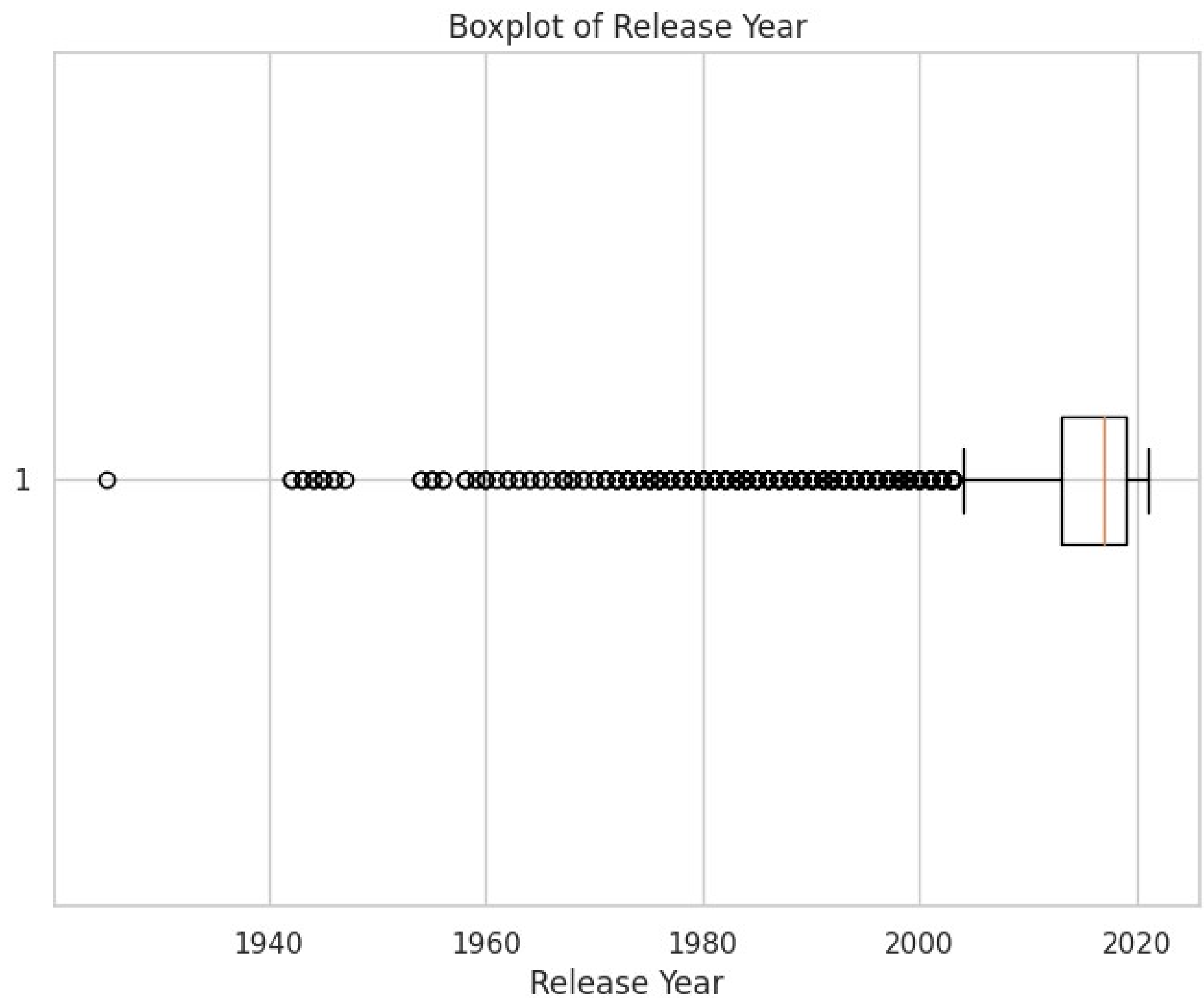
```
# Calculate the time difference in days between date added and release
year
data['days_to_add'] = (data['date_added'] -
pd.to_datetime(data['release_year'], format='%Y')).dt.days

# Find the mode (most common) value of days to add
mode_duration = data['days_to_add'].mode()[0]

mode_duration

282.0

data.head(2)

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

    duration                                        description  \
0     90 min  As her father nears the end of his life, filmm...
1  2 Seasons  After crossing paths at a party, a Cape Town t...
```

```
            cast          director        country
listed_in  \
0  Unknown_Actor   Kirsten Johnson  United States
Documentaries
1     Ama Qamata  Unknown_Director   South Africa  International TV
Shows

  week_of_release month_of_release  days_to_add
0         38-2021   September-2021        633.0
1         38-2021   September-2021        266.0
```

