NETFLIX MOVIES AND TV SHOWS

ANALYSIS

PRESENTED BY:

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netflix-movies-and-tv-shows

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0.1 Import Libraries

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

0.2 Load Data and get Some Information

[2]:
```
data = pd.read_csv("netflix_titles.csv")
```

[3]:
```
data.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]:
```
data.tail()
```

[4]:
```
     show_id     type        title         director  \
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  \
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  \
8802  November 20, 2019          2007      R    158 min
8803       July 1, 2019          2018  TV-Y7  2 Seasons
8804   November 1, 2019          2009      R     88 min
8805   January 11, 2020          2006     PG     88 min
8806      March 2, 2019          2015  TV-14    111 min

                                       listed_in  \
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
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…
```

[5]:
```
data.shape
```

[5]:
```
(8807, 12)
```

[6]:
```
data.columns
```

[6]:
```
Index(['show_id', 'type', 'title', 'director', 'cast', 'country', 'date_added',
       'release_year', 'rating', 'duration', 'listed_in', 'description'],
      dtype='object')
```

[7]:
```
data.dtypes
```

[7]:
```
show_id         object
type            object
title           object
director        object
cast            object
country         object
date_added      object
release_year     int64
rating          object
duration        object
listed_in       object
description     object
dtype: object
```

[8]:
```
data.info()
```

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

```
dtypes: int64(1), object(11)
memory usage: 825.8+ KB
```

[9]:
```
data.isnull().sum()
```

[9]:
```
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
```

0.3 Data Cleaning and Preprocessing

[10]:
```
data.duplicated().sum()
```

[10]:
```
0
```

[11]:
```
data = data.set_index("show_id")
```

[12]:
```
data.head(2)
```

[12]:

show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in
s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90 min	Documentaries
s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban…	South Africa	September 24, 2021	2021	TV-MA	2 Seasons	

```
s2       International TV Shows, TV Dramas, TV Mysteries

                                                  description
show_id
s1       As her father nears the end of his life, filmm…
s2       After crossing paths at a party, a Cape Town t…
```

[13]:
```
data.isnull().sum()
```

[13]:
```
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
```

[14]:
```
columns_to_replace = ["director", 'cast', "country"]
data[columns_to_replace] = data[columns_to_replace].replace(np.nan,  "Unknown")
```

[15]:
```
columns_to_drop = ["date_added", "rating", "duration"]
data.dropna(subset=columns_to_drop, inplace=True)
```

[16]:
```
data.isna().sum()
```

[16]:
```
type            0
title           0
director        0
cast            0
country         0
date_added      0
release_year    0
rating          0
duration        0
listed_in       0
description     0
dtype: int64
```

[17]:
```
# changing date type
data["date_added"] = data["date_added"].astype("datetime64[ms]")
```

[18]:
```
data.dtypes
```

[18]:
```
type                    object
title                   object
director                object
cast                    object
country                 object
date_added      datetime64[ms]
release_year             int64
rating                  object
duration                object
listed_in               object
description             object
dtype: object
```

[19]:
```
data.head(3)
```

[19]:
```
            type                 title         director  \
show_id
s1         Movie  Dick Johnson Is Dead  Kirsten Johnson
s2       TV Show         Blood & Water          Unknown
s3       TV Show             Ganglands  Julien Leclercq

                                                      cast        country  \
show_id
s1                                                 Unknown  United States
s2       Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban…   South Africa
s3       Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi…        Unknown

        date_added  release_year rating   duration  \
show_id
s1      2021-09-25          2020  PG-13     90 min
s2      2021-09-24          2021  TV-MA  2 Seasons
s3      2021-09-24          2021  TV-MA   1 Season

                                                listed_in  \
show_id
s1                                          Documentaries
s2         International TV Shows, TV Dramas, TV Mysteries
s3       Crime TV Shows, International TV Shows, TV Act…

                                                description
show_id
s1       As her father nears the end of his life, filmm…
s2       After crossing paths at a party, a Cape Town t…
s3       To protect his family from a powerful drug lor…
```

[20]:
```
data['year_added'] = data['date_added'].dt.year
print(data['year_added'])
```

```
show_id
s1       2021
s2       2021
s3       2021
s4       2021
s5       2021
         …
s8803    2019
s8804    2019
s8805    2019
s8806    2020
s8807    2019
Name: year_added, Length: 8790, dtype: int32
```

[21]:
```
data['month_added'] = data['date_added'].dt.month_name()
print(data['month_added'])
```

```
show_id
s1       September
s2       September
s3       September
s4       September
s5       September
           …
s8803     November
s8804         July
s8805     November
s8806      January
s8807        March
Name: month_added, Length: 8790, dtype: object
```

0.4 Data Analysis and Visualiation

[22]:
```
data.head(3)
```

[22]:

show_id	type	title	director	cast	country
s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	Unknown	United States
s2	TV Show	Blood & Water	Unknown	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban…	South Africa
s3	TV Show	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi…	Unknown

```
        date_added  release_year rating   duration  \
show_id
s1      2021-09-25          2020  PG-13     90 min
s2      2021-09-24          2021  TV-MA  2 Seasons
s3      2021-09-24          2021  TV-MA   1 Season

                                                listed_in  \
show_id
s1                                          Documentaries
s2            International TV Shows, TV Dramas, TV Mysteries
s3         Crime TV Shows, International TV Shows, TV Act…

                                               description  year_added  \
show_id
s1         As her father nears the end of his life, filmm…        2021
s2         After crossing paths at a party, a Cape Town t…        2021
s3         To protect his family from a powerful drug lor…        2021

        month_added
show_id
s1        September
s2        September
s3        September
```

[23]:
```
data.describe()
```

[23]:
```
                      date_added  release_year   year_added
count                       8790   8790.000000  8790.000000
mean   2019-05-17 21:44:01.638000   2014.183163  2018.873606
min          2008-01-01 00:00:00   1925.000000  2008.000000
25%          2018-04-06 00:00:00   2013.000000  2018.000000
50%          2019-07-03 00:00:00   2017.000000  2019.000000
75%          2020-08-19 18:00:00   2019.000000  2020.000000
max          2021-09-25 00:00:00   2021.000000  2021.000000
std                          NaN      8.825466     1.573568
```

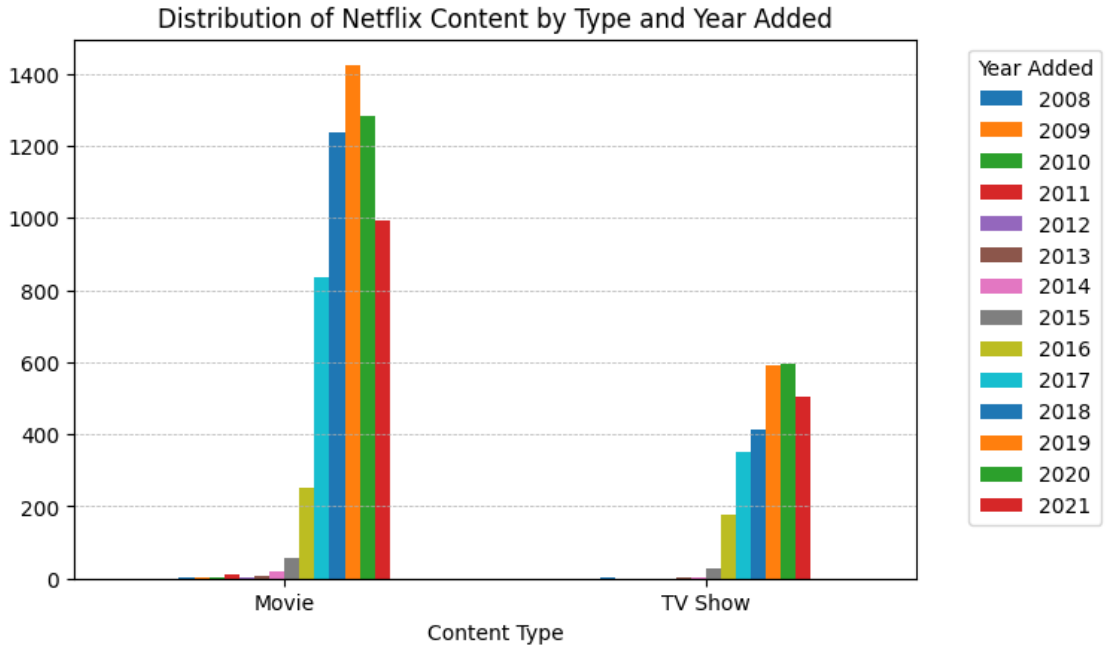
1. How has the distribution of different types of Netflix content (Movies vs. TV Shows) evolved over the years?

[24]:
```
pd.crosstab(data.type, data.year_added)
```

[24]:
```
year_added  2008  2009  2010  2011  2012  2013  2014  2015  2016  2017  2018  \
type
Movie          1     2     1    13     3     6    19    56   251   836  1237
TV Show        1     0     0     0     0     5     5    26   175   349   411

