```
# Importing the Library
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

# Rading the CSV Files Path
import pandas as pd
df =
pd.read_csv("https://d2beiqkhq929f0.cloudfront.net/public_assets/asset
s/000/000/940/original/netflix.csv")

# Rading the first 5 records
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                                                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...
```

```
# Checking the number of rows and columns
df.shape
```

```
(8807, 12)
```

```
# Summary Infomartion
# This provide the information about non-null values and data types od
each columns.
# IT also help to idenetify the null values
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
```

```
# We can gain insights into the numerical attributes such as count,
# mean, standard deviation, minimum, maximum, and quartiles
df.describe()
```

```
       release_year        month         year
count   8787.000000  8787.000000  8787.000000
mean    2014.185843     6.654490  2018.872539
std        8.825944     3.435514     1.574439
min     1925.000000     1.000000  2008.000000
25%     2013.000000     4.000000  2018.000000
50%     2017.000000     7.000000  2019.000000
75%     2019.000000    10.000000  2020.000000
max     2021.000000    12.000000  2021.000000
```

```
df.describe(include='O')
```

```
       show_id   type                 title       director  \
count     8807   8807                  8807           6173   
unique    8807      2                  8807           4528   
top         s1  Movie  Dick Johnson Is Dead  Rajiv Chilaka
```

```
freq         1   6131                     1             19

                      cast         country       date_added rating
duration  \
count                 7982            7976             8797   8803
8804
unique                7692             748             1767     17
220
top     David Attenborough  United States  January 1, 2020  TV-MA  1
Season
freq                    19            2818              109   3207
1793

                           listed_in  \
count                           8807
unique                           514
top     Dramas, International Movies
freq                             362

                                              description
count                                                8807
unique                                               8775
top     Paranormal activity at a lush, abandoned prope...
freq                                                    4

# This dataset explores the missing values in each column
# using df. isnull().sum(). We aim to identify the columns with
# missing values and determine the percentage of missing data in each
column.
# df.isnull().sum()
df.isnull().sum()/len(df)*100  # checking the percentage of null
values in particular column

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

# We identify and remove duplicate records using
df.duplicated().sum().
df.duplicated().sum()
```

```
0
```

```python
# Handling Missing Values in Specific Columns
# repalcing the missing value in director and cast with not found
df['director'].replace(np.nan,'Not Found',inplace=True)
df['cast'].replace(np.nan,'Not Found',inplace=True)
```

```python
# df.isnull().sum()
df['country'].value_counts()
```

```
United States                             2818
India                                      972
United Kingdom                             419
Japan                                      245
South Korea                                199
                                          ...
Romania, Bulgaria, Hungary                   1
Uruguay, Guatemala                           1
France, Senegal, Belgium                     1
Mexico, United States, Spain, Colombia       1
United Arab Emirates, Jordan                 1
Name: country, Length: 748, dtype: int64
```

```python
df['country'].fillna(df['country'].mode()[0],inplace=True)
```

```python
# finding mode rating for movie and TV show
movie_rat = df.loc[df['type'] == "Movie",'rating'].mode()[0]
tv_show_rat = df.loc[df['type'] == 'TV Show','rating'].mode()[0]
```

```python
df['rating'] = df.apply(lambda x: movie_rat if x['type'] == 'Movie'
                        and pd.isna(x['rating'])
                        else tv_show_rat
                        if x['type'] == 'TV Show'
                        and pd.isna(x['rating'])
                        else x['rating'],axis=1)
```

```python
# finding mode rating for movie and TV show
movie_duration = df.loc[df['type'] == "Movie",'duration'].mode()[0]
tv_duration = df.loc[df['type'] == 'TV Show','duration'].mode()[0]
```

```python
df['duration'] = df.apply(lambda x: movie_duration if x['type'] ==
'Movie'
                        and pd.isna(x['duration'])
                        else tv_duration
                        if x['type'] == 'TV Show'
                        and pd.isna(x['duration'])
                        else x['duration'],axis=1)
```

```python
# Dropping Remaining Missing Values
# df.isnull().sum()
df.dropna(inplace=True)
df.head(5)
```

```
  show_id     type                  title         director  \
0      s1    Movie   Dick Johnson Is Dead  Kirsten Johnson
1      s2  TV Show          Blood & Water        Not Found
2      s3  TV Show              Ganglands  Julien Leclercq
3      s4  TV Show  Jailbirds New Orleans        Not Found
4      s5  TV Show           Kota Factory        Not Found

                                                cast        country  \
0                                          Not Found  United States
1  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...   South Africa
2  Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...  United States
3                                          Not Found  United States
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...
```

```python
# Date Handling
df['date_added'] = pd.to_datetime(df['date_added'])

df['month'] = df['date_added'].dt.month
df['month_name'] = df['date_added'].dt.month_name()
df['year'] = df['date_added'].dt.year

df.head(3)
```

```
  show_id     type                 title         director  \
0      s1    Movie  Dick Johnson Is Dead  Kirsten Johnson
1      s2  TV Show         Blood & Water        Not Found
2      s3  TV Show             Ganglands  Julien Leclercq
```

```
                                                cast        country  \
0                                          Not Found  United States   
1  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...   South Africa   
2  Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...  United States   

  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   

                                           listed_in  \
0                                      Documentaries   
1    International TV Shows, TV Dramas, TV Mysteries   
2  Crime TV Shows, International TV Shows, TV Act...   

                                         description  month month_name 
year  
0  As her father nears the end of his life, filmm...      9  September 
2021  
1  After crossing paths at a party, a Cape Town t...      9  September 
2021  
2  To protect his family from a powerful drug lor...      9  September 
2021  
```

```python
df.columns
```

```
Index(['show_id', 'type', 'title', 'director', 'cast', 'country', 
'date_added',
       'release_year', 'rating', 'duration', 'listed_in', 
'description',
       'month', 'month_name', 'year'],
      dtype='object')
```

```python
# Data Transformation: Cast, Country, Listed In, and Director
# splitting and expanding the cast column
df_cast = 
pd.melt(df['cast'].str.split(",",expand=True),var_name='cast_index', 
value_name='cast_new')
df_cast['show_id'] = df['show_id']
df_cast = df_cast.reset_index(drop=True)
df_cast.head()
```

```
   cast_index       cast_new show_id
0           0      Not Found      s1
1           0     Ama Qamata      s2
2           0  Sami Bouajila      s3
3           0      Not Found      s4
4           0     Mayur More      s5
```

```python
df_country = 
pd.melt(df['country'].str.split(",",expand=True),var_name='country_ind
ex',
value_name='country_new')
df_country['show_id'] = df['show_id']
df_country = df_country.reset_index(drop=True)
df_country.head()
```

```
   country_index    country_new show_id
0              0  United States      s1
1              0   South Africa      s2
2              0  United States      s3
3              0  United States      s4
4              0          India      s5
```

```
df_listed_in =
pd.melt(df['listed_in'].str.split(",",expand=True),var_name='listed_in
_index',
value_name='listed_in_new')
df_listed_in['show_id'] = df['show_id']
df_listed_in = df_listed_in.reset_index(drop=True)
df_listed_in.head()
```

```
   listed_in_index           listed_in_new show_id
0                0           Documentaries      s1
1                0  International TV Shows      s2
2                0          Crime TV Shows      s3
3                0              Docuseries      s4
4                0  International TV Shows      s5
```

```
df_director =
pd.melt(df['director'].str.split(",",expand=True),var_name='director_i
ndex',
value_name='director_new')
df_director['show_id'] = df['show_id']
df_director = df_director.reset_index(drop=True)
df_director.head()
```

```
   director_index     director_new show_id
0               0  Kirsten Johnson      s1
1               0        Not Found      s2
2               0  Julien Leclercq      s3
3               0        Not Found      s4
4               0        Not Found      s5
```

```
# df.head(1)
df.shape
```

```
(8797, 15)
```

```
df= df.merge(df_cast,on='show_id',how='left')
df = df.merge(df_country,on='show_id',how='left')
df = df.merge(df_director,on='show_id',how='left')
df = df.merge(df_listed_in,on='show_id',how='left')

df.head()

  show_id     type                  title         director  \
0      s1    Movie   Dick Johnson Is Dead  Kirsten Johnson   
1      s2  TV Show          Blood & Water        Not Found   
2      s3  TV Show              Ganglands  Julien Leclercq   
3      s4  TV Show  Jailbirds New Orleans        Not Found   
4      s5  TV Show           Kota Factory        Not Found   

                                                cast        country  \
0                                          Not Found  United States   
1  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...   South Africa   
2  Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...  United States   
3                                          Not Found  United States   
4  Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...          India   

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

   cast_index       cast_new  country_index    country_new 
director_index  \
0           0      Not Found              0  United States 
0   
1           0     Ama Qamata              0   South Africa 
0   
2           0  Sami Bouajila              0  United States 
0   
3           0      Not Found              0  United States 
0   
4           0     Mayur More              0          India 
0   

      director_new listed_in_index           listed_in_new  
0  Kirsten Johnson               0           Documentaries  
1        Not Found               0  International TV Shows  
2  Julien Leclercq               0          Crime TV Shows  
3        Not Found               0              Docuseries  
4        Not Found               0  International TV Shows  

[5 rows x 23 columns]

df.drop(['cast','country','director','listed_in','cast_index','listed_
in_index','country_index','director_index'],axis=1,inplace=True)
```

```
df.head()
```