Boxplot

there is a lot of historical content which is not prefered by modern audience

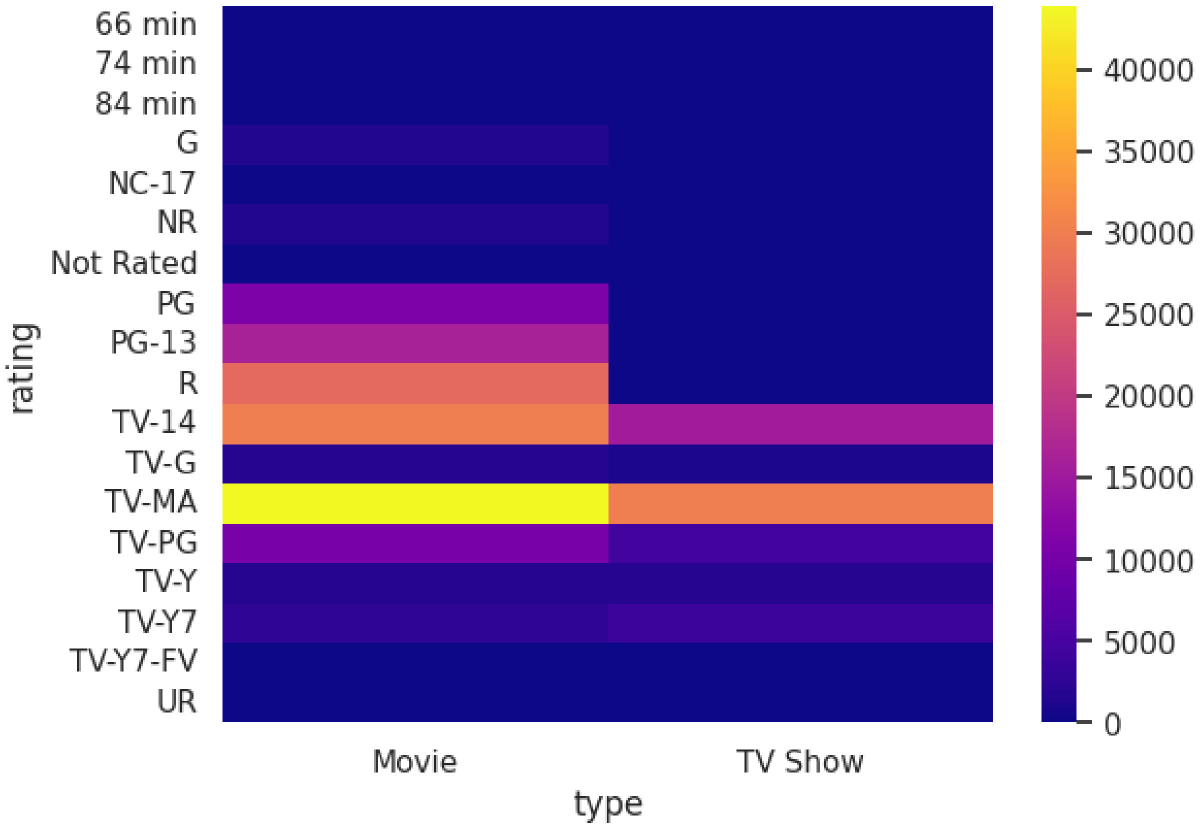
```
plt.figure(figsize=(8, 6))
plt.boxplot(df['release_year'], vert=False)
plt.xlabel('Release Year')
plt.title('Boxplot of Release Year')
plt.show()
```



#Heatmap
It shows that TV shows and movies are highly rated as TV-MA, and from this, we can conclude that Netflix should focus more on content that is based on this particular rating