year_added  2019  2020  2021
```

```
type
Movie       1424  1284   993
TV Show      592   595   505
```

[25]:
```
pd.crosstab(data.type, data.year_added).plot(kind="bar")
plt.tight_layout()
plt.title("Distribution of Netflix Content by Type and Year Added")
plt.xlabel("Content Type")
plt.legend(title='Year Added', bbox_to_anchor=(1.05, 1), loc='upper left')
plt.grid(True, which='both', axis='y', linestyle='--', linewidth=0.5)
plt.xticks(rotation=0)
plt.show()
```

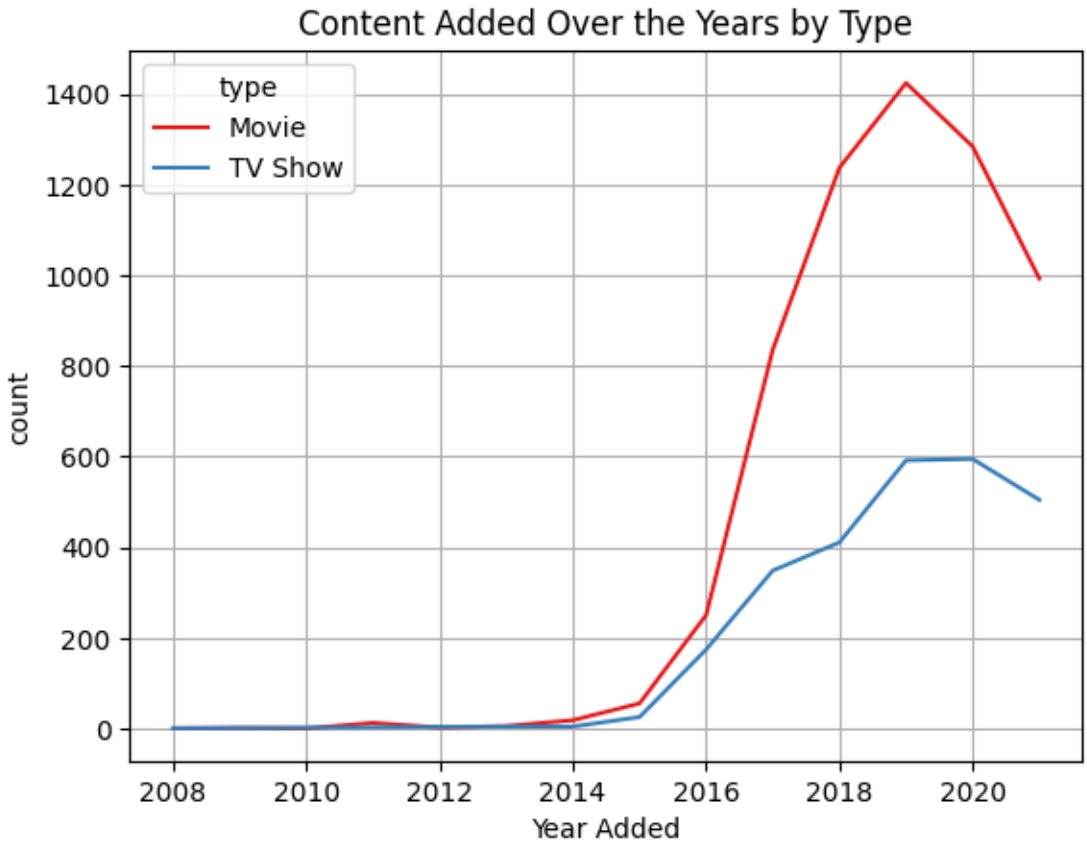


[26]:
```
data.groupby(['year_added', 'type']).size().reset_index(name='count').
  ↪sort_values('count',ascending=False).head(10)
```

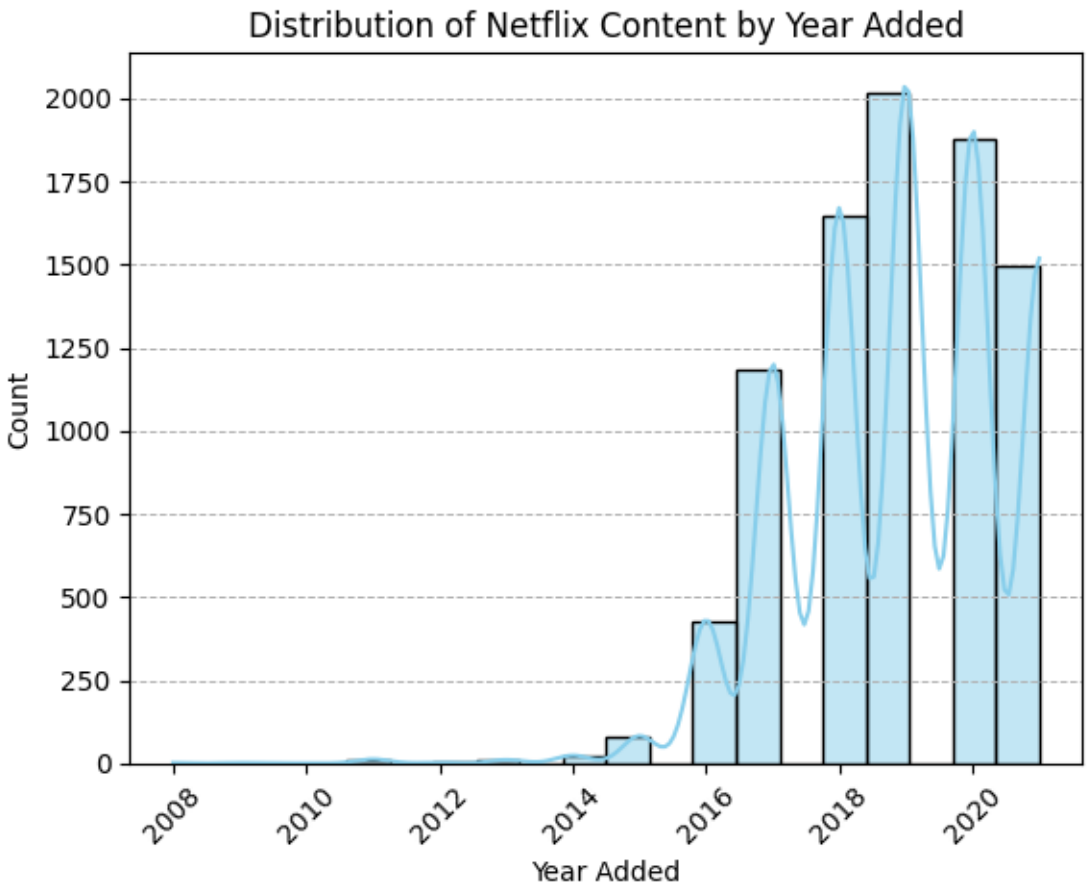
[26]:
```
    year_added     type  count
18        2019    Movie   1424
20        2020    Movie   1284
16        2018    Movie   1237
22        2021    Movie    993
14        2017    Movie    836
21        2020  TV Show    595
19        2019  TV Show    592
23        2021  TV Show    505
```