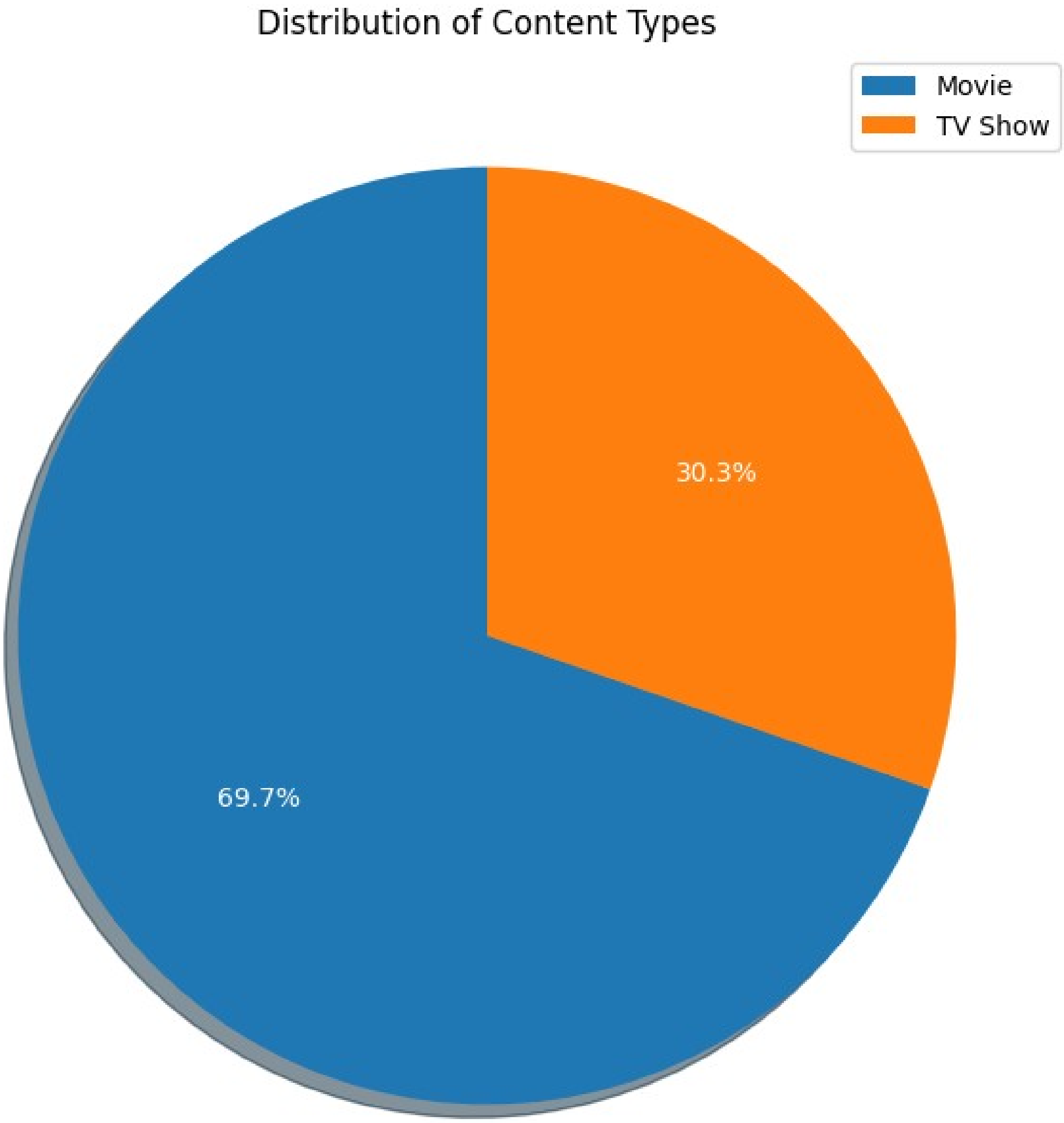
```
  show_id     type                  title date_added  release_year
rating  \
0      s1    Movie   Dick Johnson Is Dead 2021-09-25          2020
PG-13
1      s2  TV Show          Blood & Water 2021-09-24          2021
TV-MA
2      s3  TV Show              Ganglands 2021-09-24          2021
TV-MA
3      s4  TV Show  Jailbirds New Orleans 2021-09-24          2021
TV-MA
4      s5  TV Show           Kota Factory 2021-09-24          2021
TV-MA

    duration                                        description  month
\
0     90 min  As her father nears the end of his life, filmm...      9

1  2 Seasons  After crossing paths at a party, a Cape Town t...      9

2   1 Season  To protect his family from a powerful drug lor...      9

3   1 Season  Feuds, flirtations and toilet talk go down amo...      9

4  2 Seasons  In a city of coaching centers known to train I...      9


  month_name  year       cast_new    country_new     director_new  \
0  September  2021      Not Found  United States  Kirsten Johnson
1  September  2021     Ama Qamata   South Africa        Not Found
2  September  2021  Sami Bouajila  United States  Julien Leclercq
3  September  2021      Not Found  United States        Not Found
4  September  2021     Mayur More          India        Not Found

            listed_in_new
0           Documentaries
1  International TV Shows
2          Crime TV Shows
3              Docuseries
4  International TV Shows
```

```
df.shape
```

