Netflix-EDA

March 23, 2025

1 Netflix-Exploratory Data Analysis (EDA) and Visualization Using Python

[1]:
```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

[2]:
```python
df=pd.read_csv(r"C:\Users\mysel\Downloads\netflix_titles_2021 -␣
↪netflix_titles_2021.csv")
```

[3]:
```python
df.head()
```

[3]:
```
  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…
```

[4]:
```
df.isnull().sum()
```

[4]:
```
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
```

[5]:
```
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
```

```
[6]: df.describe(include="all")
```

```
[6]:        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
     mean       NaN    NaN                   NaN            NaN
     std        NaN    NaN                   NaN            NaN
     min        NaN    NaN                   NaN            NaN
     25%        NaN    NaN                   NaN            NaN
     50%        NaN    NaN                   NaN            NaN
     75%        NaN    NaN                   NaN            NaN
     max        NaN    NaN                   NaN            NaN

                          cast        country       date_added  release_year  \
     count                7982           7976             8797   8807.000000
     unique               7692            748             1714           NaN
     top     David Attenborough  United States  January 1, 2020           NaN
     freq                   19           2818              110           NaN
     mean                  NaN            NaN              NaN   2014.180198
     std                   NaN            NaN              NaN      8.819312
     min                   NaN            NaN              NaN   1925.000000
     25%                   NaN            NaN              NaN   2013.000000
     50%                   NaN            NaN              NaN   2017.000000
     75%                   NaN            NaN              NaN   2019.000000
     max                   NaN            NaN              NaN   2021.000000

            rating  duration                     listed_in  \
     count    8803      8804                          8807
     unique     17       220                           514
     top     TV-MA  1 Season  Dramas, International Movies
     freq     3207      1793                           362
     mean      NaN       NaN                           NaN
     std       NaN       NaN                           NaN
     min       NaN       NaN                           NaN
     25%       NaN       NaN                           NaN
     50%       NaN       NaN                           NaN
     75%       NaN       NaN                           NaN
     max       NaN       NaN                           NaN

                                                   description
     count                                                8807
     unique                                               8775
     top     Paranormal activity at a lush, abandoned prope…
     freq                                                    4
     mean                                                  NaN
```

```
std                                                    NaN
min                                                    NaN
25%                                                    NaN
50%                                                    NaN
75%                                                    NaN
max                                                    NaN
```

1.1 Data Cleaning and Handling Outliers

[7]:
```
# Convert 'date_added' to datetime
df['date_added'] = pd.to_datetime(df['date_added'])
```

[8]:
```
# Ensure 'duration' is string and fill missing values
df['duration'] = df['duration'].astype(str).fillna('Unknown')

# Convert seasons to equivalent minutes (assuming 1 season = 400 min)
def convert_duration(x):
    if 'Season' in x:
        try:
            num_seasons = int(x.split()[0])
            return f"{num_seasons * 400} min"
        except (ValueError, IndexError):
            return 'Unknown'
    return x

df['duration'] = df['duration'].apply(convert_duration)

# Extract numeric values using raw string to avoid warnings
df['duration_numeric'] = df['duration'].str.extract(r'(\d+)').astype(float)
```

[9]:
```
# Fill missing values:
df['director'] = df['director'].fillna('Unknown')
df['cast'] = df['cast'].fillna('Unknown')
df['country'] = df['country'].fillna('Unknown')
df['rating'] = df['rating'].fillna('Not Rated')
df['duration_numeric'] = df['duration_numeric'].fillna(0)
```

[10]:
```
# Check for duplicates
duplicates = df.duplicated().sum()
duplicates
```

[10]:
```
0
```

[11]:
```
#After fiiling Missing Values
df.info()
```

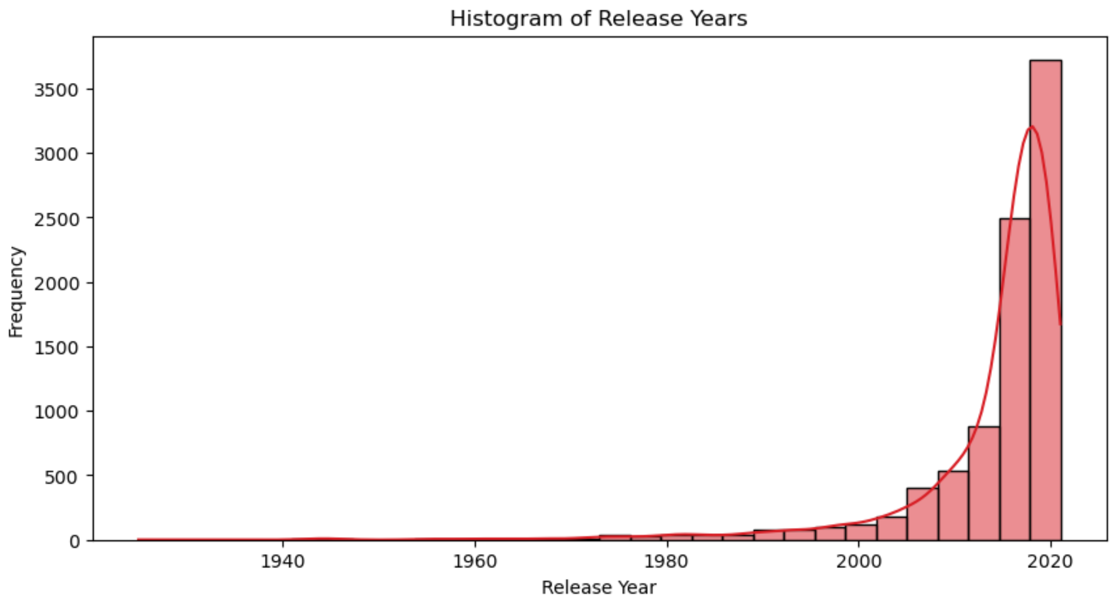
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8807 entries, 0 to 8806
```

```
Data columns (total 13 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          8807 non-null   object
 4   cast              8807 non-null   object
 5   country           8807 non-null   object
 6   date_added        8797 non-null   datetime64[ns]
 7   release_year      8807 non-null   int64
 8   rating            8807 non-null   object
 9   duration          8807 non-null   object
 10  listed_in         8807 non-null   object
 11  description       8807 non-null   object
 12  duration_numeric  8807 non-null   float64
dtypes: datetime64[ns](1), float64(1), int64(1), object(10)
memory usage: 894.6+ KB
```

2 Visualizing and Finding insights

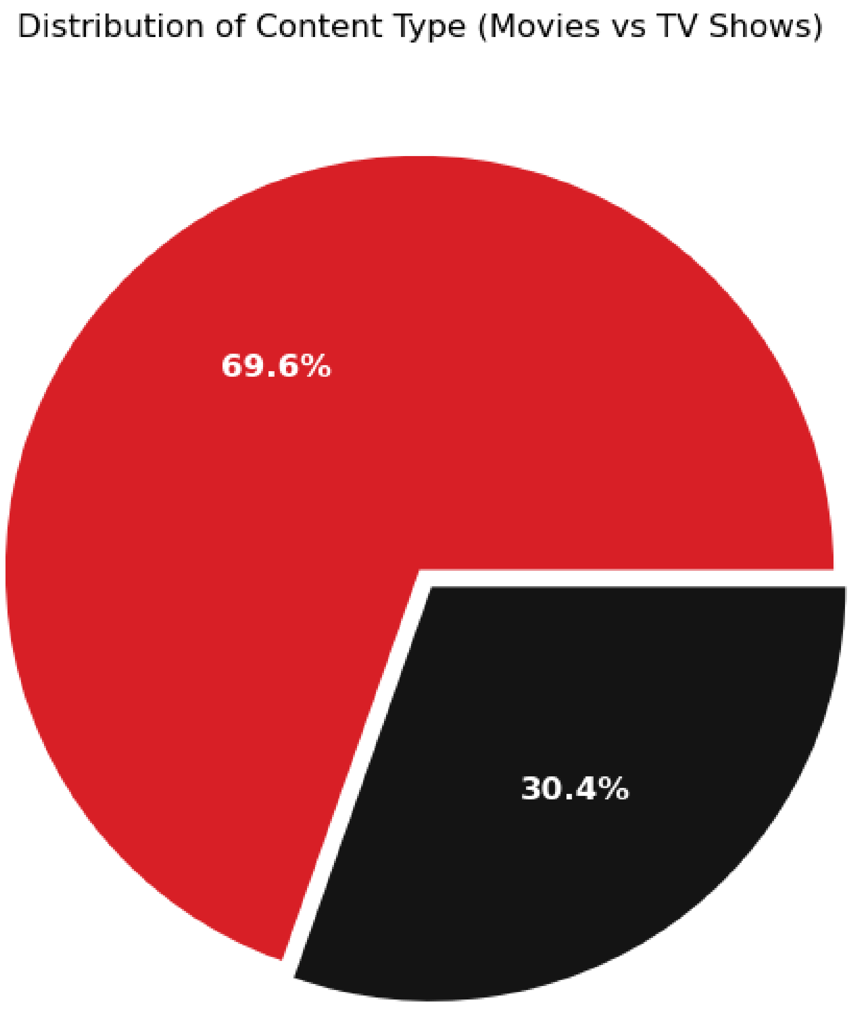
2.1 Plot histogram for release year

[12]:
```
plt.figure(figsize=(10, 5))
sns.histplot(df['release_year'], bins=30, kde=True, color='#D81F26')
plt.title('Histogram of Release Years')
plt.xlabel('Release Year')
plt.ylabel('Frequency')
plt.show()
```