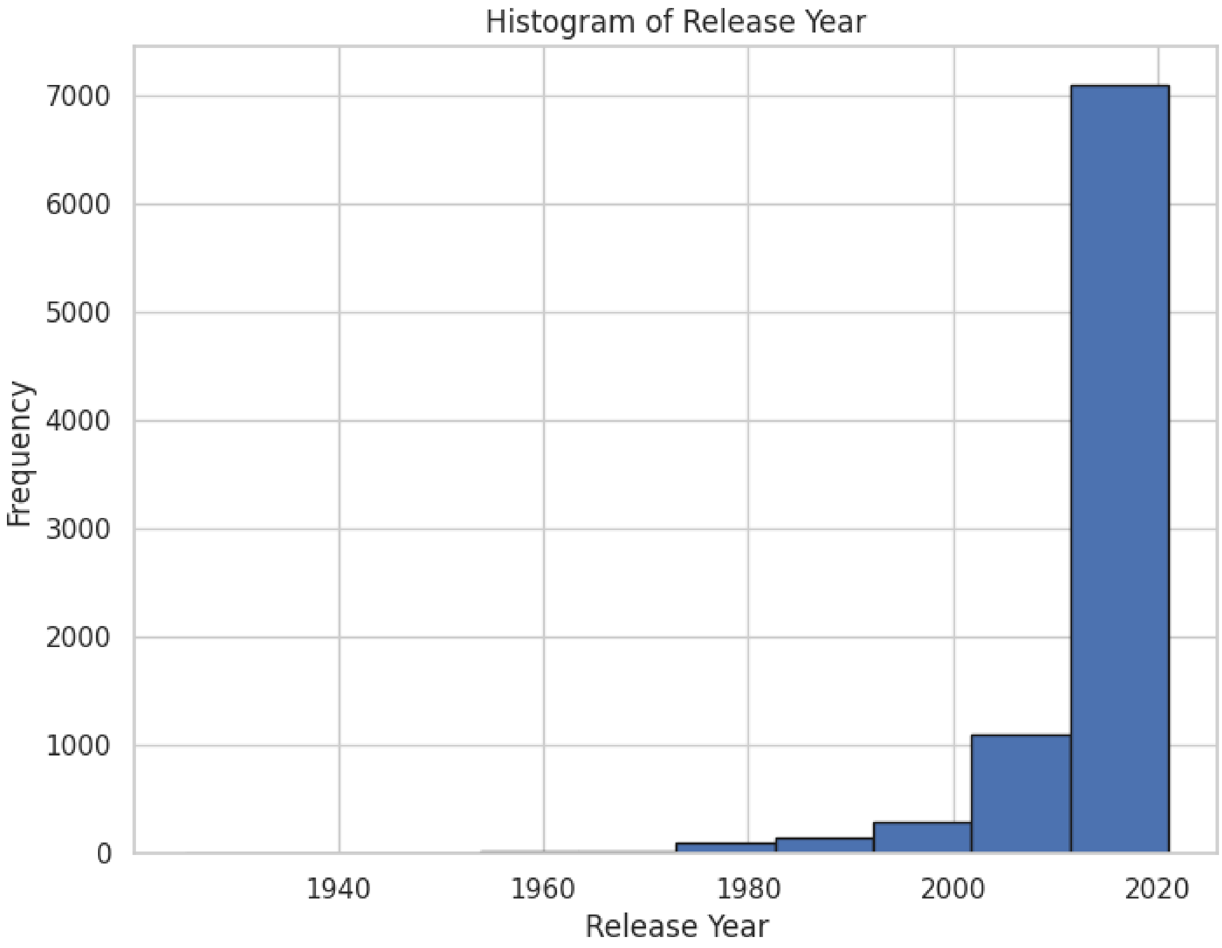
```
colormap = plt.cm.plasma
sns.heatmap(pd.crosstab(data["rating"], data["type"]), cmap =
colormap)
```

```
<Axes: xlabel='type', ylabel='rating'>
```