```
17          2018  TV Show    411
15          2017  TV Show    349
```

[27]:
```
year_type_count = data.groupby(['year_added', 'type']).size().
 ↪reset_index(name='count')
sns.lineplot(data=year_type_count, x='year_added', y='count', hue='type',␣
 ↪palette='Set1')
plt.title("Content Added Over the Years by Type")
plt.xlabel("Year Added")
plt.grid(True)
plt.show()
```



[28]:
```
plt.tight_layout()
sns.histplot(data=data, x="year_added", bins=20, kde=True, color="skyblue")
plt.title("Distribution of Netflix Content by Year Added")
plt.xlabel("Year Added")
plt.xticks(rotation=45)
plt.grid(True, which='both', axis='y', linestyle='--', linewidth=0.7)
plt.show()
```



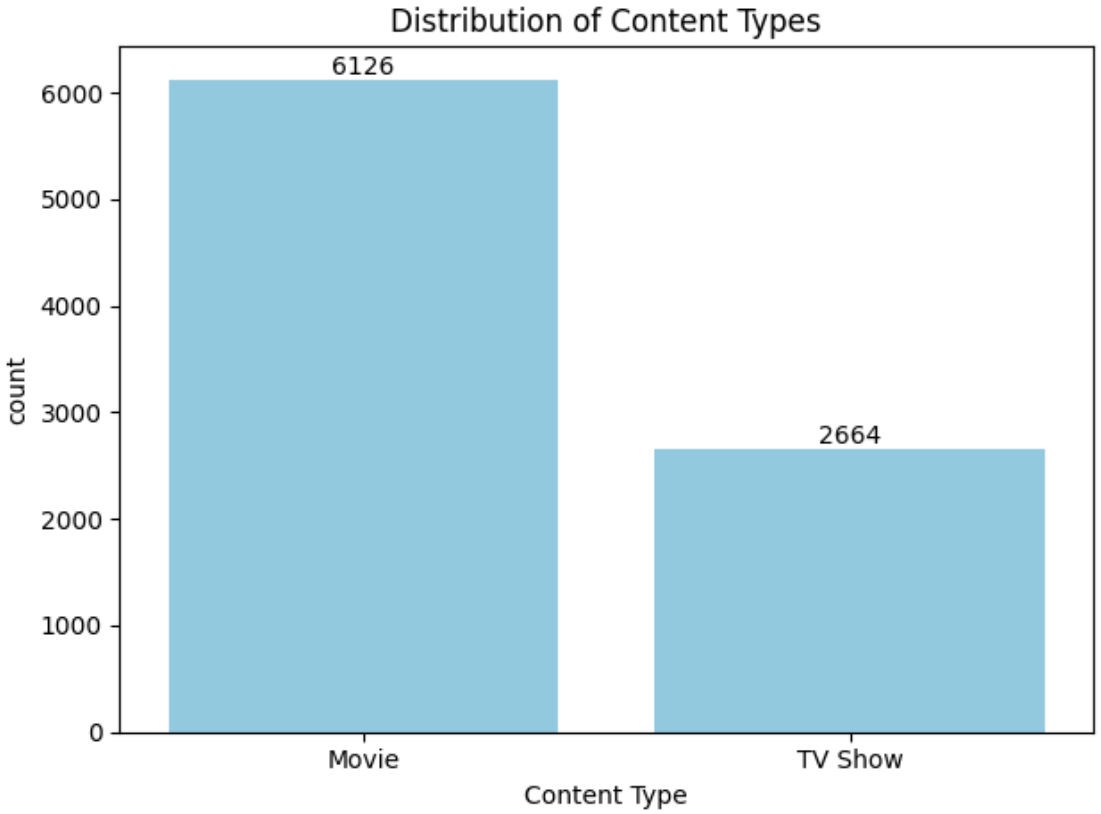
0.4.1 2. What is the distribution of different content types on Netflix?

[29]:
```
Movies = data['type'].value_counts()['Movie']
tv_shows = data['type'].value_counts()['TV Show']
print(f"Total Movies: {Movies}")
print(f"Total TV Shows: {tv_shows}")
```

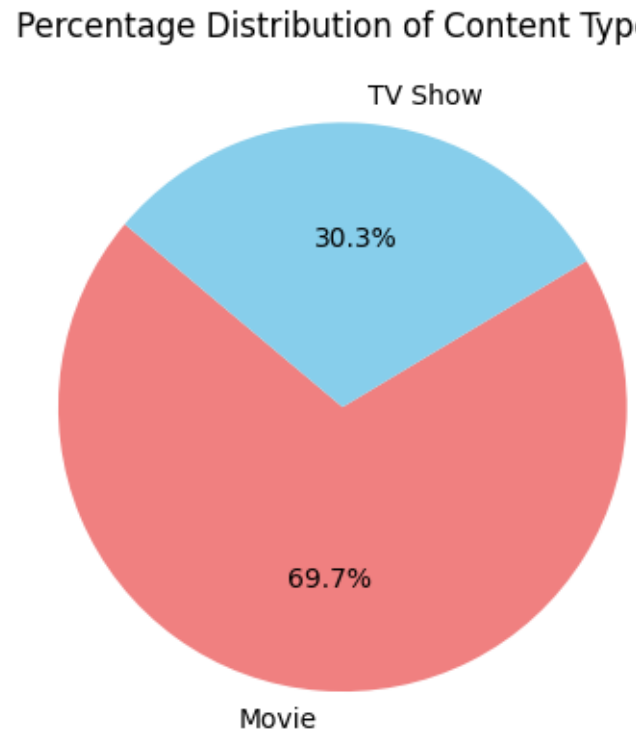
```
Total Movies: 6126
Total TV Shows: 2664
```

[30]:
```
sns.countplot(data=data, x="type", color='skyblue')
plt.title("Distribution of Content Types")
plt.xlabel("Content Type")

for index, value in enumerate(data['type'].value_counts()):
    plt.text(index, value, str(value), ha='center', va='bottom')