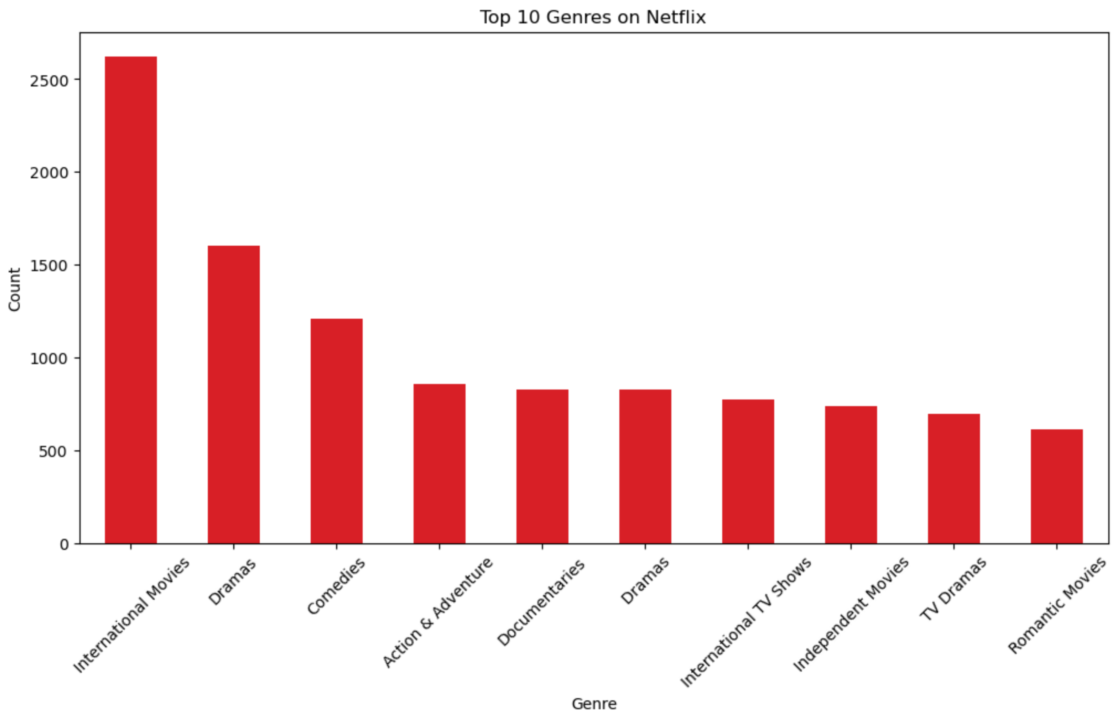
2.2 Visualizing content type using a pie chart

```
[13]: plt.figure(figsize=(7, 7))
      df['type'].value_counts().plot.pie(autopct='%1.1f%%',␣
       ↪colors=['#D81F26','#141414'],textprops={'color': 'white','size':
       ↪12,'fontweight': 'bold'},explode=[0,0.05])
      plt.title('Distribution of Content Type (Movies vs TV Shows)')
      plt.ylabel('')
      plt.show()
```



2.3 Visualizing Top genres using a bar chart

[14]:
```
plt.figure(figsize=(12, 6))
df['listed_in'].str.split(',').explode().value_counts().head(10).
  ↪plot(kind='bar', color='#D81F26')
plt.title('Top 10 Genres on Netflix')
plt.xlabel('Genre')
plt.ylabel('Count')
plt.xticks(rotation=45)
plt.show()
```



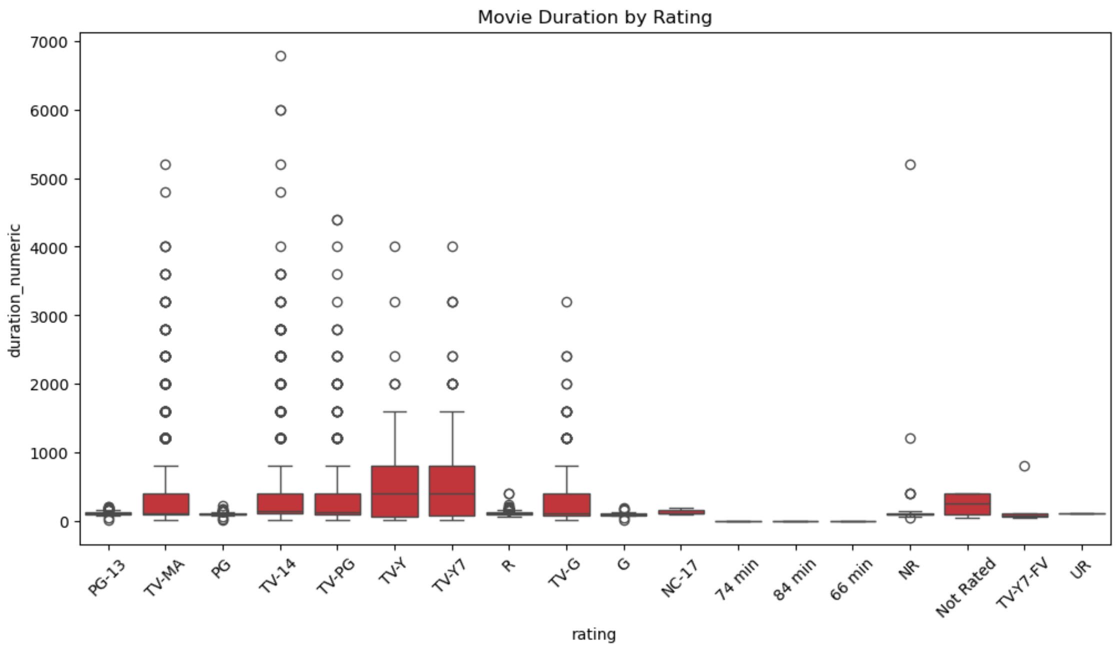
3 Here are the insights from the visualizations:

3.1 Content Type:

Movies account for approximately 70% of the content on Netflix, while TV shows make up the remaining 30%. ## Genres: The most common genres include Dramas, Comedies, and Documentaries, reflecting Netflix's strong focus on diverse storytelling.

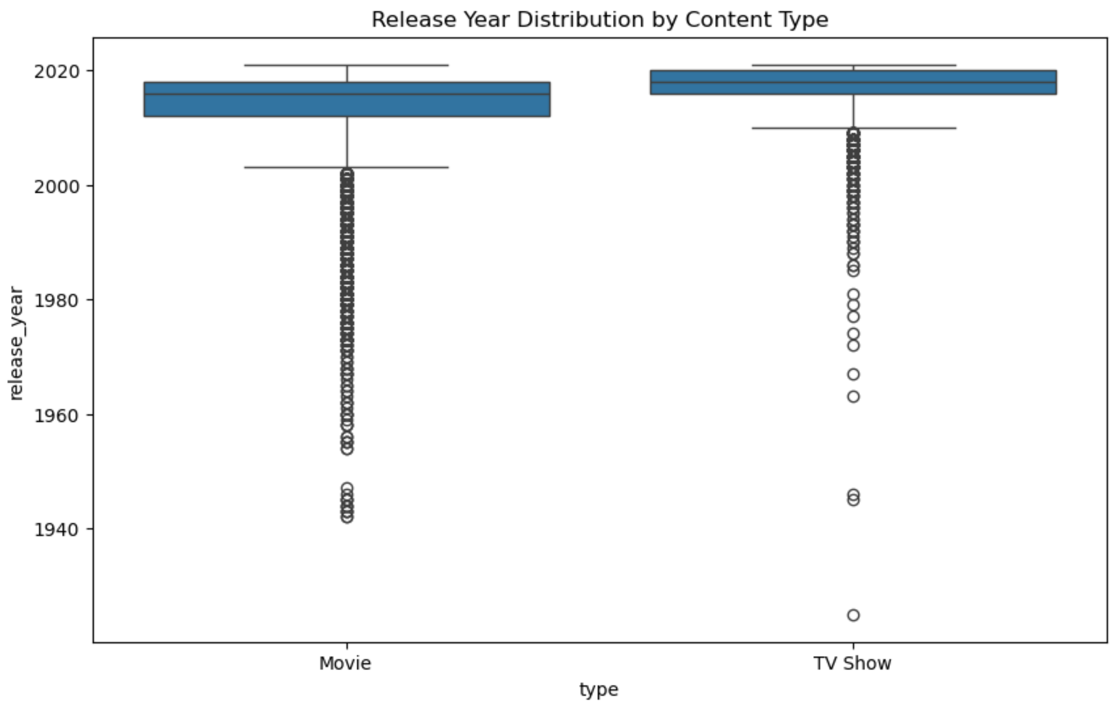
3.2 Boxplot for Movie Duration by Rating

[15]:
```python
plt.figure(figsize=(12, 6))
sns.boxplot(x='rating', y='duration_numeric', data=df, color='#D81F26')
plt.title('Movie Duration by Rating')
plt.xticks(rotation=45)
plt.show()
```



3.3 Boxplot for release years by content type

[16]:
```python
plt.figure(figsize=(10, 6))
sns.boxplot(x='type', y='release_year', data=df)
plt.title('Release Year Distribution by Content Type')
plt.show()
```