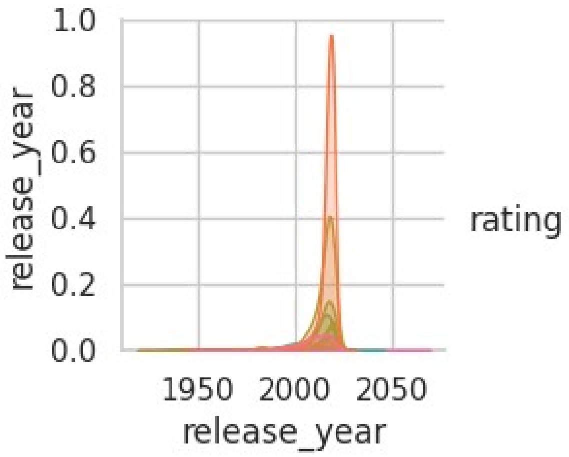
Histogram

```
plt.figure(figsize=(8, 6))
plt.hist(df['release_year'], bins=10, edgecolor='k')
plt.xlabel('Release Year')
plt.ylabel('Frequency')
plt.title('Histogram of Release Year')
plt.grid(True)
plt.show()
```



Pairplot

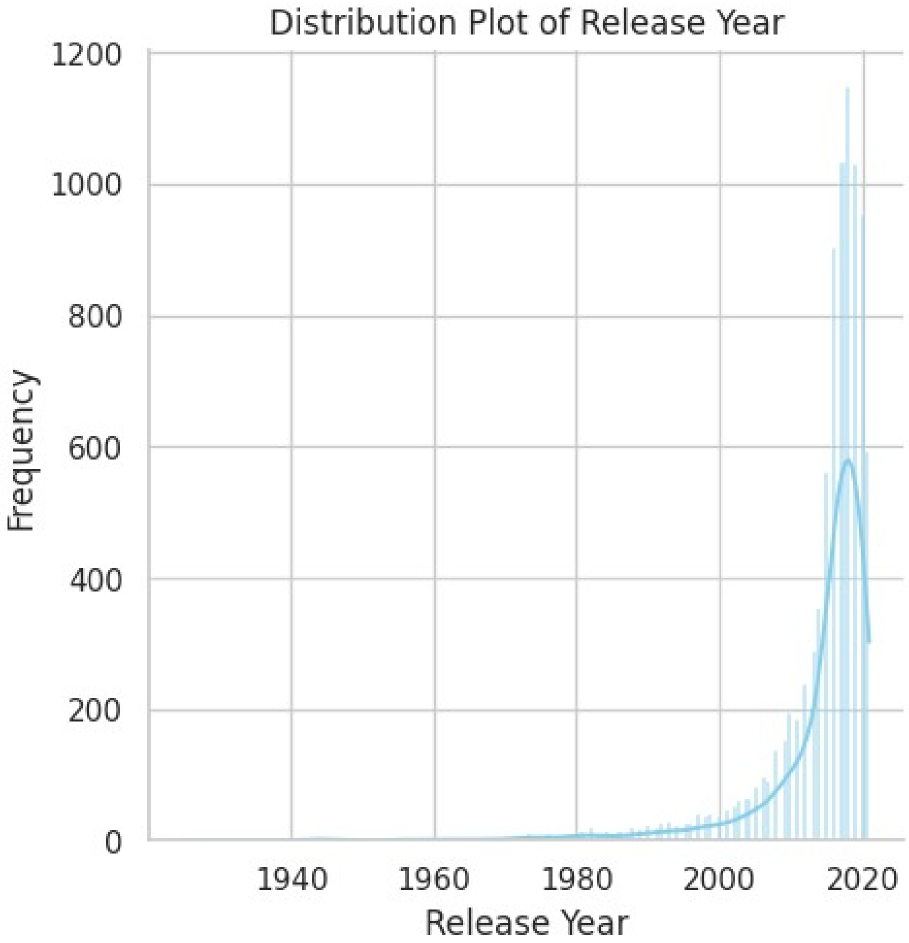
```
sns.pairplot(df, hue='rating', markers=['o', 's', 'D'])
plt.show()
```



Distplot

```
plt.figure(figsize=(8, 6))
sns.displot(data=df, x='release_year', kde=True, color='skyblue')
plt.xlabel('Release Year')
plt.ylabel('Frequency')
plt.title('Distribution Plot of Release Year')
plt.grid(True)
plt.show()
```