plt.tight_layout()
```

```
plt.show()
```



[31]:
```
plt.tight_layout()
data['type'].value_counts().plot(kind='pie', autopct='%1.1f%%', startangle=140,␣
↪colors=['lightcoral', 'skyblue'])
plt.title('Percentage Distribution of Content Types')
plt.ylabel('')
plt.show()
```



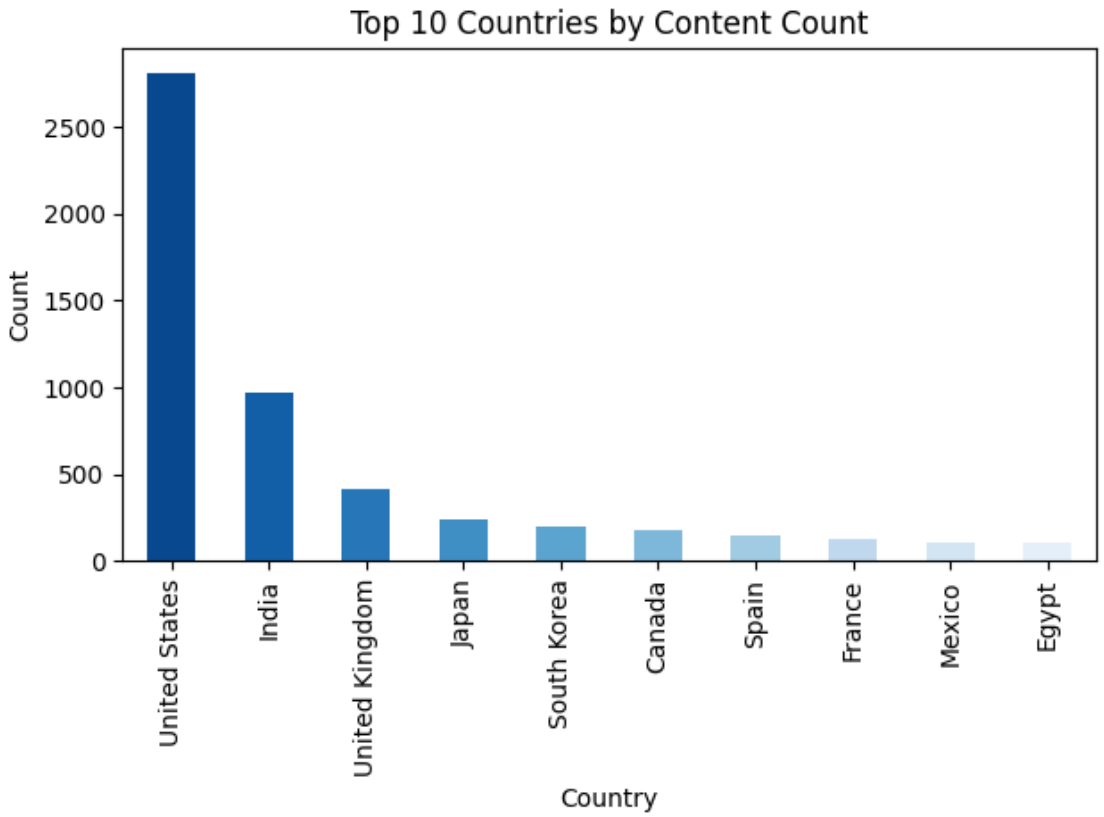
0.4.2 3. Which countries have the most content available on Netflix?

[32]:
```
top_10_countries = data['country'].replace("Unknown", pd.NA).dropna().
↪value_counts().head(10)
top_10_countries
```

[32]:
```
country
United States     2809
India              972
United Kingdom     418
Japan              243
South Korea        199
Canada             181
Spain              145
France             124
Mexico             110
Egypt              106
Name: count, dtype: int64
```

[33]:
```
# Top 10 countries with most content
top_countries = data['country'].replace("Unknown", pd.NA).dropna().
↪value_counts().head(10)
```

```
colors = sns.color_palette("Blues", len(top_countries))[::-1]
top_countries.plot(kind='bar', color=colors)
plt.title("Top 10 Countries by Content Count")
plt.xlabel("Country")
plt.ylabel("Count")
plt.tight_layout()
plt.show()
```



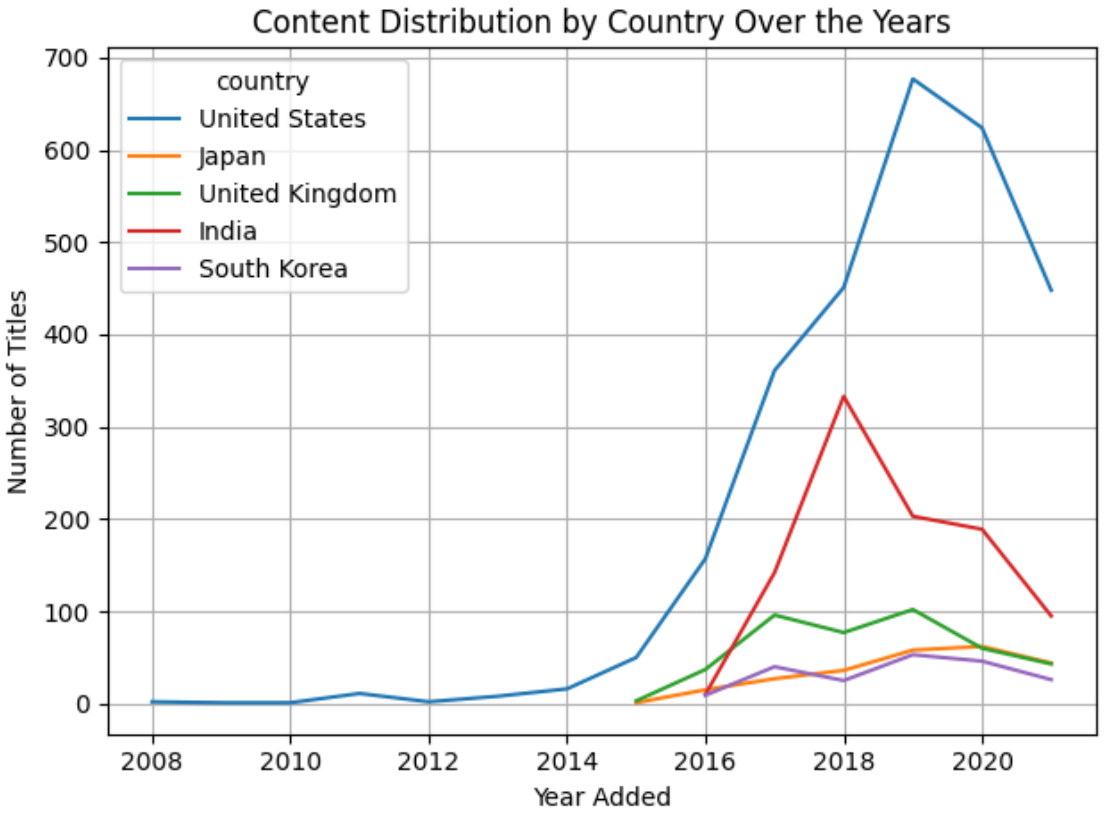
[34]:
```
temp = data.groupby(['year_added', 'country']).size().reset_index(name='count').
↪sort_values("count",ascending=False)
temp
```

[34]:

	year_added	country	count
717	2019	United States	677
952	2020	United States	624
491	2018	United States	451
1163	2021	United States	448
278	2017	United States	361
…	…	…	…
625	2019	Italy, United States	1
222	2017	Netherlands, Belgium	1

```
627          2019     Japan, United States      1
628          2019                   Jordan      1
169          2017  Colombia, United States      1

[1206 rows x 3 columns]
```

[35]:
```
country_year_trends = data.groupby(["year_added", "country"]).size().
 ↪reset_index(name='count')
top_countries = country_year_trends[country_year_trends['country'].
 ↪isin(['United States', 'India', 'United Kingdom', 'Japan', 'South Korea'])]