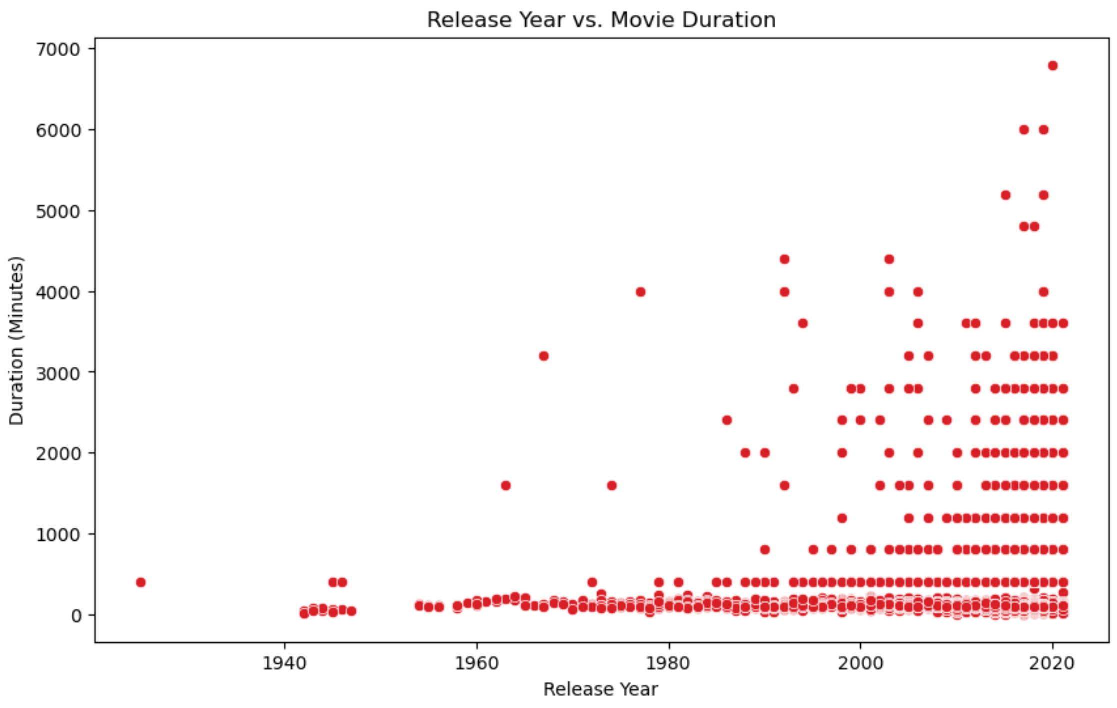
4 The boxplots provide these insights:

4.1 Movie Duration by Rating:

TV-MA and TV-14 movies tend to have longer durations compared to other ratings like PG or R. Movies with a G rating have shorter durations, typically aligned with children's content. ## Release Year by Content Type: Both movies and TV shows have seen a significant rise in releases after 2015. However, TV shows display a slightly wider range, with older releases still available on the platform.

4.2 Scatter plot to explore relationship between release year and movie duration

[17]:
```
plt.figure(figsize=(10, 6))
sns.scatterplot(x='release_year', y='duration_numeric', data=df,␣
 ↪color='#D81F26', alpha=1)
plt.title('Release Year vs. Movie Duration')
plt.xlabel('Release Year')
plt.ylabel('Duration (Minutes)')
plt.show()
```



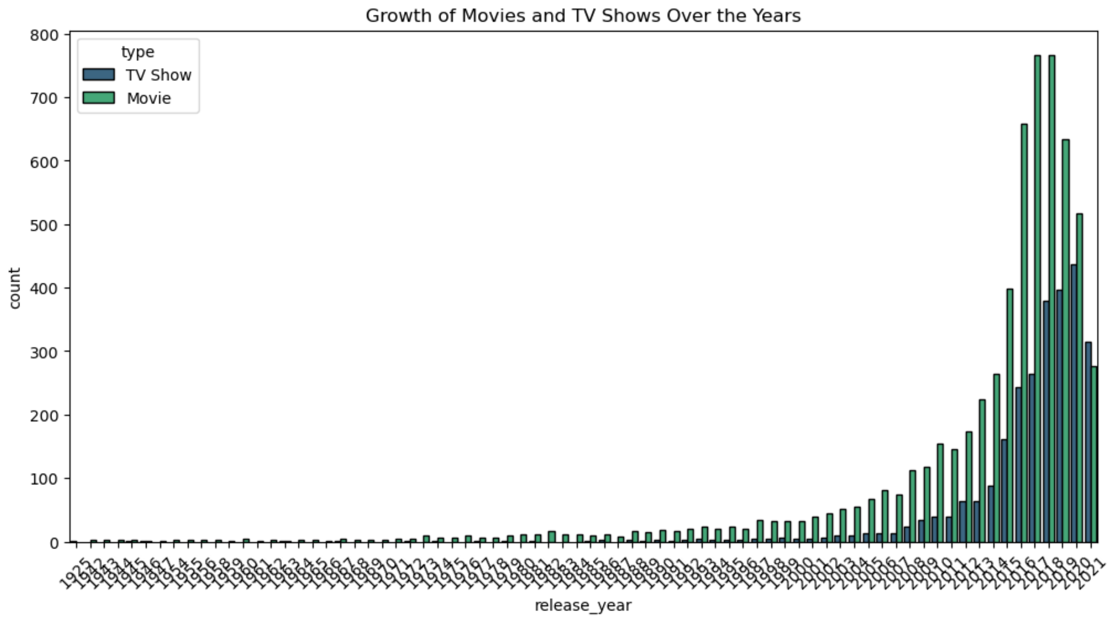
5 The analysis of relationships reveals:

5.1 Release Year vs. Movie Duration:

Most Movies/Series duration under 1000 min. Movies generally remain within the 60 to 120-minute range, irrespective of release year and most movies released in range between 2000 to 2020.

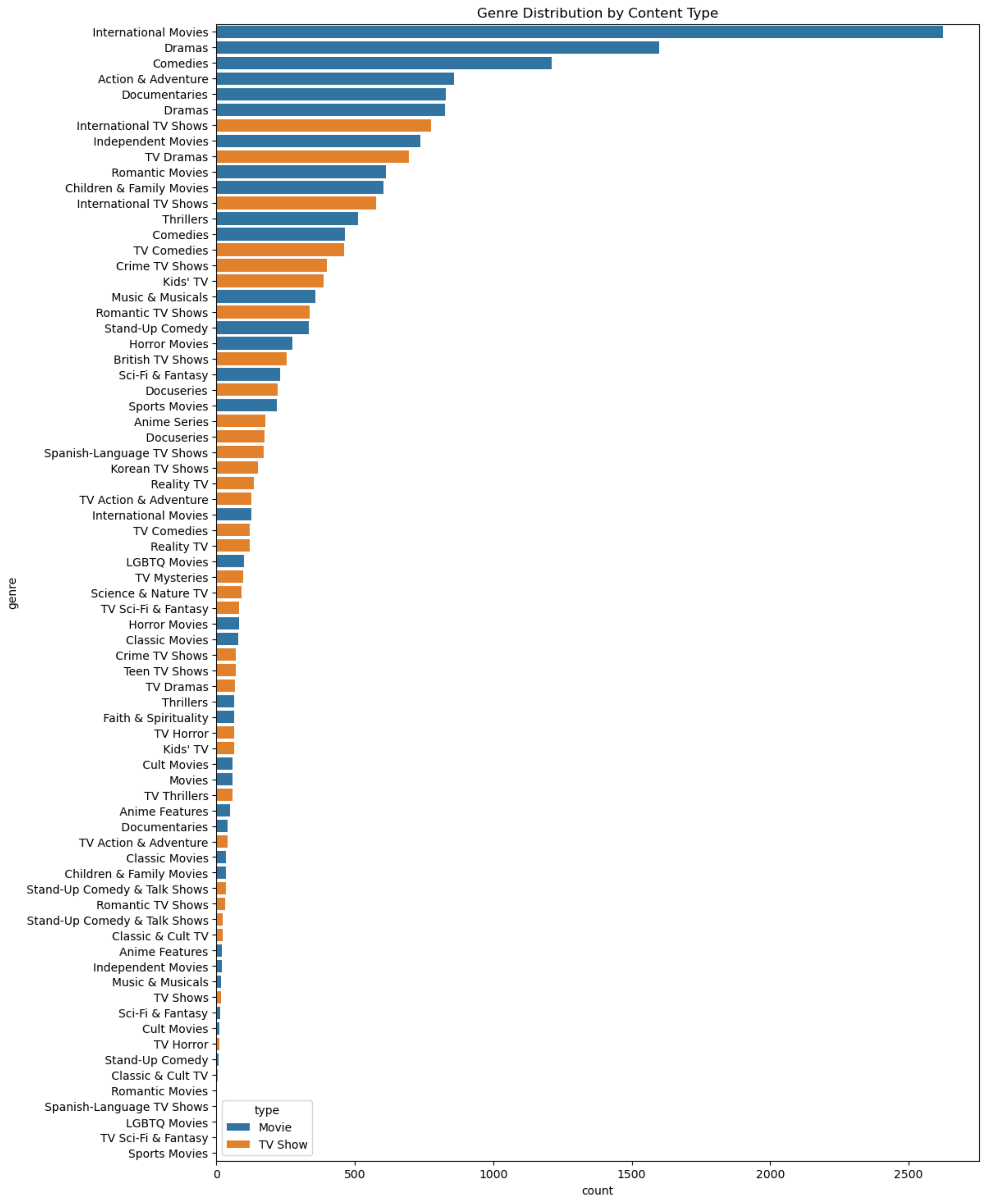
5.2 Analyzing the Growth of Movies and TV Shows Over the Years

[18]:
```
plt.figure(figsize=(12, 6))
sns.countplot(x='release_year', hue='type', data=df, palette='viridis',␣
 ↪edgecolor='black')
plt.title('Growth of Movies and TV Shows Over the Years')
plt.xticks(rotation=45)
plt.show()
```