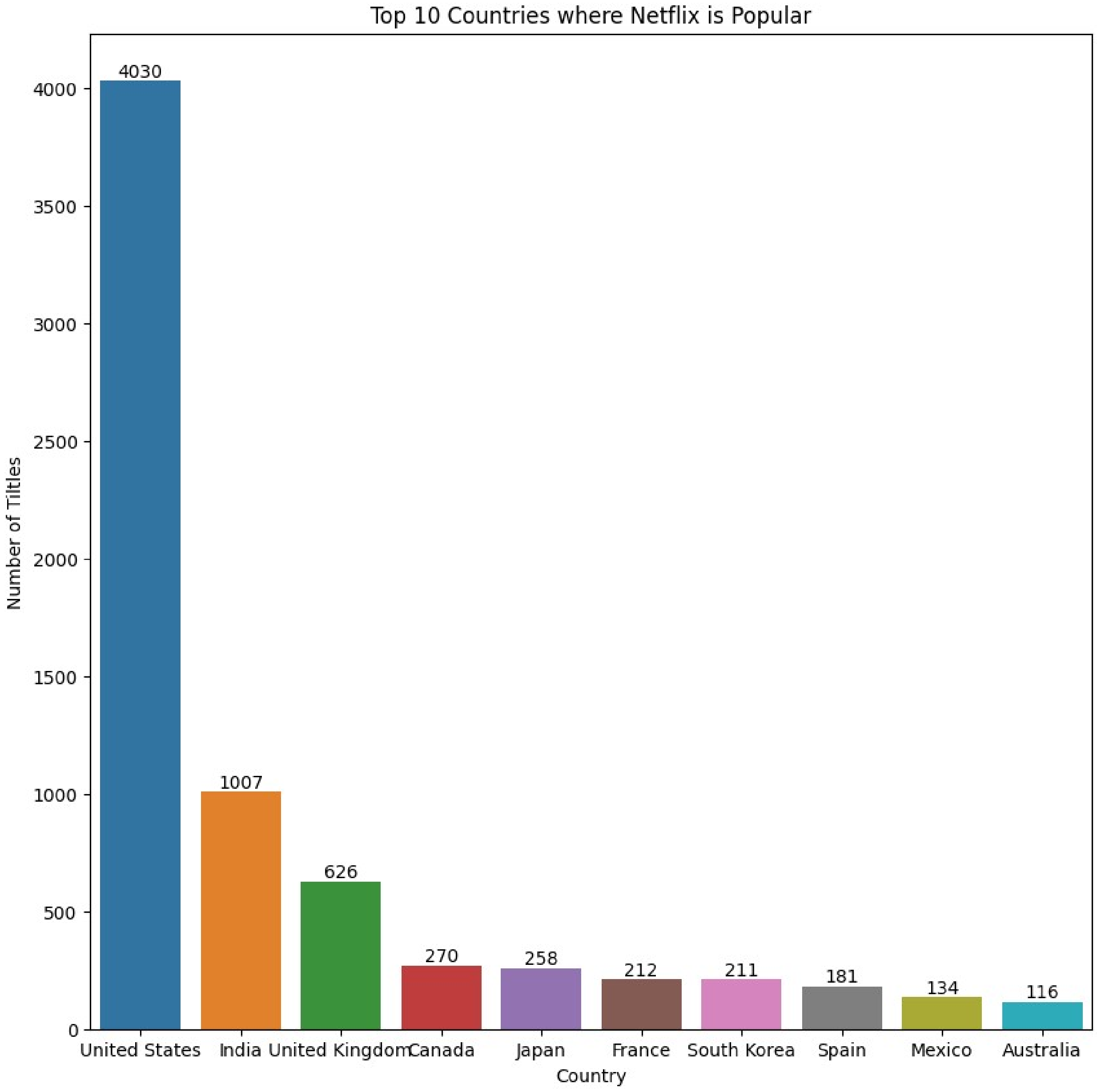
```
(8797, 15)
```

```
# Distribution of Content Types
# calculate the percentage distribution of content types
```

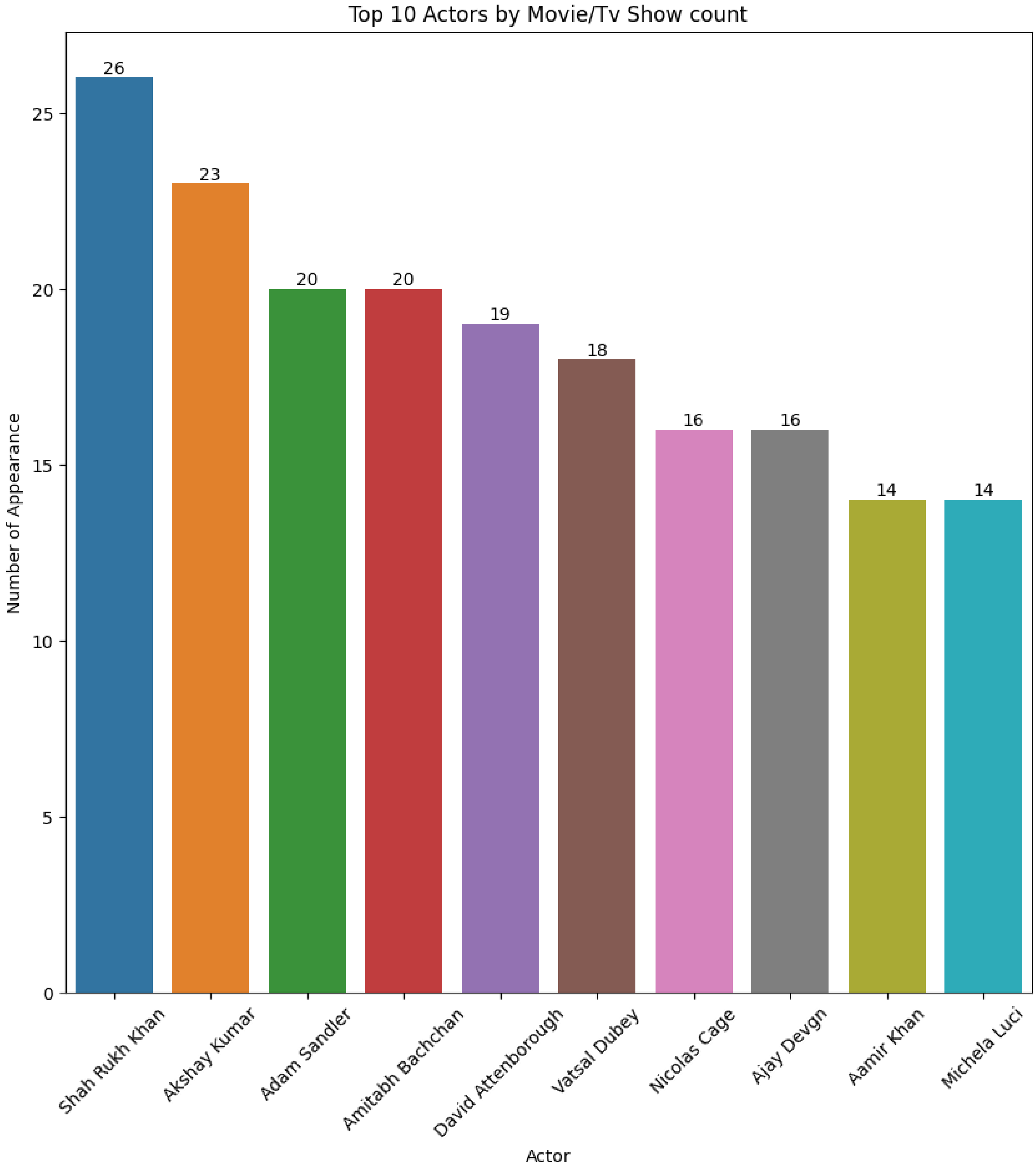
```python
x = df.groupby(['type'])['type'].count()
y = len(df)
r = ((x/y)*100).round(2)

mf_ratio = pd.DataFrame(r)

plt.figure(figsize=(10,8))
plt.pie(mf_ratio['type'],
        labels=mf_ratio.index,
        autopct='%1.1f%%',
        startangle=90,
        shadow=True,textprops={'color':'white'})
plt.legend(loc='upper right')
plt.title('Distribution of Content Types')
plt.show()
```