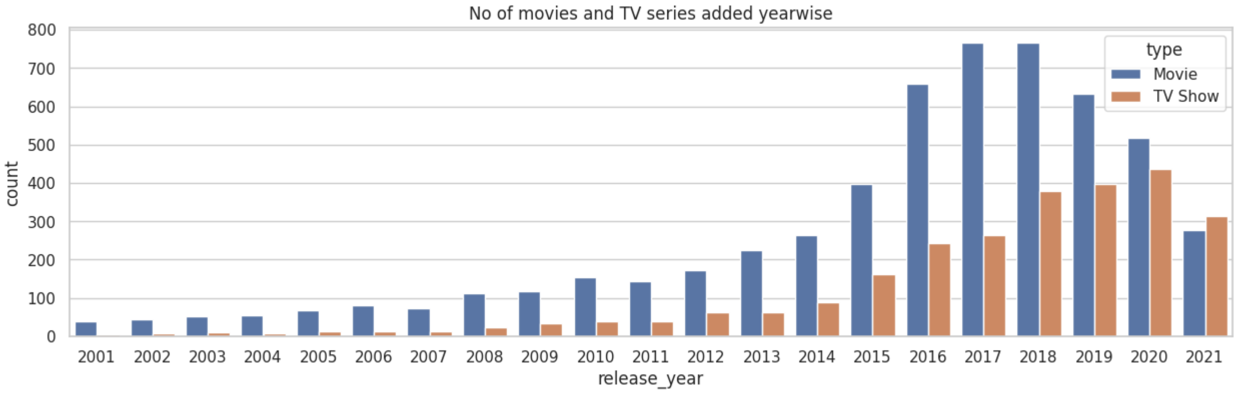
```
<Figure size 800x600 with 0 Axes>
```



Countplot

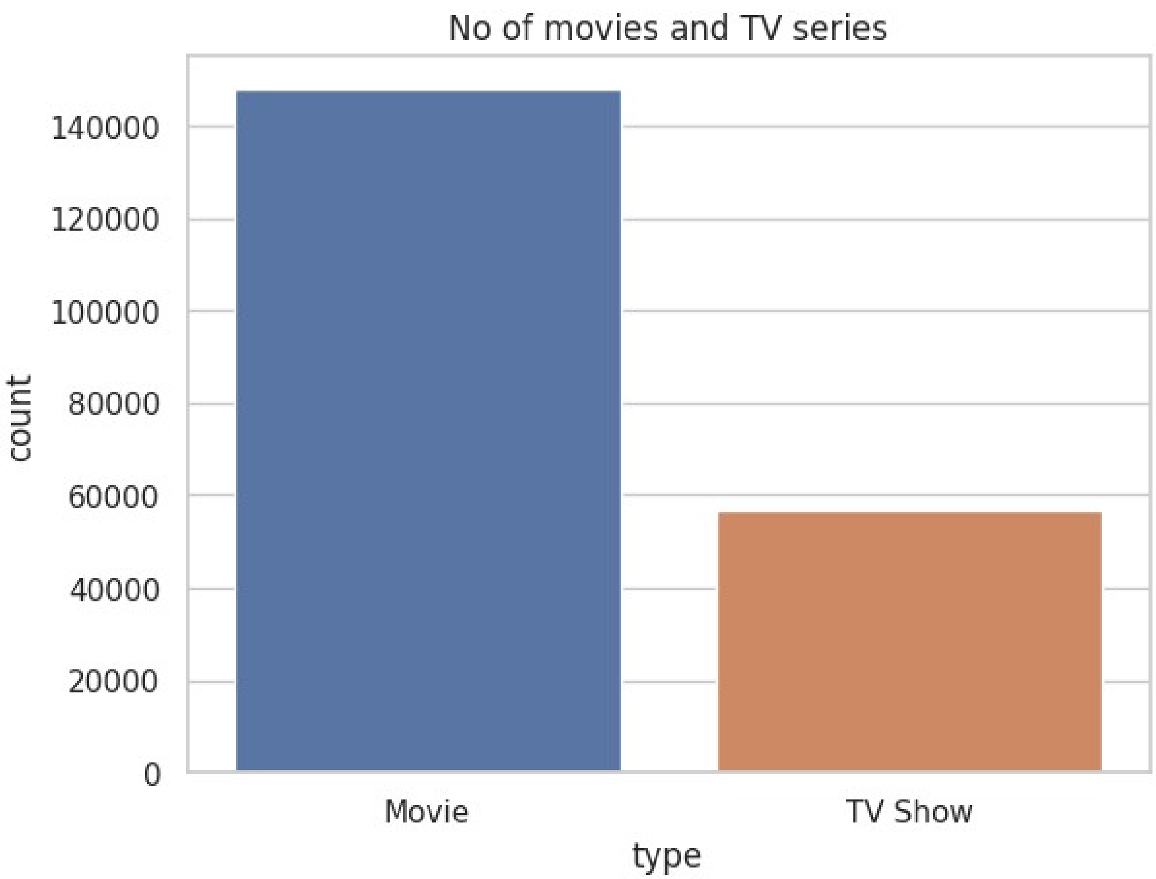
```
plt.figure(figsize=(15,4))
df_year = df.loc[df['release_year']>2000] #used masked to get out data
for movies
```

```
sns.countplot(x='release_year', data = df_year, hue='type')
plt.title("No of movies and TV series added yearwise")
plt.show()
```