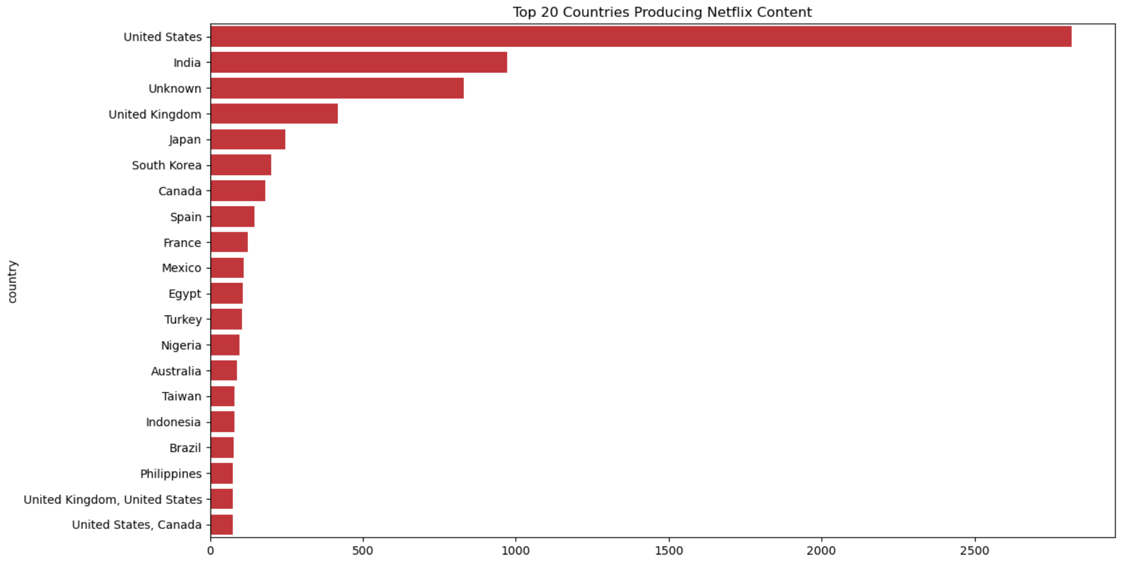
5.3 Distribution of Genres (Movies vs TV Shows)

```
[19]: df_exploded = df.assign(genre=df['listed_in'].str.split(',')).explode('genre')
plt.figure(figsize=(12, 18))
sns.countplot(y='genre', hue='type', data=df_exploded,␣
 ↪order=df_exploded['genre'].value_counts().index)
plt.title('Genre Distribution by Content Type')
plt.show()
```



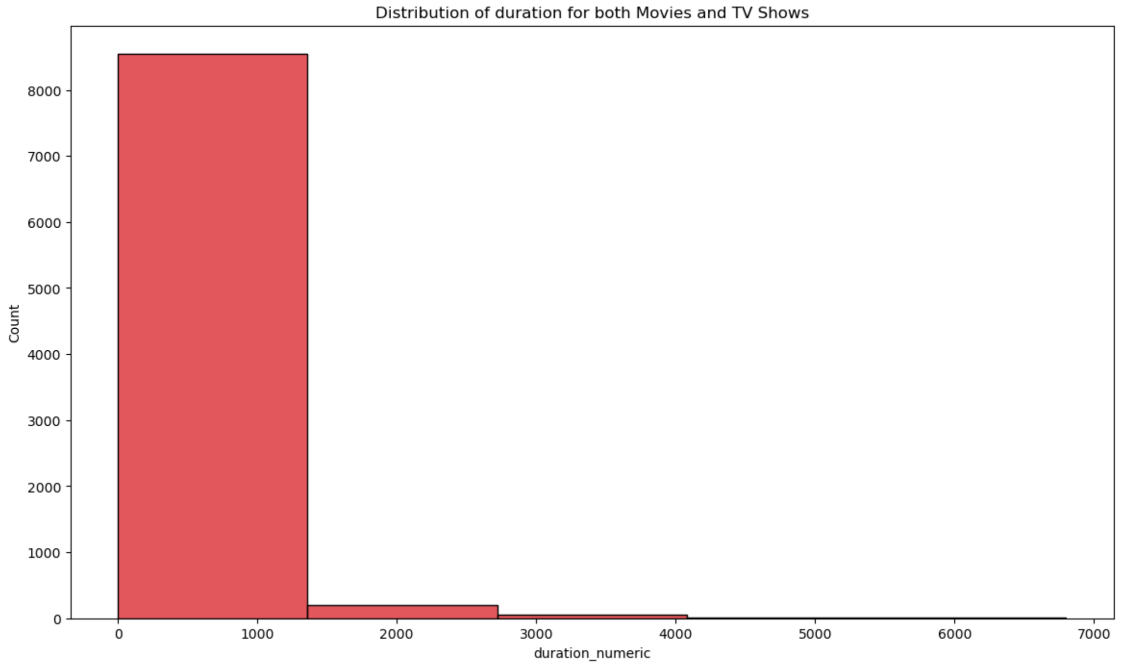
5.4 Distribution of Content by Country

[20]:
```
plt.figure(figsize=(14, 8))
df_country = df['country'].value_counts().head(20)
sns.barplot(x=df_country.values, y=df_country.index,color='#D81F26')
plt.title('Top 20 Countries Producing Netflix Content')
plt.show()
```



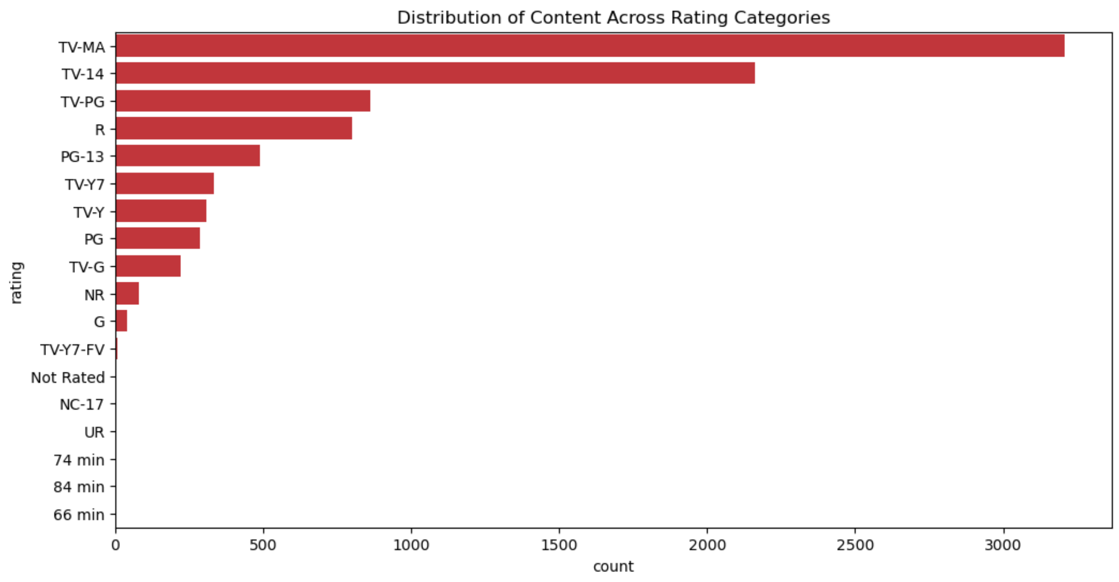
5.5 Distribution of duration for both Movies and TV Shows

[21]:
```
plt.figure(figsize=(14, 8))
sns.histplot(df['duration_numeric'], bins=5, color='#D81F26')
plt.title("Distribution of duration for both Movies and TV Shows")
plt.show()
```



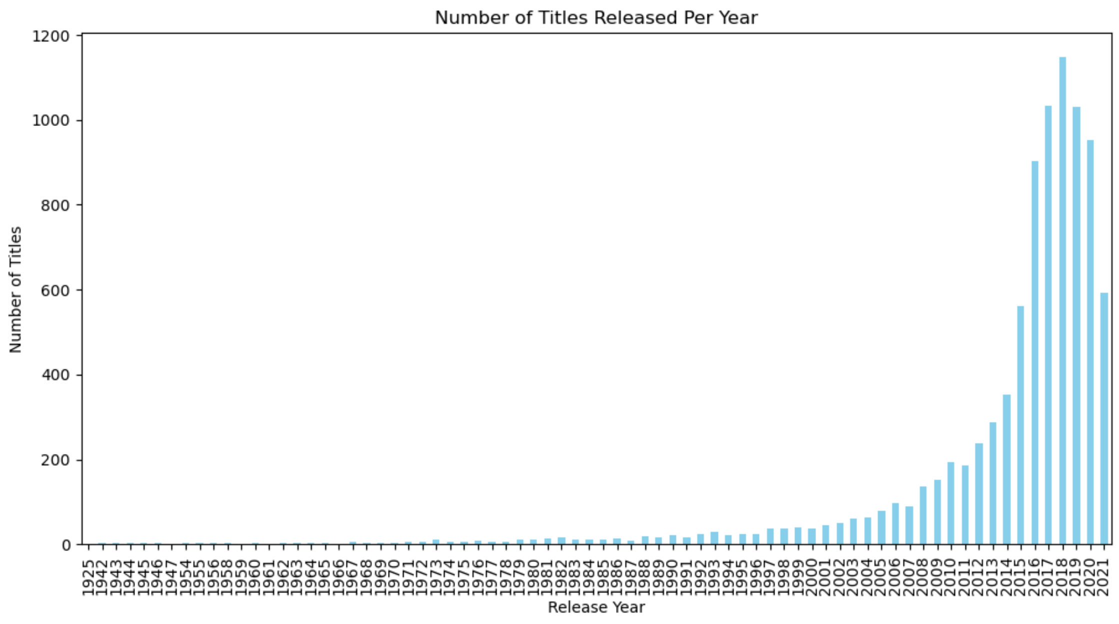
5.6 Rating Distribution

[22]:
```
plt.figure(figsize=(12, 6))
sns.countplot(y='rating', data=df, order=df['rating'].value_counts().index,␣
 ↪color='#D81F26')
plt.title('Distribution of Content Across Rating Categories')
plt.show()
```