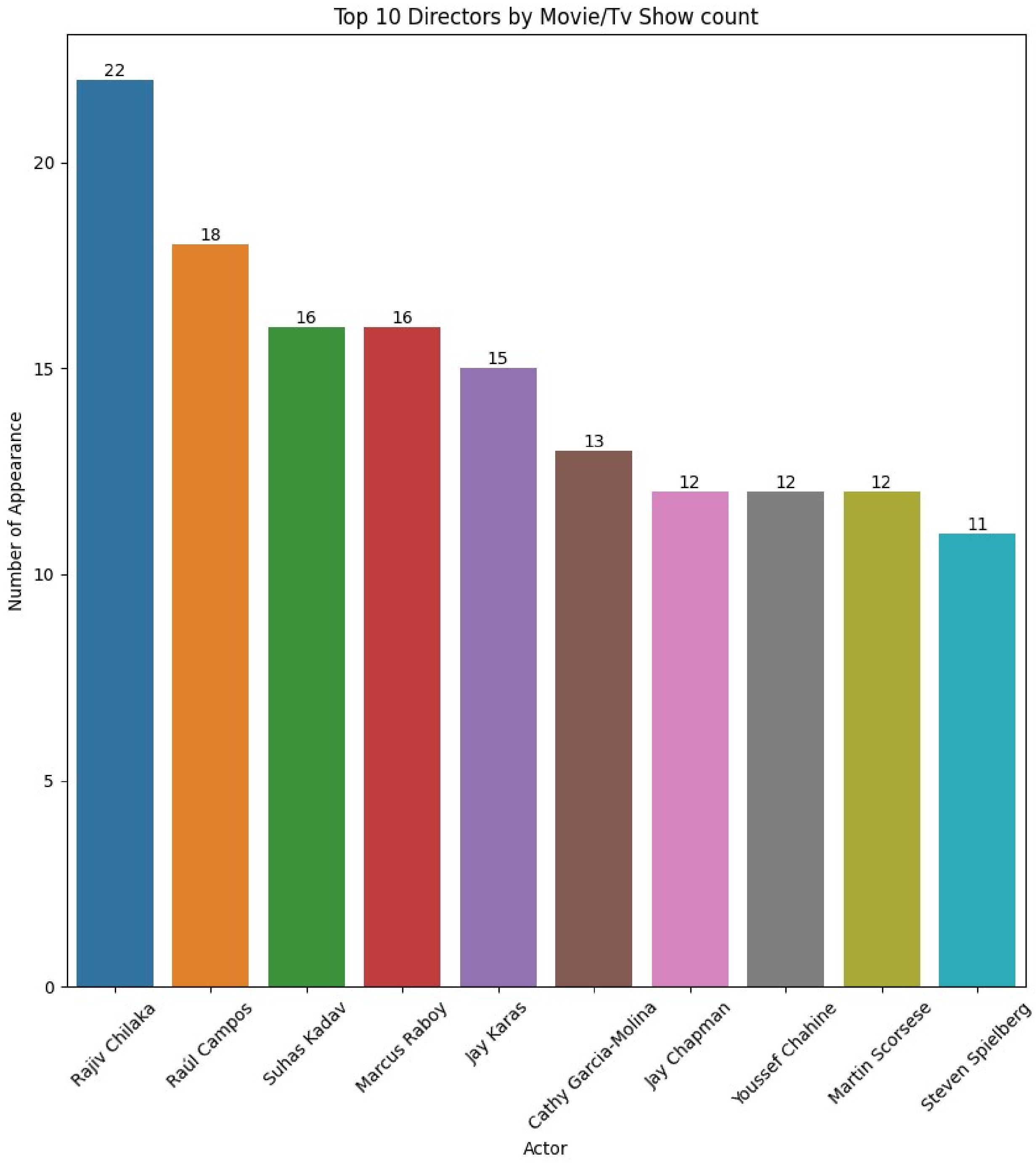
```
# top 10 countries where netflix is popular
top_10_countries = df['country_new'].value_counts().head(10)

plt.figure(figsize=(10,10))
bar_plot = sns.barplot(x=top_10_countries.index,y=top_10_countries)
plt.xlabel('Country')
plt.ylabel('Number of Tiltles')
plt.title('Top 10 Countries where Netflix is Popular')

# adding the count the above the bar
for index, value in enumerate(top_10_countries.values):
  bar_plot.text(index,value,str(value),ha='center',va='bottom')


plt.show()
```