sns.lineplot(data=top_countries, x='year_added', y='count', hue='country')
plt.title("Content Distribution by Country Over the Years")
plt.xlabel("Year Added")
plt.ylabel("Number of Titles")
plt.grid(True)
plt.tight_layout()
plt.show()
```

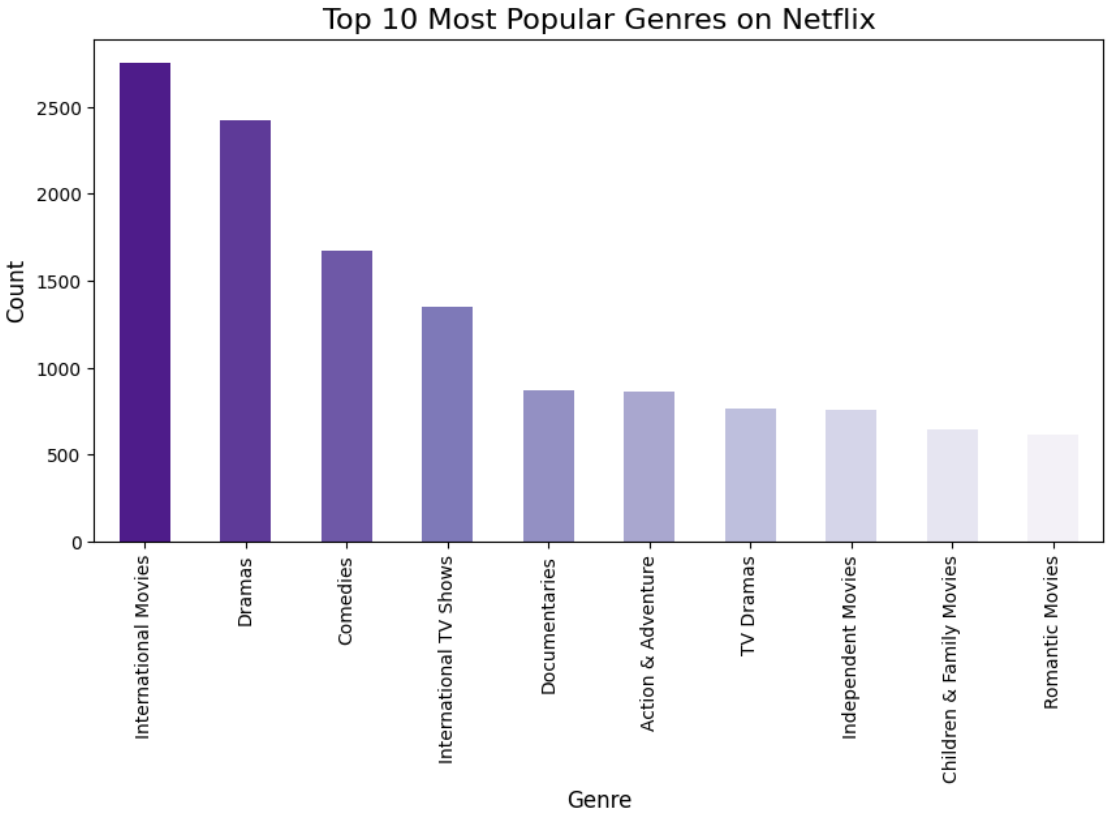


0.4.3 4. What are the most popular genres available on Netflix?

[36]:
```
data['listed_in'].str.split(', ').explode().value_counts().head(10)
```

[36]:
```
listed_in
International Movies        2752
Dramas                      2426
Comedies                    1674
International TV Shows      1349
Documentaries                869
Action & Adventure           859
TV Dramas                    762
Independent Movies           756
Children & Family Movies     641
Romantic Movies              616
Name: count, dtype: int64
```

[37]:
```
# Top 10 most common genres
top_10_genres_count = data['listed_in'].str.split(', ').explode().
 ↪value_counts().head(10)
colors = sns.color_palette("Purples", len(top_10_genres_count))[::-1]
plt.figure(figsize=(10,5))
top_10_genres_count.plot(kind='bar', color=colors)
plt.title("Top 10 Most Popular Genres on Netflix", fontsize=16)
plt.xlabel("Genre", fontsize=12)
plt.ylabel("Count", fontsize=12)
plt.show()
```



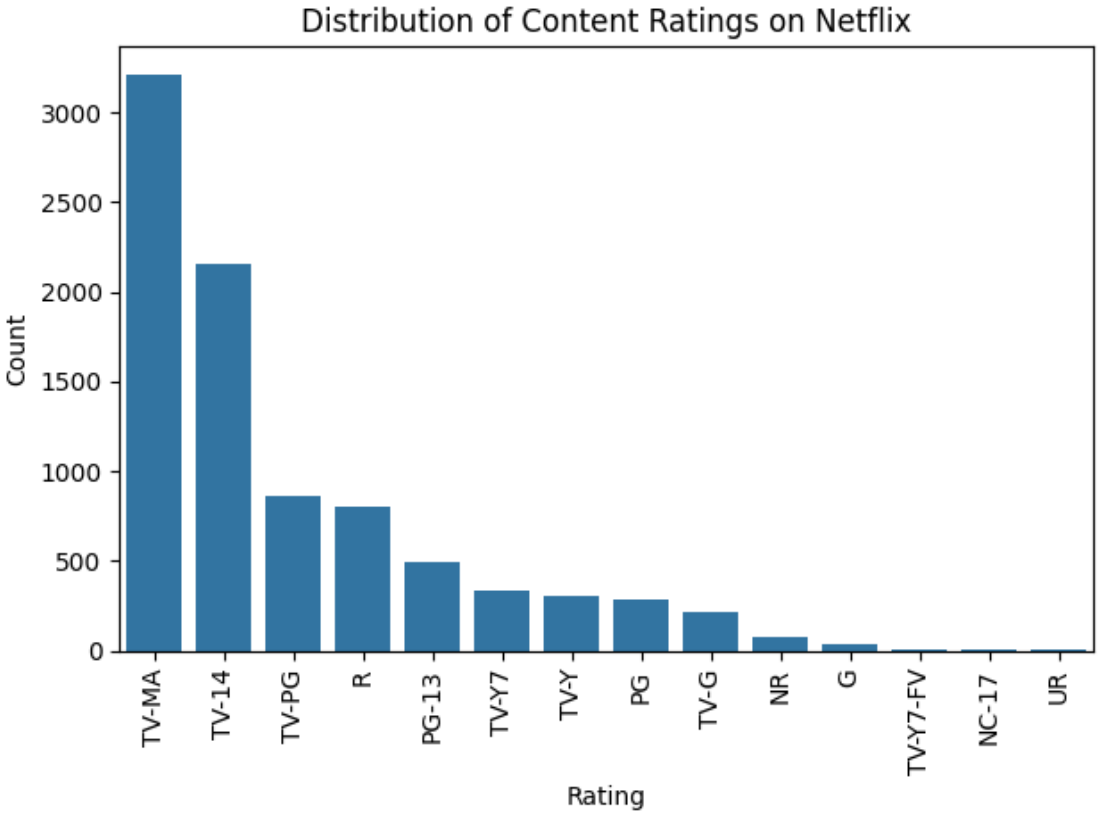
0.4.4 5. How are content ratings distributed on Netflix?

[38]:
```
# content ratings distributions
data['rating'].value_counts().head(10)
```

[38]:
```
rating
TV-MA    3205
TV-14    2157
TV-PG     861
R         799
PG-13     490
TV-Y7     333
TV-Y      306
PG        287
TV-G      220
NR         79
Name: count, dtype: int64
```

[39]:
```
ratings = data['rating'].value_counts().index
sns.countplot(data=data, x="rating", order=ratings)
plt.title("Distribution of Content Ratings on Netflix")
```