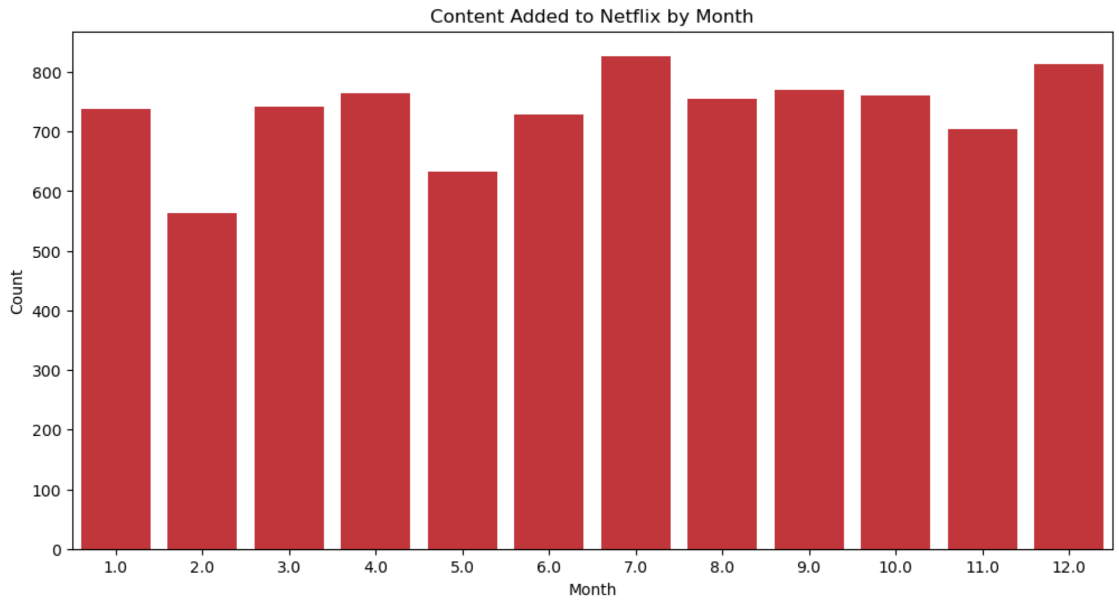
5.7 Number of Titles Released Per Year

[23]:
```
plt.figure(figsize=(12, 6))
df_release = df['release_year'].value_counts().sort_index()
df_release.plot(kind='bar', color='skyblue')
plt.title('Number of Titles Released Per Year')
plt.xlabel('Release Year')
plt.ylabel('Number of Titles')
plt.show()
```



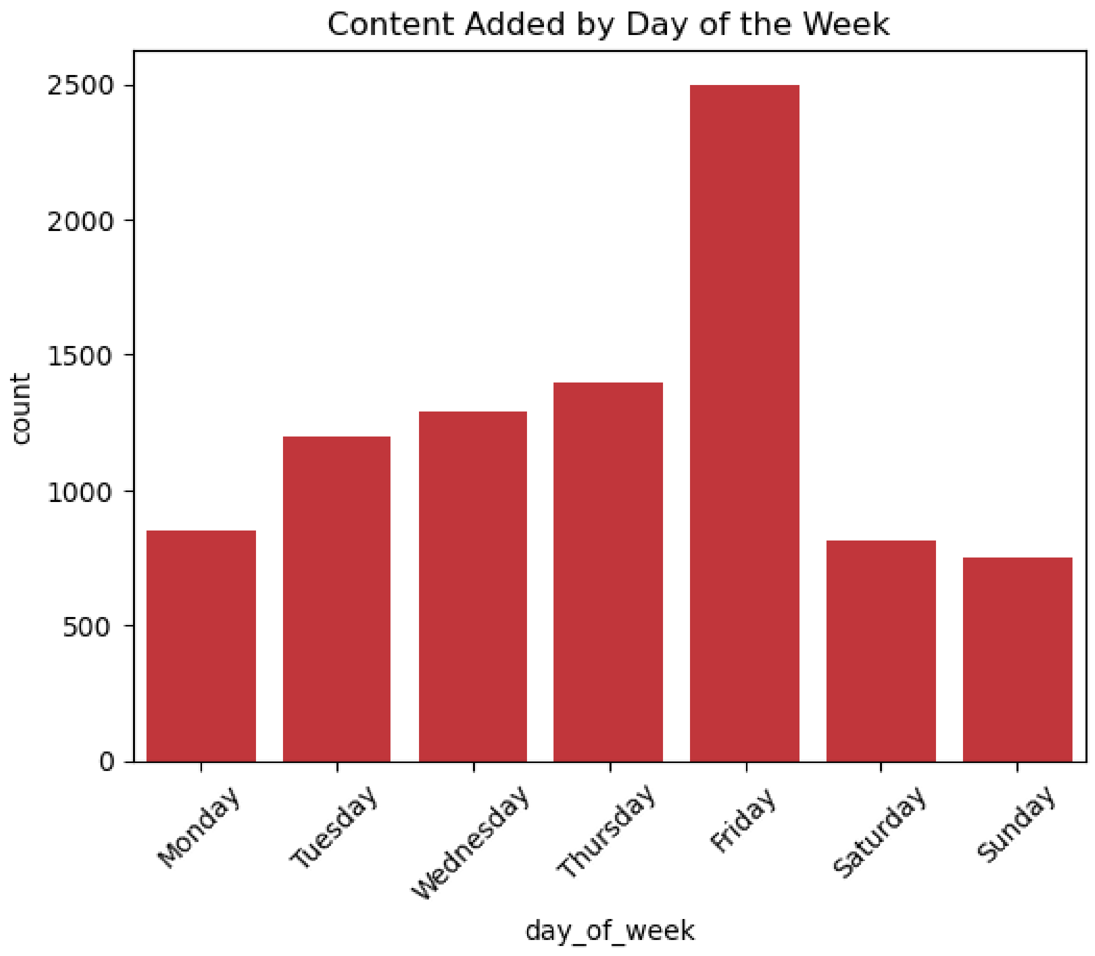
5.8 Content Added to Netflix by Month

[24]:
```python
df['date_added'] = pd.to_datetime(df['date_added'])
df['month_added'] = df['date_added'].dt.month
plt.figure(figsize=(12, 6))
sns.countplot(x='month_added', data=df,color='#D81F26')
plt.title('Content Added to Netflix by Month')
plt.xlabel('Month')
plt.ylabel('Count')
plt.show()
```



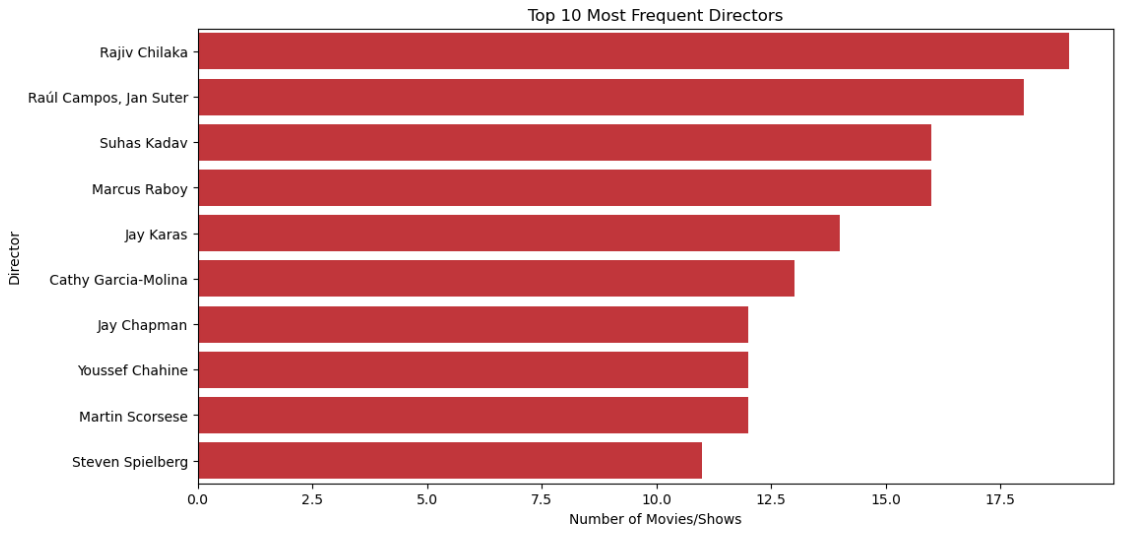
5.9 Day of the Week Analysis

[25]:
```
df['day_of_week'] = df['date_added'].dt.day_name()
sns.countplot(x='day_of_week', data=df, order=['Monday', 'Tuesday',␣
 ↪'Wednesday', 'Thursday', 'Friday', 'Saturday', 'Sunday'],color='#D81F26')
plt.title('Content Added by Day of the Week')
plt.xticks(rotation=45)
plt.show()
```