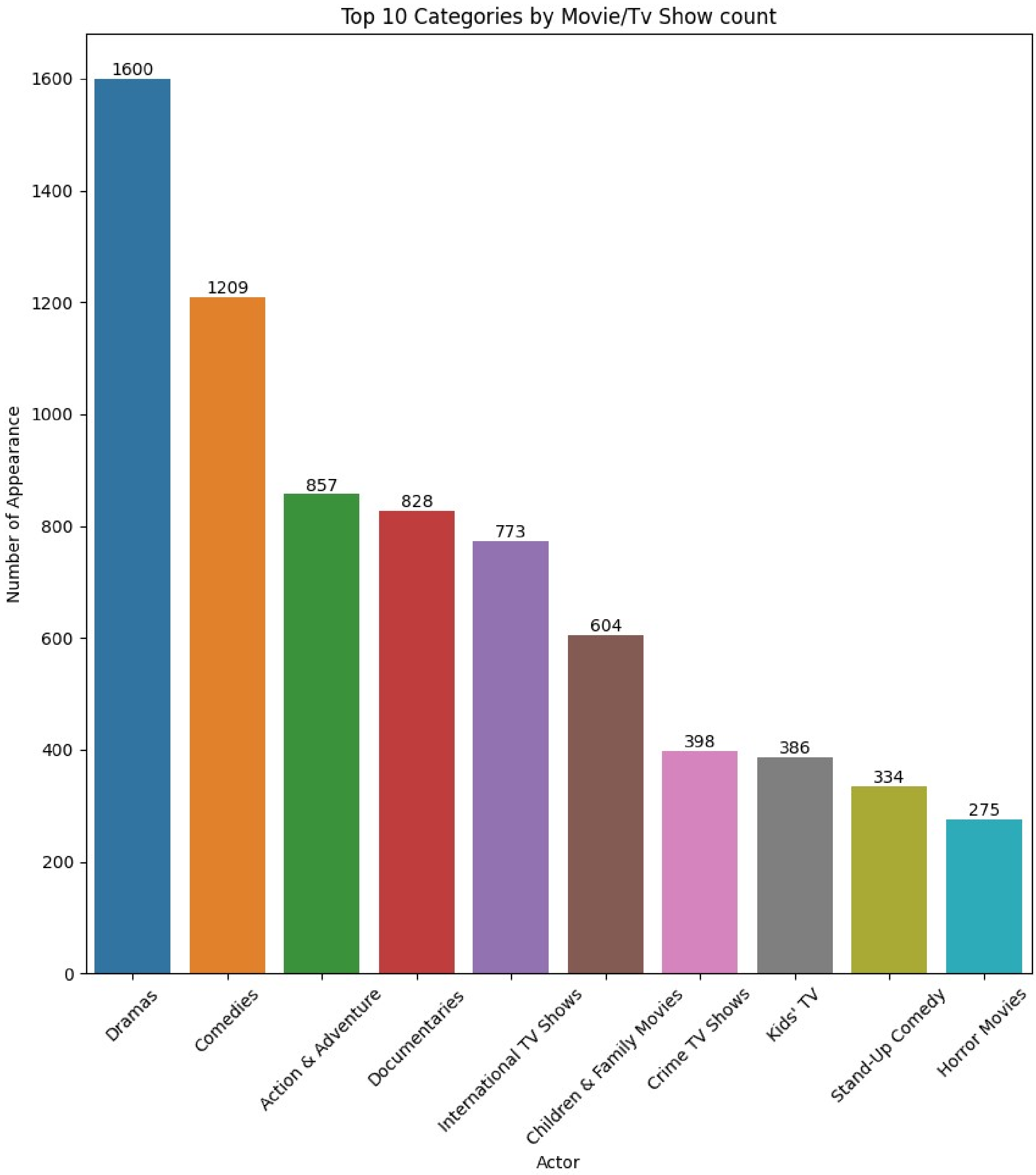
```
# top 10 Actors by movie/Tv show count
top_10_cast = df['cast_new'].value_counts()[1:].head(10)

plt.figure(figsize=(10,10))
bar_plot1 = sns.barplot(x=top_10_cast.index,y=top_10_cast.values)
plt.xticks(rotation=45)
plt.xlabel('Actor')
plt.ylabel('Number of Appearance')
plt.title('Top 10 Actors by Movie/Tv Show count')

for index, value in enumerate(top_10_cast.values):
  bar_plot1.text(index,value,str(value),ha='center',va='bottom')

plt.show()
```



```
# top 10 Directors by movie/Tv show count
top_10_director = df['director_new'].value_counts()[1:].head(10)
# df['director_new'].value_counts().head(10)

plt.figure(figsize=(10,10))
bar_plot2 =
sns.barplot(x=top_10_director.index,y=top_10_director.values)
plt.xticks(rotation=45)
plt.xlabel('Actor')
plt.ylabel('Number of Appearance')
plt.title('Top 10 Directors by Movie/Tv Show count')

for index, value in enumerate(top_10_director.values):
  bar_plot2.text(index,value,str(value),ha='center',va='bottom')

plt.show()
```

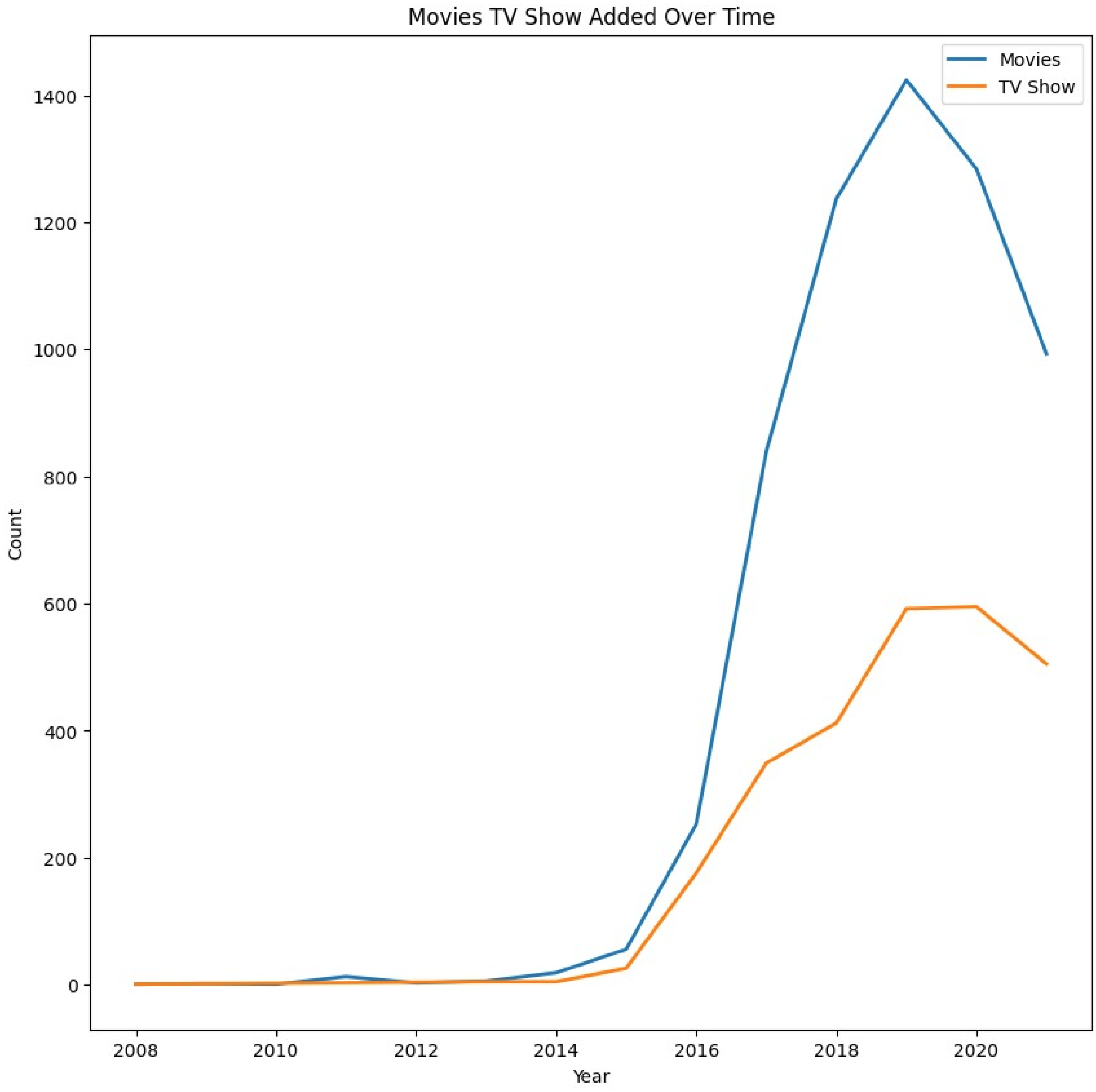


```
# top 10 Categories by movie/Tv show count
top_10_listed =
df['listed_in_new'].str.strip().value_counts().head(10)
# df['listed_in_new'].str.strip().value_counts()

plt.figure(figsize=(10,10))
bar_plot3 = sns.barplot(x=top_10_listed.index,y=top_10_listed.values)
plt.xticks(rotation=45)
plt.xlabel('Actor')
plt.ylabel('Number of Appearance')
plt.title('Top 10 Categories by Movie/Tv Show count')

for index, value in enumerate(top_10_listed.values):
  bar_plot3.text(index,value,str(value),ha='center',va='bottom')

plt.show()
```



```python
# Movies and TV shows Over Time
df_movies = df[df['type'] == "Movie"]
df_tv_shows = df[df['type'] == "TV Show"]

movies_count = df_movies['year'].value_counts().sort_index()
tv_show_count = df_tv_shows['year'].value_counts().sort_index()
```