```
plt.xlabel("Rating")
plt.ylabel('Count')
plt.xticks(rotation=90)
plt.tight_layout()
plt.show()
```



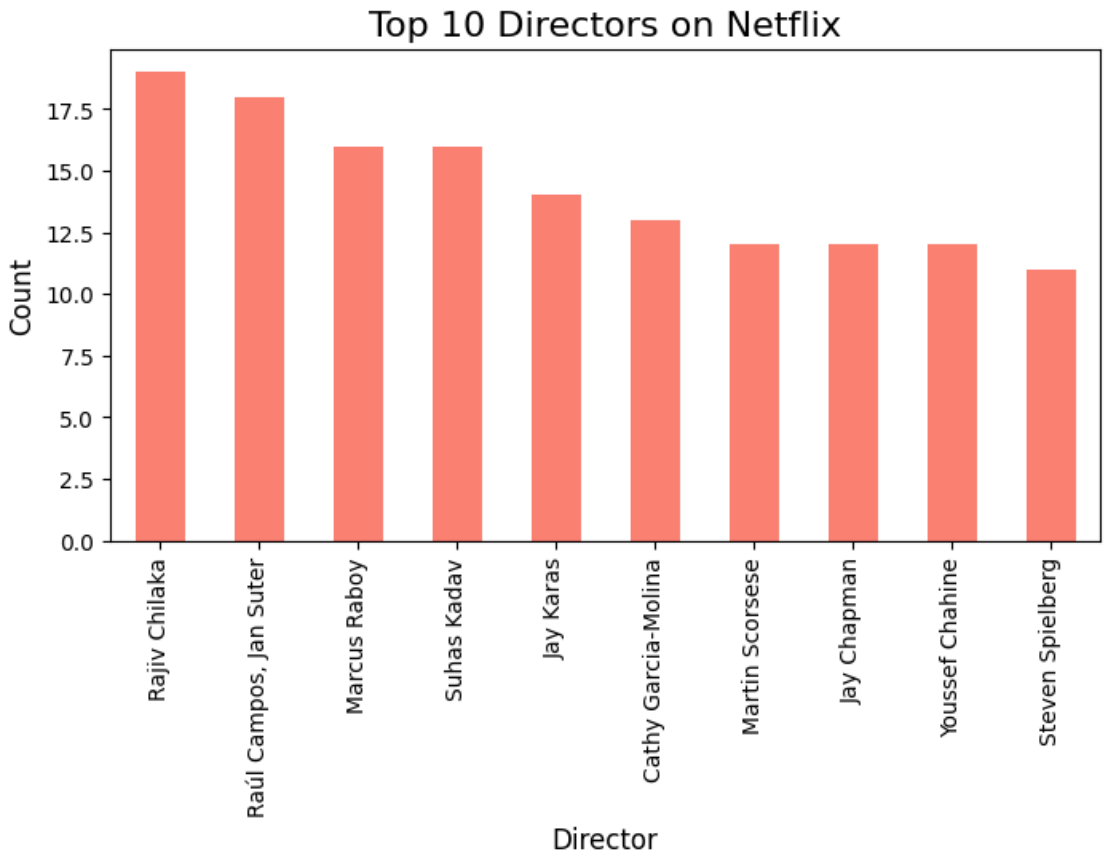
0.4.5 6. Who are the top 10 directors with the most content on Netflix?

[40]:
```
data['director'].replace("Unknown", pd.NA).dropna().value_counts().head(10)
```

[40]:
```
director
Rajiv Chilaka             19
Raúl Campos, Jan Suter    18
Marcus Raboy              16
Suhas Kadav               16
Jay Karas                 14
Cathy Garcia-Molina       13
Martin Scorsese           12
Jay Chapman               12
Youssef Chahine           12
```

```
Steven Spielberg          11
Name: count, dtype: int64
```

[41]:
```
# top 10 directors
plt.figure(figsize=(8,4))
top_directors = data['director'].replace("Unknown", pd.NA).dropna().
 ↪value_counts().head(10)
top_directors.plot(kind='bar', color='salmon')
plt.title("Top 10 Directors on Netflix", fontsize=16)
plt.xlabel("Director", fontsize=12)
plt.ylabel("Count", fontsize=12)
plt.show()
```



0.4.6 7. Find average duration of movies?

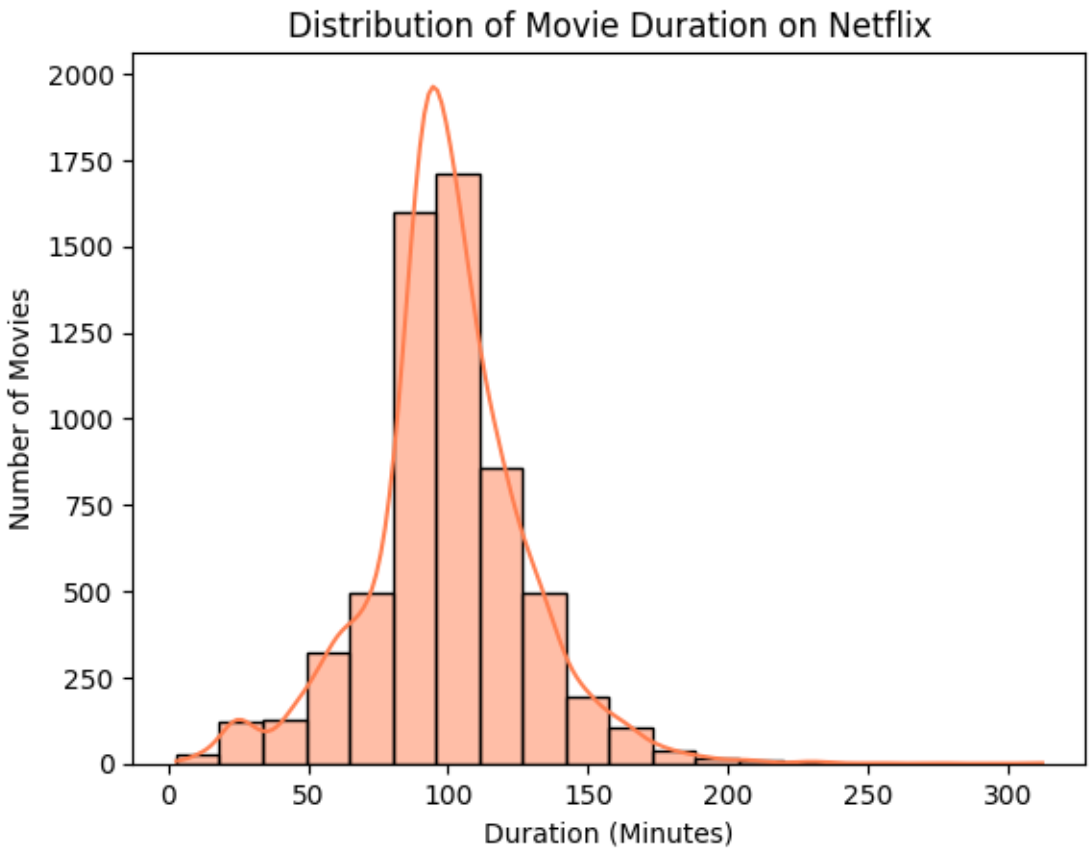
[42]:
```
movie_data = data[data['type'] == "Movie"]
avg_movie_duration = movie_data['duration'].str.replace(' min', '').astype(int).
 ↪mean()
print(f"Average Movie Duration (Minutes): {avg_movie_duration:.2f}")
```