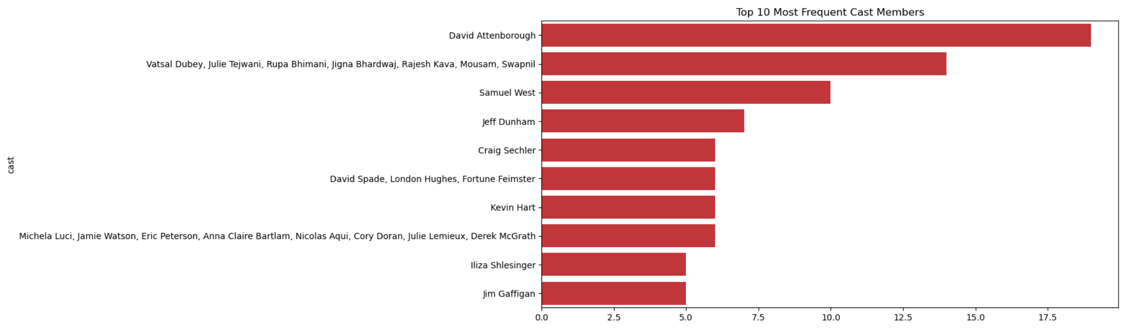
5.10 Most Frequent Directors

[26]:
```python
directors = df['director'].value_counts().iloc[1:11]
plt.figure(figsize=(12, 6))
sns.barplot(x=directors.values, y=directors.index,color='#D81F26')
plt.title('Top 10 Most Frequent Directors')
plt.xlabel('Number of Movies/Shows')
plt.ylabel('Director')
plt.show()
```



5.11 Frequent Cast Members

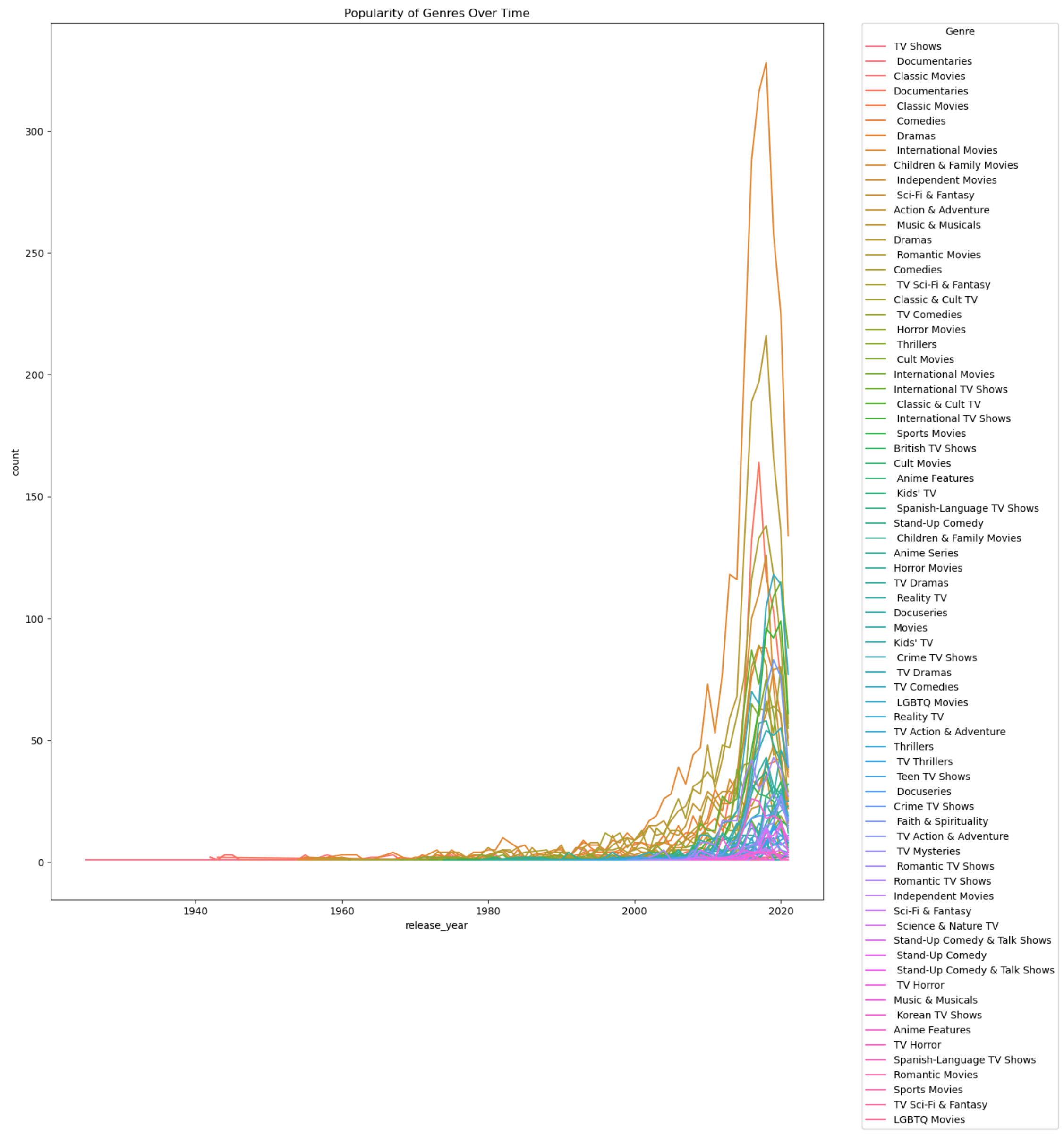
[27]:
```
cast= df['cast'].value_counts().iloc[1:11]
plt.figure(figsize=(12, 6))
sns.barplot(x=cast.values, y=cast.index,color='#D81F26')
plt.title('Top 10 Most Frequent Cast Members')
plt.show()
```



5.12 Popularity of Genres Over Time

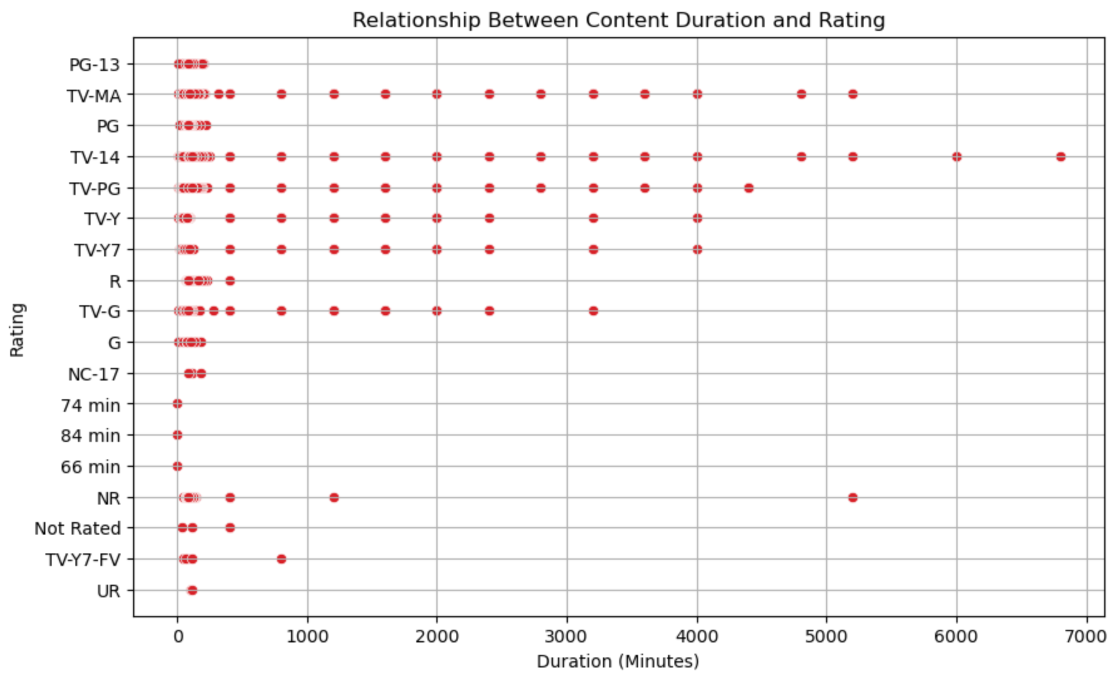
[28]:
```
plt.figure(figsize=(14, 16))
genre_trend = df_exploded.groupby(['release_year', 'genre']).size().
    ↪reset_index(name='count')
sns.lineplot(x='release_year', y='count', hue='genre', data=genre_trend)
plt.legend(title="Genre", bbox_to_anchor=(1.05, 1), loc='upper left',␣
    ↪borderaxespad=0)
```

```python
plt.title('Popularity of Genres Over Time')
plt.show()
```



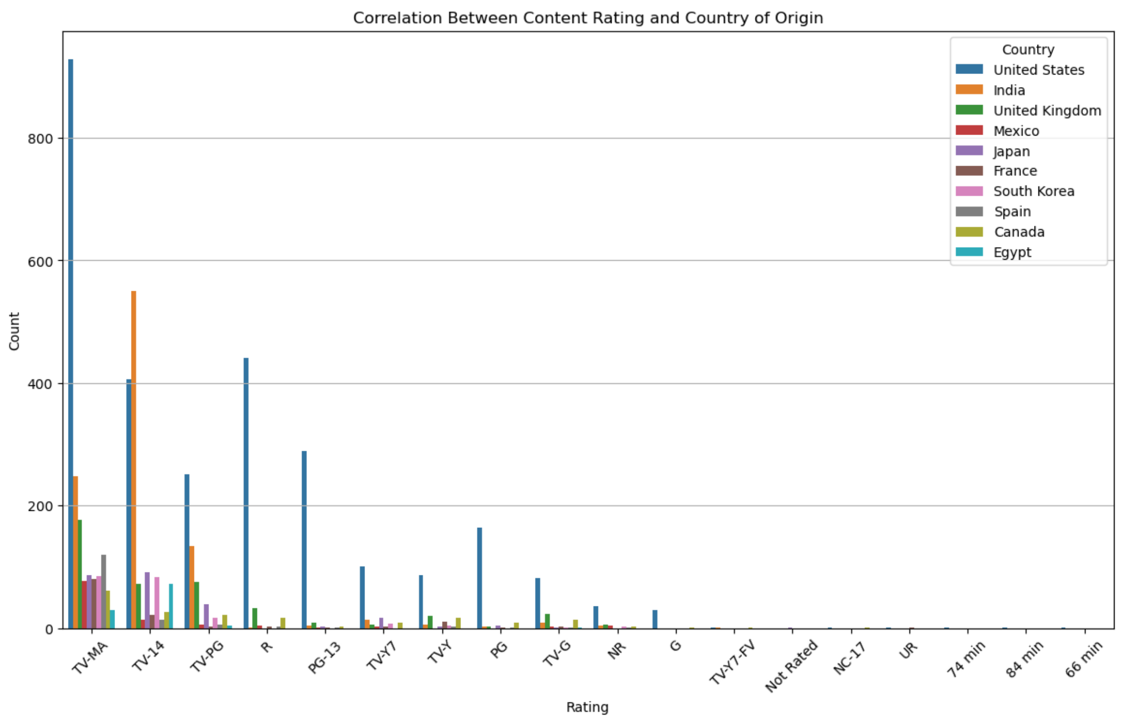
5.13 Relationship Between Content Duration and Rating