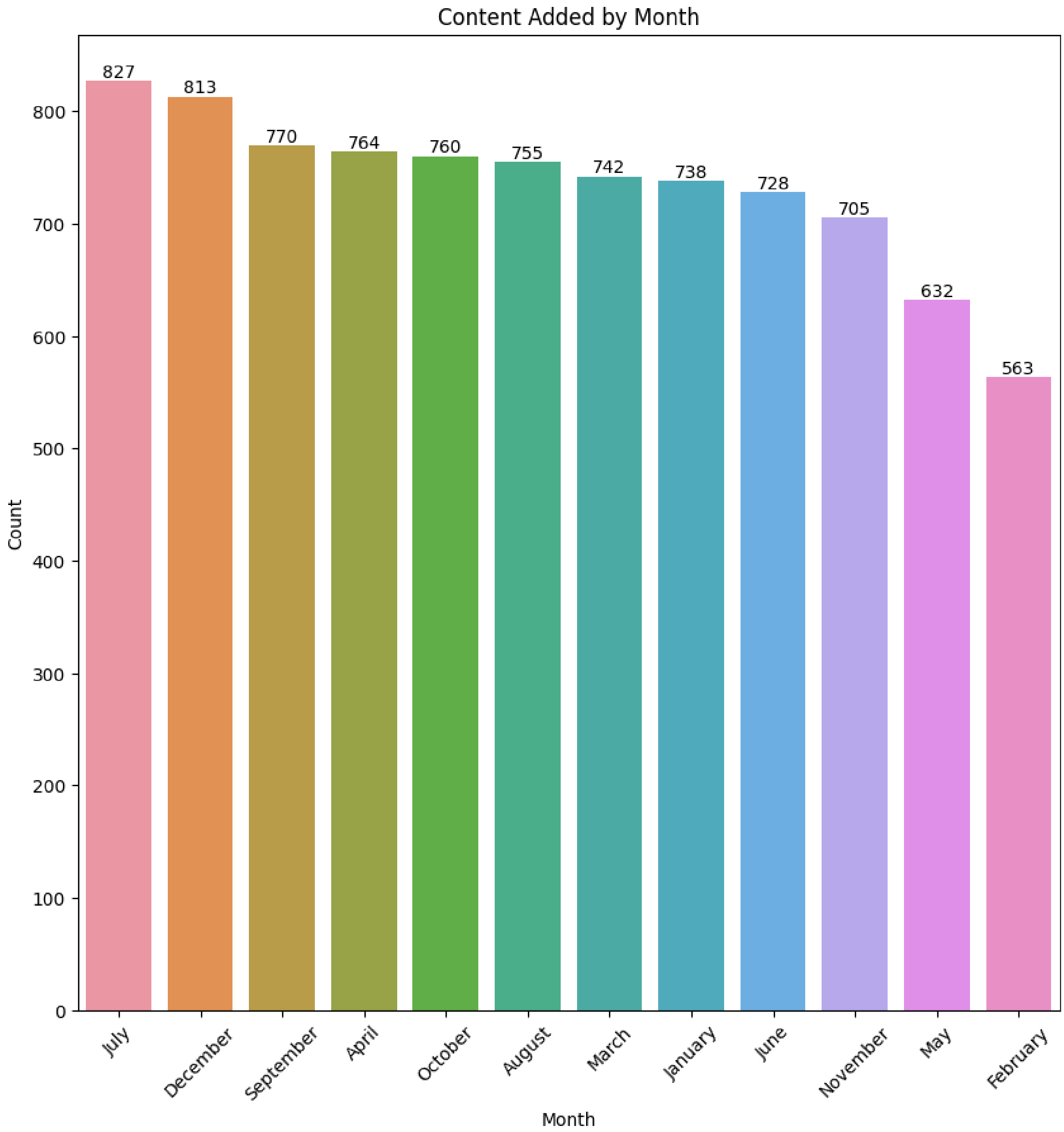
```
plt.figure(figsize=(10,10))
plt.plot(movies_count.index,movies_count.values,label='Movies',linewidth=2)
plt.plot(tv_show_count.index,tv_show_count.values,label='TV Show',linewidth=2)
plt.xlabel('Year')
plt.ylabel('Count')
plt.title('Movies TV Show Added Over Time')
plt.legend()
plt.show()
```