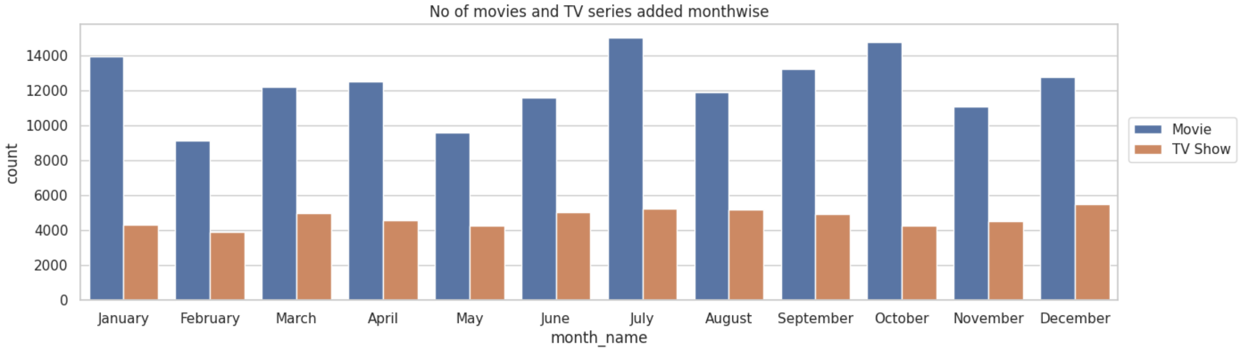
Univariate Analysis

```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
data['date_added'] = pd.to_datetime(data['date_added'],
errors='coerce')
# Create a new DataFrame with the datetime columns
data_datetime = data.copy()
data_datetime['Year'] = data_datetime['date_added'].dt.year
data_datetime['Month'] = data_datetime['date_added'].dt.month
data_datetime['Day'] = data_datetime['date_added'].dt.day_name()
# Plot the countplot
sns.countplot(x="type", data=data_datetime)
plt.title("No of movies and TV series")
plt.show()
```



Bivariate Analysis

```
data_datetime = pd.DataFrame(data)
data_datetime['Year'] = data.date_added.dt.year
data_datetime['month'] = data.date_added.dt.month
data_datetime['day'] = data.date_added.dt.day_name()
data_datetime_month = data_datetime.sort_values(by ="month")
data_datetime_month['month_name'] = data.date_added.dt.month_name()
#defining fig size fot the graph image
plt.figure(figsize=(15,4))
sns.countplot(x = "month_name" , data = data_datetime_month , hue =
"type")
plt.title("No of movies and TV series added monthwise")
#title name of the plot
plt.legend(loc=(1.01,0.5))
plt.show()
```


No of movies and TV series added monthwise
count
0
2000
4000
6000
8000
10000
12000
14000
month_name
January
February
March
April
May
June
July
August
September
October
November
December
Movie
TV Show