[29]:
```python
plt.figure(figsize=(10, 6))
sns.scatterplot(x='duration_numeric', y='rating', data=df, color='#D81F26')
plt.title('Relationship Between Content Duration and Rating')
plt.xlabel('Duration (Minutes)')
plt.ylabel('Rating')
plt.grid(True)
plt.show()
```



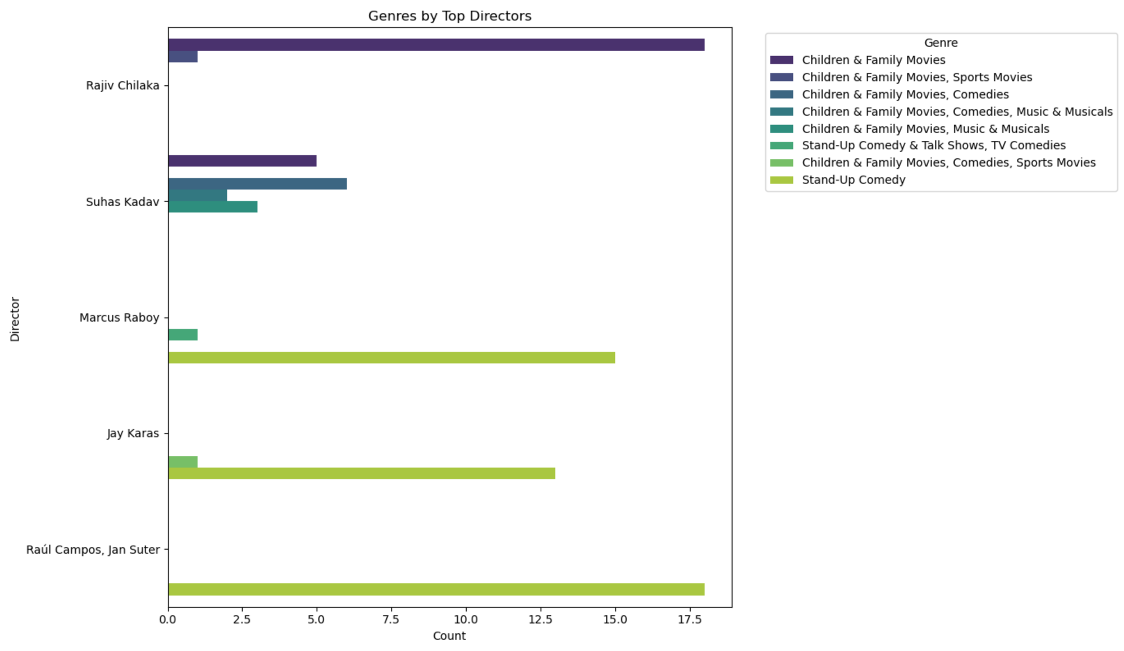
5.14 Plotting the relationship between countries and content ratings

```
[30]: top_countries_rating = df[df['country'] != 'Unknown']['country'].value_counts().
        ↪head(10).index
      filtered_data = df[df['country'].isin(top_countries_rating)]
      plt.figure(figsize=(14, 8))
      sns.countplot(data=filtered_data, x='rating', hue='country', order=df['rating'].
        ↪value_counts().index)
      plt.title('Correlation Between Content Rating and Country of Origin')
      plt.xlabel('Rating')
      plt.ylabel('Count')
      plt.legend(title='Country')
      plt.xticks(rotation=45)
      plt.grid(axis='y')
      plt.show()
```



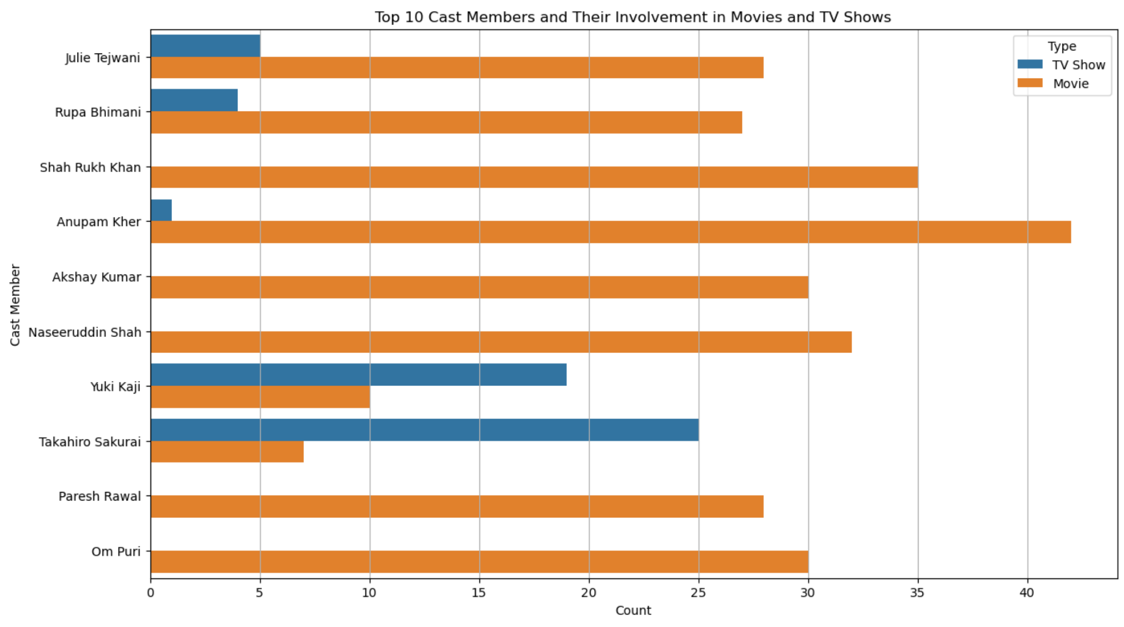
5.15 Extract top directors with count of gerne

[31]:
```
# Get the top 10 directors
top_directors = df[df['director'] != 'Unknown']['director'].value_counts().
    ↪head(5).index

# Filter data for those directors
director_data = df[df['director'].isin(top_directors)].explode('listed_in')

plt.figure(figsize=(14, 8))
sns.countplot(data=director_data, y='director', hue='listed_in',␣
    ↪palette='viridis')
plt.title('Genres by Top Directors')
plt.xlabel('Count')
plt.ylabel('Director')
plt.legend(title='Genre', bbox_to_anchor=(1.05, 1), loc='upper left')
plt.tight_layout()
plt.show()
```



5.16 Extract top cast members

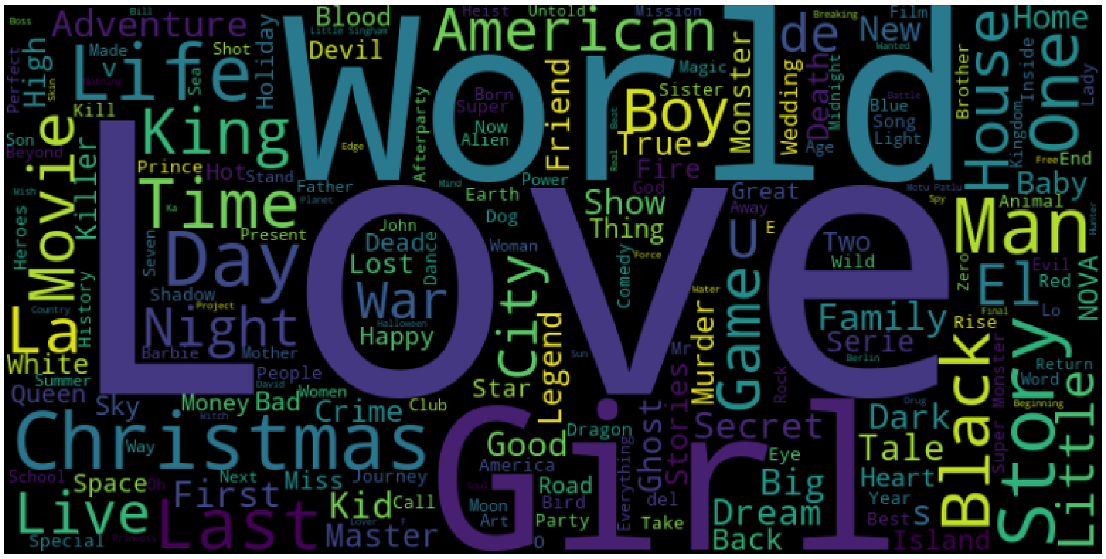
[32]:
```
df_exploded_cast = df.copy()
df_exploded_cast['cast'] = df_exploded_cast['cast'].str.split(', ')
df_exploded_cast = df_exploded_cast.explode('cast')
top_cast = df_exploded_cast[df_exploded_cast['cast'] != 'Unknown']['cast'].
  ↪value_counts().head(10).index
cast_data = df_exploded_cast[df_exploded_cast['cast'].isin(top_cast)]
plt.figure(figsize=(14, 8))
sns.countplot(data=cast_data, y='cast', hue='type')
plt.title('Top 10 Cast Members and Their Involvement in Movies and TV Shows')
plt.xlabel('Count')
plt.ylabel('Cast Member')
plt.legend(title='Type')
plt.grid(axis='x')
plt.show()
```