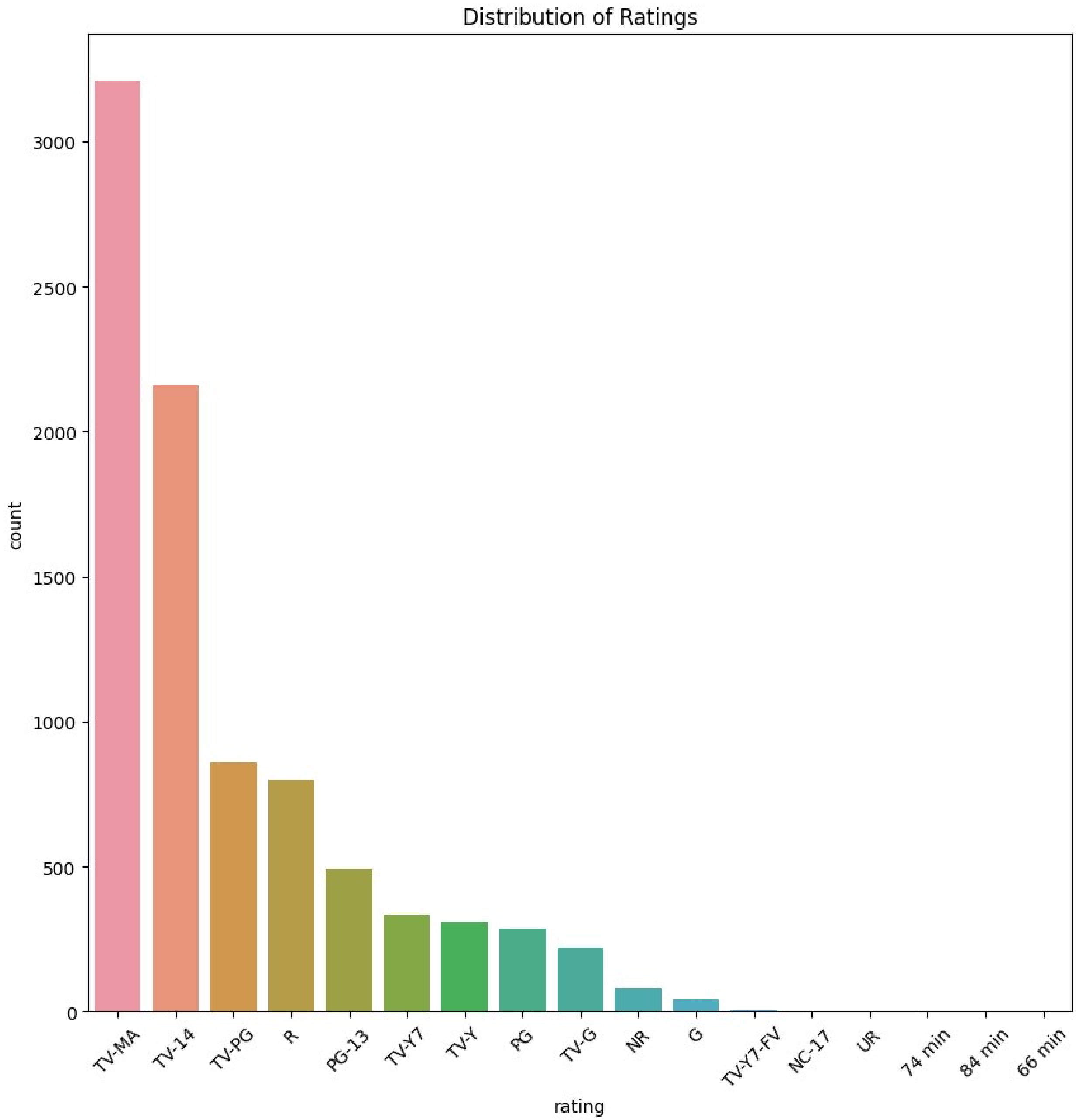
```
# Content Added by Month
df.head(1)
```

```
  show_id   type                 title date_added  release_year rating
\
0      s1  Movie  Dick Johnson Is Dead 2021-09-25          2020  PG-13


  duration                                        description
month  \
0   90 min  As her father nears the end of his life, filmm...      9


  month_name  year   cast_new    country_new     director_new
listed_in_new
0  September  2021  Not Found  United States  Kirsten Johnson
Documentaries
```

```
monthly_counts = df['month_name'].value_counts()

plt.figure(figsize=(10,10))
bar_plot4 =
sns.barplot(x=monthly_counts.index,y=monthly_counts.values)
plt.xlabel('Month')
plt.ylabel('Count')
plt.title('Content Added by Month')

for index,value in enumerate(monthly_counts.values):
  bar_plot4.text(index,value,str(value),ha='center',va='bottom')

plt.xticks(rotation=45)
plt.show()
```



```
# count the occurance to visualize the ratings
rating_counts = df['rating'].value_counts()

plt.figure(figsize=(10,10))
sns.barplot(x=rating_counts.index,y=rating_counts.values)
plt.xlabel('rating')
plt.ylabel('count')
plt.title('Distribution of Ratings')
plt.xticks(rotation=45)
plt.show()
```

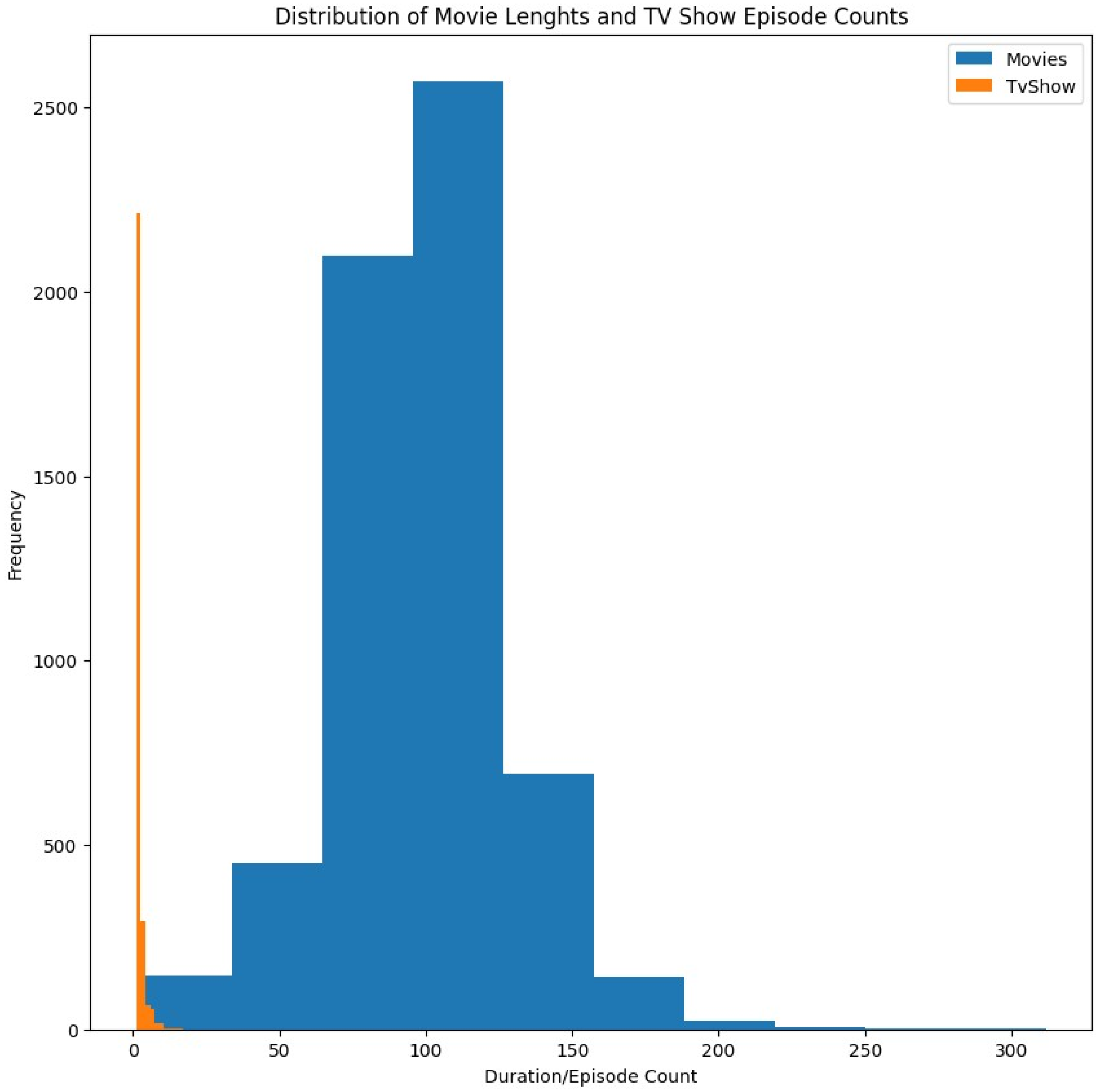


```
df.dropna(axis=0,inplace=True)

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