```
Average Movie Duration (Minutes): 99.58
```

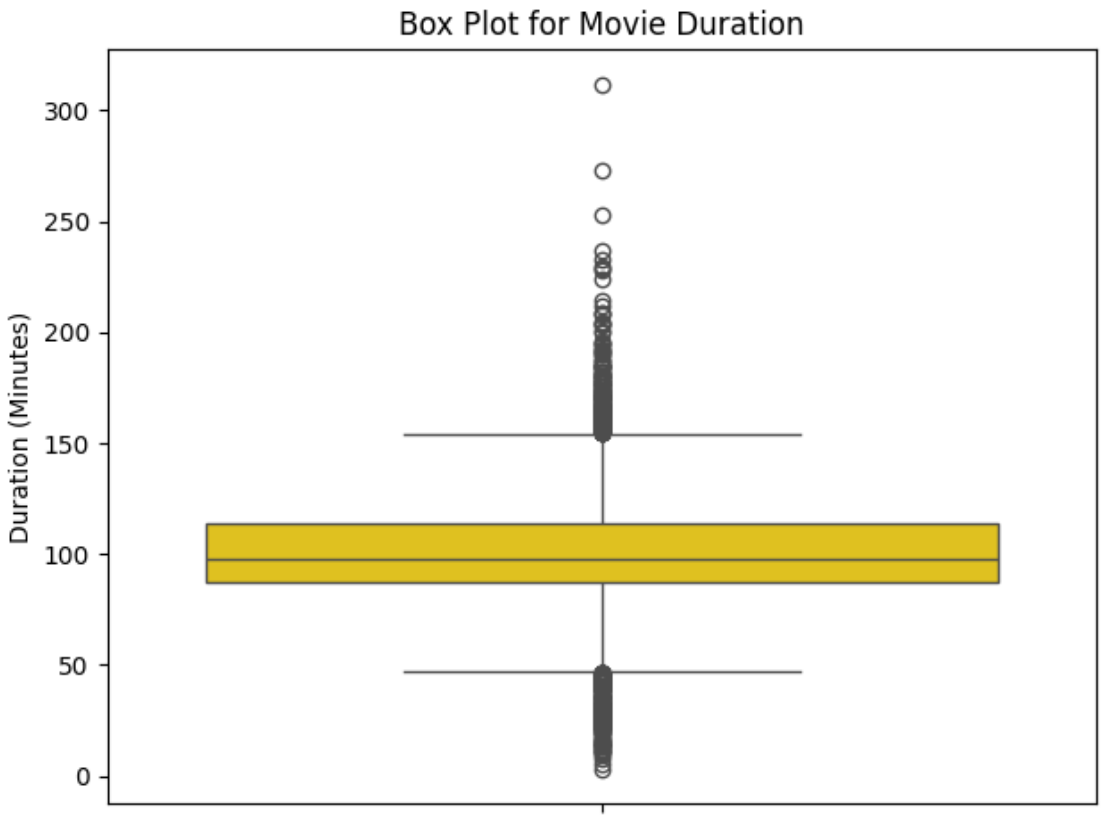
[43]:
```
import plotly.graph_objects as go