5.17 Generate word cloud for recent titles

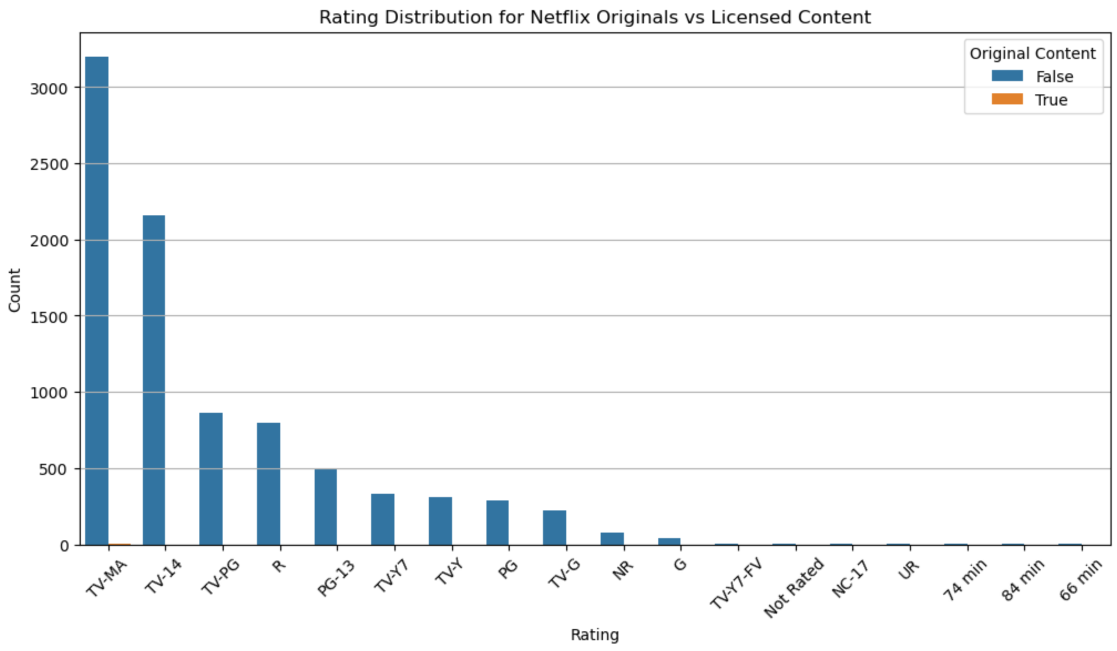
[33]:
```
from wordcloud import WordCloud
recent_titles = ' '.join(df[df['release_year'] >= 2015]['title'].dropna())
wordcloud_recent = WordCloud(width=800, height=400, background_color='black').
  ↪generate(recent_titles)
plt.figure(figsize=(10, 6))
plt.imshow(wordcloud_recent, interpolation='bilinear')
plt.axis('off')
plt.title('Word Cloud of Recent Netflix Titles (2015 - 2021)')
plt.show()
```

Word Cloud of Recent Netflix Titles (2015 - 2021)



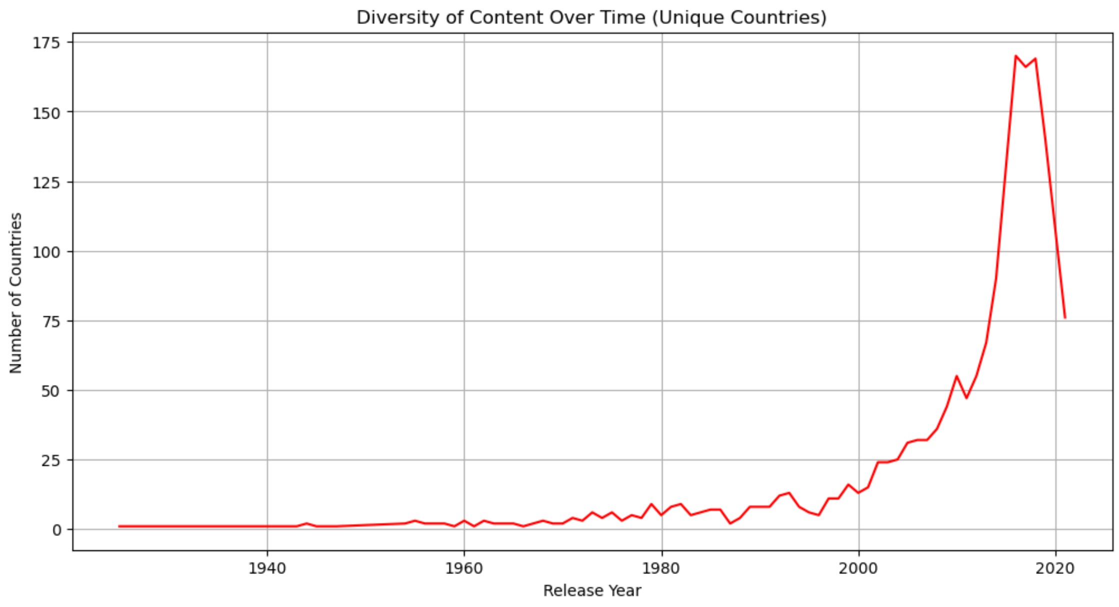
5.18 Netflix Originals vs Licensed Content

[34]:
```
df['is_original'] = df['title'].str.contains('Netflix')

plt.figure(figsize=(12, 6))
sns.countplot(data=df, x='rating', hue='is_original', order=df['rating'].
 ↪value_counts().index)
plt.title('Rating Distribution for Netflix Originals vs Licensed Content')
plt.xlabel('Rating')
plt.ylabel('Count')
plt.legend(title='Original Content')
plt.xticks(rotation=45)
plt.grid(axis='y')
plt.show()
```



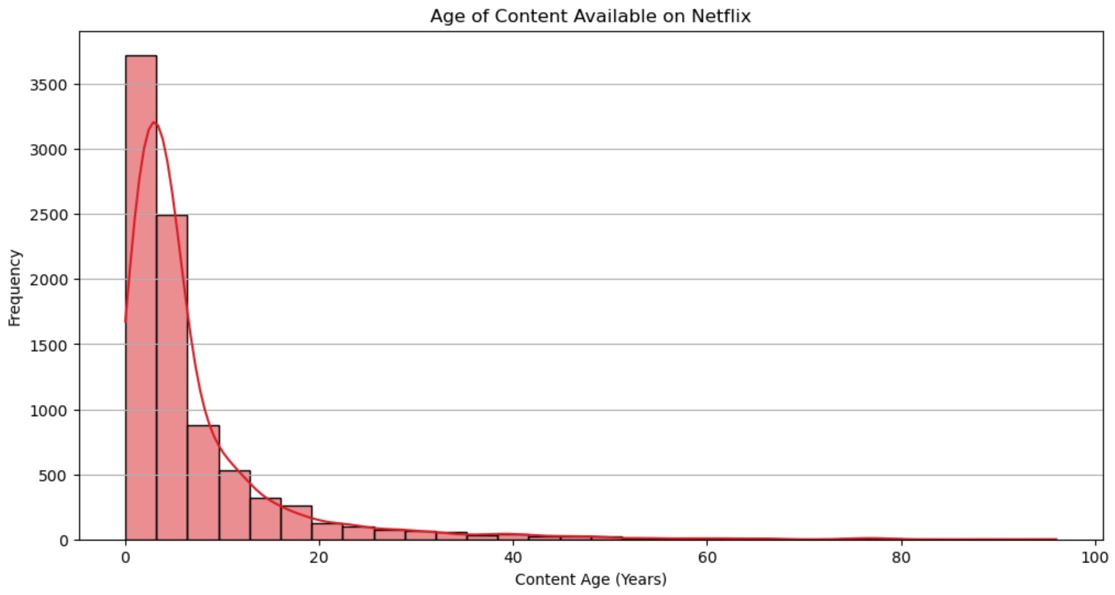
5.19 Diversity of Content Over Time

[35]:
```
country_year = df.groupby('release_year')['country'].nunique()
plt.figure(figsize=(12, 6))
country_year.plot(kind='line', color='red')
plt.title('Diversity of Content Over Time (Unique Countries)')
plt.xlabel('Release Year')
plt.ylabel('Number of Countries')
plt.grid(True)
plt.show()
```



5.20 Correlation Between Age of Content and Popularity

[36]:
```
df['content_age'] = 2021 - df['release_year']

plt.figure(figsize=(12, 6))
sns.histplot(df['content_age'], bins=30, kde=True, color='#D81F26')
plt.title('Age of Content Available on Netflix')
plt.xlabel('Content Age (Years)')
plt.ylabel('Frequency')
plt.grid(axis='y')
plt.show()
```


Age of Content Available on Netflix
Frequency
Content Age (Years)
0
500
1000
1500
2000
2500
3000
3500
0
20
40
60
80
100

```
[ ]:
```