```
Dramas                              1599
Comedies                            1209
Action & Adventure                   857
Documentaries                        828
International TV Shows               772
Children & Family Movies             604
Crime TV Shows                       398
```

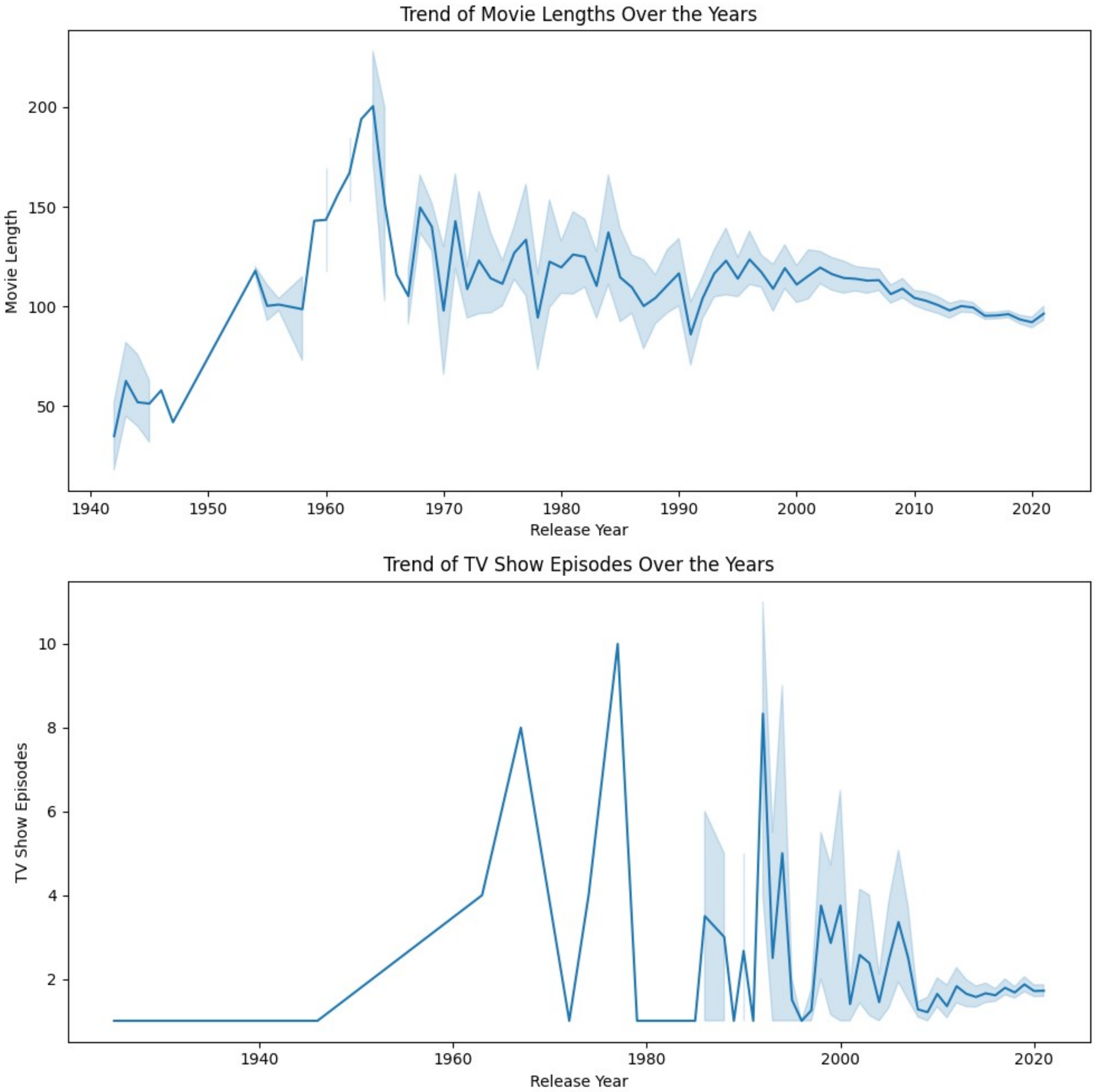
```
Kids' TV                         386
Stand-Up Comedy                  334
Horror Movies                    275
British TV Shows                 251
Docuseries                       220
Anime Series                     175
International Movies             128
Reality TV                       120
TV Comedies                      119
Classic Movies                    80
TV Dramas                         66
Thrillers                         65
Movies                            57
TV Action & Adventure             39
Stand-Up Comedy & Talk Shows      34
Romantic TV Shows                 32
Anime Features                    21
Independent Movies                20
Classic & Cult TV                 20
Music & Musicals                  18
TV Shows                          16
Sci-Fi & Fantasy                  13
Cult Movies                       12
TV Horror                         11
Romantic Movies                    3
Spanish-Language TV Shows          2
LGBTQ Movies                       1
TV Sci-Fi & Fantasy                1
Sports Movies                      1
Name: listed_in_new, dtype: int64

genres =
pd.DataFrame(index=df['listed_in_new'],columns=df['listed_in_new'],dty
pe=float)

genres.fillna(0,inplace=True)

# for _,row in df.iterrows():
#   listed_in = row['listed_in_new'].split(', ')
#   for genre1 in listed_in:
#     for genre2 in listed_in:
#       genres.at[genre1,genre2] += 1

# Distribution of movie lenght and TV Show episode Counts
moveie_len = df_movies['duration'].str.extract('(\
d+)',expand=False).astype(int)
tv_show_len = df_tv_shows['duration'].str.extract('(\
d+)',expand=False).astype(int)
```

```
plt.figure(figsize=(10,10))
plt.hist(moveie_len,label='Movies',bins=10)
plt.hist(tv_show_len,label='TvShow',bins=10)
plt.xlabel('Duration/Episode Count')
plt.ylabel('Frequency')
plt.title('Distribution of Movie Lenghts and TV Show Episode Counts')
plt.legend()
plt.show()
```



```
# The Trend of Movies/TV Show Lenght OVer The Years
plt.figure(figsize=(10,10))
plt.subplot(2,1,1)
```

```
sns.lineplot(data=df_movies,x='release_year',y=moveie_len)
plt.xlabel('Release Year')
plt.ylabel('Movie Length')
plt.title('Trend of Movie Lengths Over the Years')


plt.subplot(2, 1, 2)
sns.lineplot(data=df_tv_shows, x='release_year', y=tv_show_len)
plt.xlabel('Release Year')
plt.ylabel('TV Show Episodes')
plt.title('Trend of TV Show Episodes Over the Years')
plt.tight_layout()
plt.show()
```


Trend of Movie Lengths Over the Years
Movie Length
200
150
100
50
1940
1950
1960
1970
1980
1990
2000
2010
2020
Release Year
Trend of TV Show Episodes Over the Years
TV Show Episodes
10
8
6
4
2
1940
1960
1980
2000
2020
Release Year