fig = go.Figure(go.Indicator(mode='number',
                             value=avg_movie_duration,
                             title={'text': "Average Movie Duration (Minutes)",␣
 ↪"font":{"size":16, "color":"darkblue"}},
                             number={"font":{"size":40, "color":"green"}},
                             domain={'x':[0,1], 'y':[0,1]}))
fig.update_layout(
    paper_bgcolor='skyblue',
    height=200,
    width=300,
)
fig.show()
```

0.4.7 8. How is the duration of movies distributed on Netflix?

[44]:
```
# Histogram for movie duration
movie_duration = data[data['type']=='Movie']['duration'].str.replace(' min',␣
 ↪'').astype(int)
sns.histplot(movie_duration, bins=20, kde=True, color='coral')
plt.title("Distribution of Movie Duration on Netflix")
plt.xlabel("Duration (Minutes)")
plt.ylabel("Number of Movies")
plt.show()
```



[45]:
```
# Box plot for movie duration to identify outliers
sns.boxplot(y=movie_duration, color='Gold')
plt.title("Box Plot for Movie Duration")
plt.ylabel("Duration (Minutes)")
plt.tight_layout()
plt.show()
```

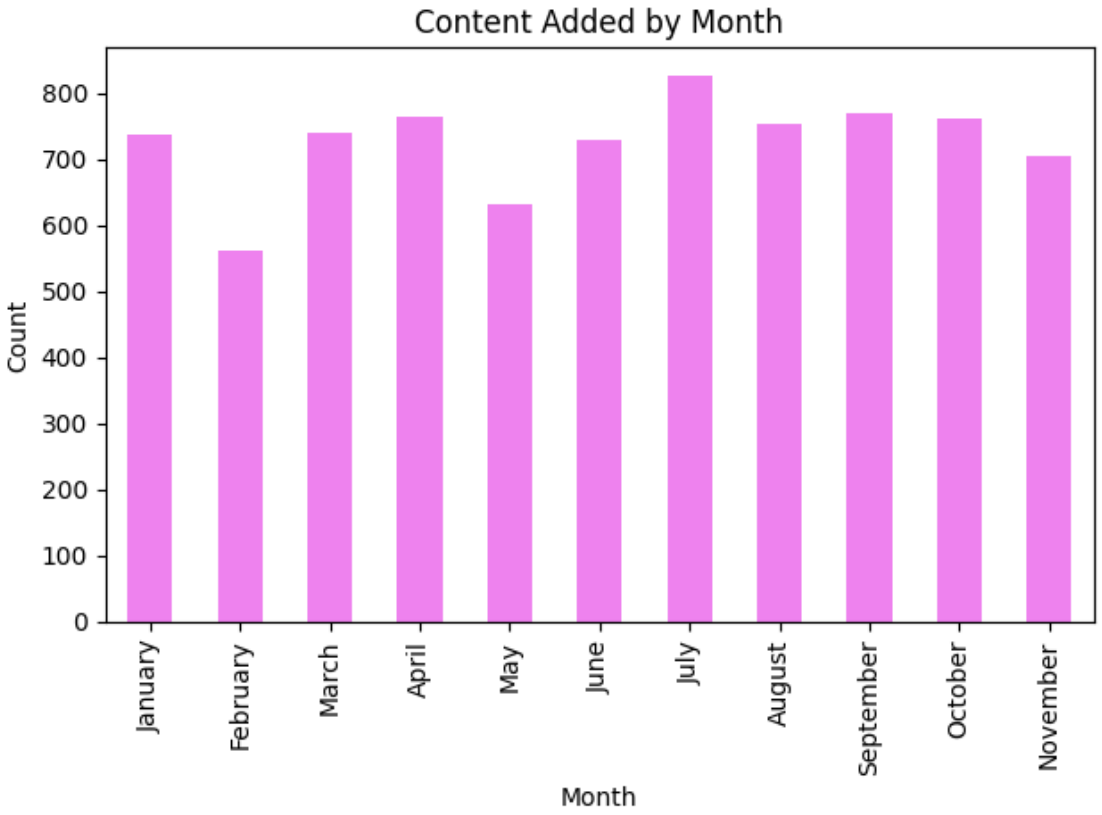


0.4.8 9. How does the number of content additions vary by month throughout the year 2021?

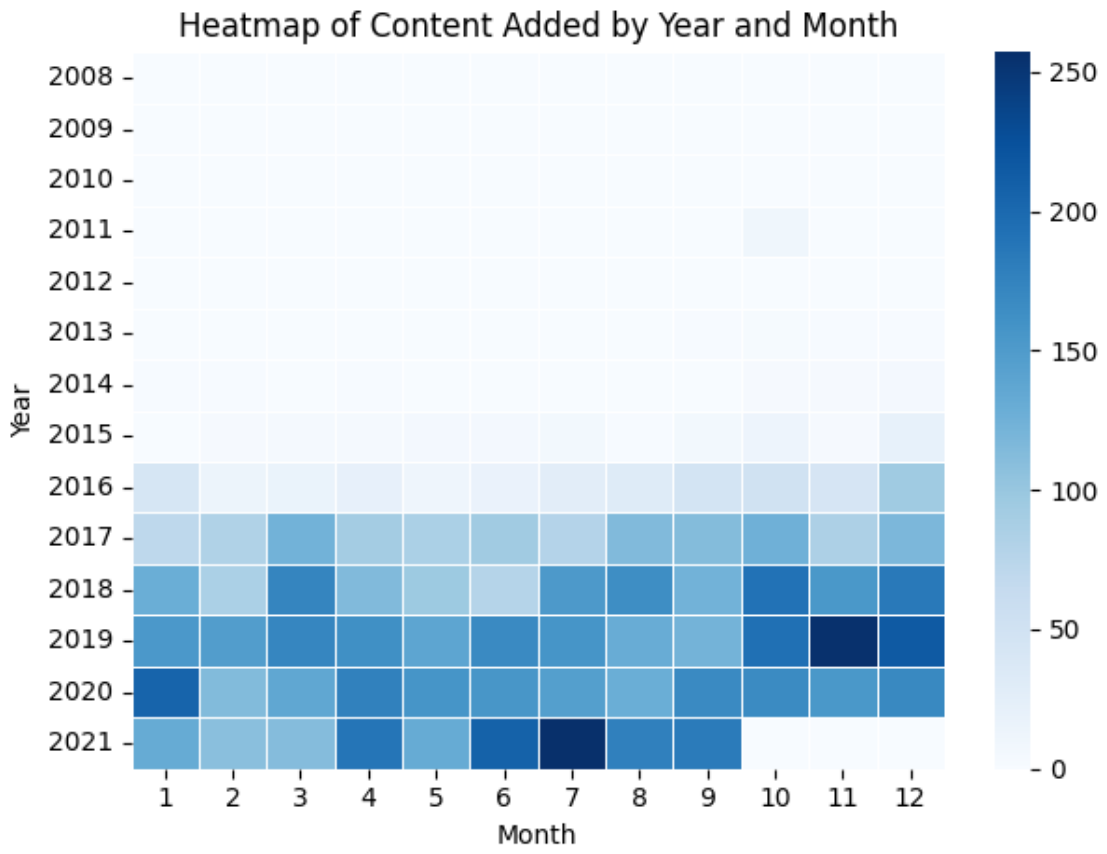
[46]:
```
data['month_added'].value_counts().reindex(pd.date_range('2021-01', '2021-12',␣
↪freq='ME').strftime('%B'), fill_value=0)
```

[46]:
```
January      737
February     562
March        741
April        763
May          632
June         728
July         827
August       754
September    769
October      760
November     705
Name: count, dtype: int64
```

[47]:
```
# Content Added per month
month_count = data['month_added'].value_counts().reindex(pd.
  ↪date_range('2021-01', '2021-12', freq='ME').strftime('%B'), fill_value=0)
month_count.plot(kind='bar', color='violet')
plt.title("Content Added by Month")
plt.xlabel("Month")
plt.ylabel('Count')
plt.tight_layout()
plt.show()
```



[48]:
```
# heatmap for title added by year and month
month_no = data['date_added'].dt.month
heatmap_data = pd.crosstab(data['year_added'], month_no)
sns.heatmap(data=heatmap_data, cmap='Blues', linewidths=.5)
plt.title("Heatmap of Content Added by Year and Month")
plt.xlabel("Month")
plt.ylabel("Year")
plt.tight_layout()
plt.show()
```

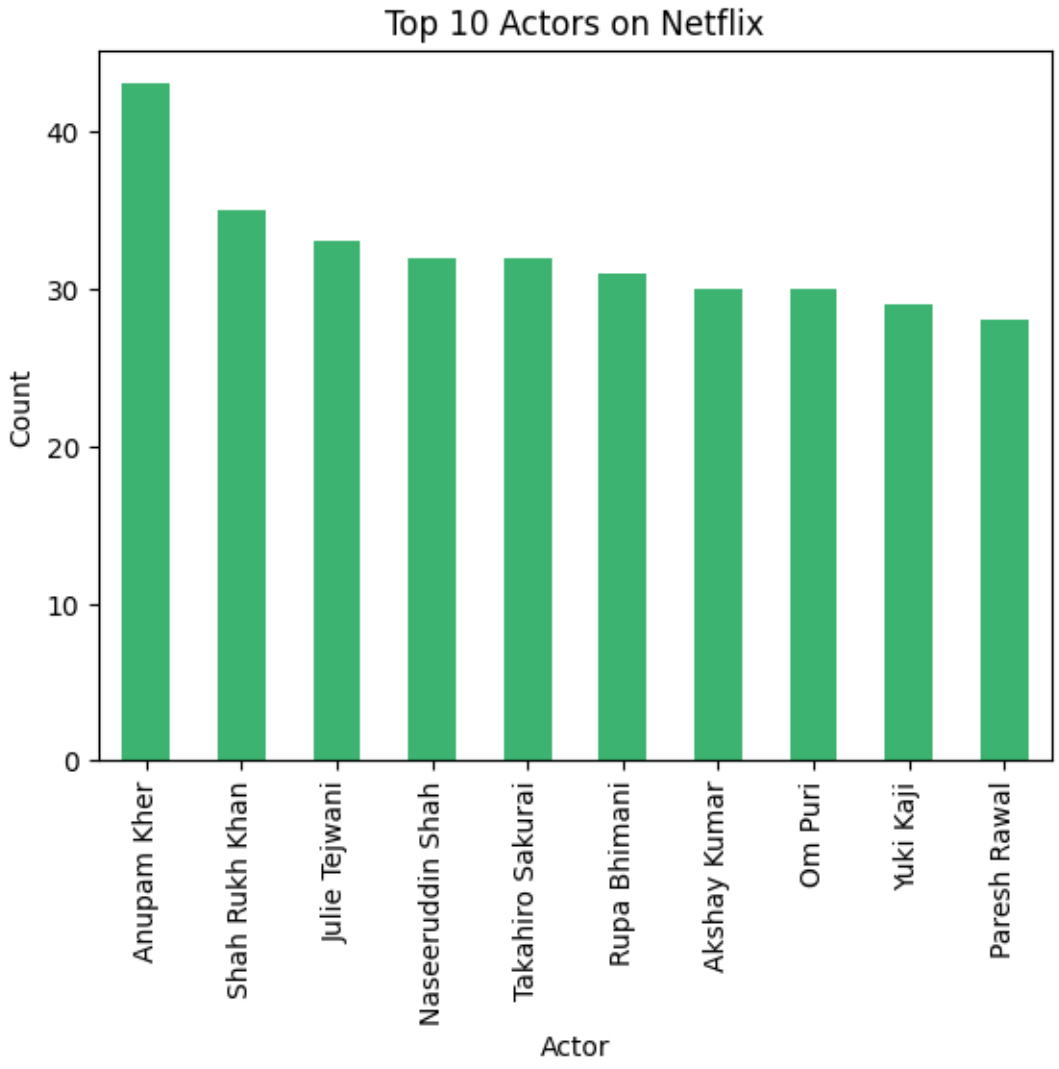


0.4.9 10. Who are the top 10 most frequently appearing actors in the Netflix dataset?

[49]:
```
top_10_actors = data['cast'].replace('Unknown', pd.NA).dropna().str.split(', ').
↪explode().value_counts().head(10)
top_10_actors
```

[49]:
```
cast
Anupam Kher          43
Shah Rukh Khan       35
Julie Tejwani        33
Naseeruddin Shah     32
Takahiro Sakurai     32
Rupa Bhimani         31
Akshay Kumar         30
Om Puri              30
Yuki Kaji            29
Paresh Rawal         28
Name: count, dtype: int64
```

[50]:
```
top_10_actors.plot(kind='bar', color="MediumSeaGreen")
plt.title("Top 10 Actors on Netflix")
plt.xlabel("Actor")
plt.ylabel("Count")
plt.show()
```



0.4.10 11. How has the number of Netflix titles released each year evolved between 1990 and 2021?

[51]:
```
pd.crosstab(data.type, data.release_year)
```

[51]:

release_year	1925	1942	1943	1944	1945	1946	1947	1954	1955	1956	…	\
type											…	
Movie	0	2	3	3	3	1	1	2	3	2	…	

```
TV Show          1     0     0     0     1     1     0     0     0     0  …

release_year  2012  2013  2014  2015  2016  2017  2018  2019  2020  2021
type
Movie          173   225   264   396   658   765   767   633   517   277
TV Show         63    61    88   159   243   265   379   397   436   315

[2 rows x 74 columns]
```

[52]:
```
filtered_data = data[(data['release_year'] >= 1990) & (data['release_year'] <=
↪2021)]
sns.countplot(data=filtered_data, x="release_year", hue="release_year",
↪palette='viridis', legend=False)
plt.title("Content Count by Release Year (1990-2021)")
plt.xticks(rotation=90)
plt.tight_layout()
plt.show()
```