In [1]:
```
!gdown "https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/
```

```
Downloading...
From: https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/0
00/000/940/original/netflix.csv
(https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/000/00
0/940/original/netflix.csv)
To: /Users/girl_intransition/netflix.csv
100%|██████████████████████████████████████| 3.40M/3.40M [00:00<00
:00, 10.3MB/s]
```

In [2]:
```
import numpy as np
from matplotlib import pyplot as plt
import seaborn as sns
import pandas as pd
nflix = pd.read_csv("/Users/girl_intransition/netflix.csv")
```

In [3]:
```
import warnings
warnings.filterwarnings('ignore')
```

In [4]:
```
df = nflix
```

How to grow the business, what kind of shows to produce, which genres / nationality movies are trending,

> Assumptions made:
>
> 1. Whatever data is given for each movie/TV show is correct.
> 2. The data given is a reflection of the fact that this kind of content worked in favor of the company

Because we do not have any quantifiable measures like revenue of the movie/tv show, user rating or critic rating and views etc, we are gong to take fields like genres, director, actors and analyse what is contributing to the current success and make recommendations accordingly.

In [5]:
```
df.head()
```

Out[5]:

	show_id	type	title	director	cast	country	date_added	release_year	ratir
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	P(-
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	T M
2	s3	TV Show	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...	NaN	September 24, 2021	2021	T M
3	s4	TV Show	Jailbirds New Orleans	NaN	NaN	NaN	September 24, 2021	2021	T M
4	s5	TV Show	Kota Factory	NaN	Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...	India	September 24, 2021	2021	T M

>> Basic observations about the data

In [6]:
```
df.shape
```

Out[6]:
```
(8807, 12)
```

> We have 8807 shows/movies in out netflix database as on

In [8]:
```
nflix.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
```

In [9]:
```
nflix.shape
```

Out[9]:
```
(8807, 12)
```

In [10]:
```
# no of rows with 0,1,2 and 3 null values

nflix.isna().sum(axis=1).value_counts()
```

Out[10]:
```
0    5332
1    2741
2     636
3      98
dtype: int64
```

In [11]:
```
nflix.loc[nflix.isna().sum(axis=1) == 3]
```

Out[11]:

	show_id	type	title	director	cast	country	date_added	release_year	rating
3	s4	TV Show	Jailbirds New Orleans	NaN	NaN	NaN	September 24, 2021	2021	TV-MA
10	s11	TV Show	Vendetta: Truth, Lies and The Mafia	NaN	NaN	NaN	September 24, 2021	2021	TV-MA

14	s15	TV Show	Crime Stories: India Detectives	NaN	NaN	NaN	September 22, 2021	2021	TV-MA
74	s75	TV Show	The World's Most Amazing Vacation Rentals	NaN	NaN	NaN	September 14, 2021	2021	TV-PG
123	s124	TV Show	Luv Kushh	NaN	NaN	NaN	September 2, 2021	2012	TV-Y7
...	...	...	...	...	...	...	...	...	...
7812	s7813	TV Show	Queens of Comedy	NaN	NaN	NaN	May 1, 2018	2017	TV-MA
8109	s8110	TV Show	Strongland	NaN	NaN	NaN	January 18, 2019	2018	TV-PG
8199	s8200	TV Show	The Bachelor	NaN	NaN	NaN	December 1, 2019	2009	TV-14
8609	s8610	TV Show	Towies	NaN	NaN	NaN	December 27, 2017	2016	TV-MA
8803	s8804	TV Show	Zombie Dumb	NaN	NaN	NaN	July 1, 2019	2018	TV-Y7

98 rows × 12 columns

Notes:

1. We are not deleting rows with three null values because we could use the data present in other fields like genre/listed_in, release year and duration to do analysis
2. They could be deleted if required when specifically working with director, cast and country variables

In [12]:
```
# no of null values in each column
nflix.isna().sum()
```

Out[12]:
```
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
```

In [13]:
```
nflix.describe(include='all')
```

Out[13]:

	show_id	type	title	director	cast	country	date_added	release_year
count	8807	8807	8807	6173	7982	7976	8797	8807.000000
unique	8807	2	8807	4528	7692	748	1767	NaN
top	s1	Movie	Dick Johnson Is Dead	Rajiv Chilaka	David Attenborough	United States	January 1, 2020	NaN
freq	1	6131	1	19	19	2818	109	NaN
mean	NaN	NaN	NaN	NaN	NaN	NaN	NaN	2014.180198
std	NaN	NaN	NaN	NaN	NaN	NaN	NaN	8.819312
min	NaN	NaN	NaN	NaN	NaN	NaN	NaN	1925.000000
25%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	2013.000000
50%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	2017.000000
75%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	2019.000000
max	NaN	NaN	NaN	NaN	NaN	NaN	NaN	2021.000000

In [14]:
```
nflix.director.value_counts()
```

Out[14]:
```
Rajiv Chilaka                     19
Raúl Campos, Jan Suter            18
Marcus Raboy                      16
Suhas Kadav                       16
Jay Karas                         14
                                  ..
Raymie Muzquiz, Stu Livingston     1
Joe Menendez                       1
Eric Bross                         1
Will Eisenberg                     1
Mozez Singh                        1
Name: director, Length: 4528, dtype: int64
```

In [15]:
```
nflix['country'].value_counts()
```

Out[15]:
```
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
```

In [16]:
```
nflix['cast'].value_counts()
```

Out[16]:
```
David Attenborough
19
Vatsal Dubey, Julie Tejwani, Rupa Bhimani, Jigna Bhardwaj, Rajesh
Kava, Mousam, Swapnil
14
Samuel West
10
Jeff Dunham
7
David Spade, London Hughes, Fortune Feimster
6

..
Michael Peña, Diego Luna, Tenoch Huerta, Joaquin Cosio, José María
Yazpik, Matt Letscher, Alyssa Diaz
1
Nick Lachey, Vanessa Lachey
1
Takeru Sato, Kasumi Arimura, Haru, Kentaro Sakaguchi, Takayuki Yam
ada, Kendo Kobayashi, Ken Yasuda, Arata Furuta, Suzuki Matsuo, Koi
chi Yamadera, Arata Iura, Chikako Kaku, Kotaro Yoshida     1
Toyin Abraham, Sambasa Nzeribe, Chioma Chukwuka Akpotha, Chioma Om
eruah, Chiwetalu Agu, Dele Odule, Femi Adebayo, Bayray McNwizu, Bi
odun Stephen                                                1
Vicky Kaushal, Sarah-Jane Dias, Raaghav Chanana, Manish Chaudhary,
Meghna Malik, Malkeet Rauni, Anita Shabdish, Chittaranjan Tripathy
1
Name: cast, Length: 7692, dtype: int64
```

In [17]:
```
nflix['listed_in'].value_counts()
```

Out[17]:
```
Dramas, International Movies                                 362
Documentaries                                                359
Stand-Up Comedy                                              334
Comedies, Dramas, International Movies                       274
Dramas, Independent Movies, International Movies             252
                                                            ...
Kids' TV, TV Action & Adventure, TV Dramas                     1
TV Comedies, TV Dramas, TV Horror                              1
Children & Family Movies, Comedies, LGBTQ Movies               1
Kids' TV, Spanish-Language TV Shows, Teen TV Shows             1
Cult Movies, Dramas, Thrillers                                 1
Name: listed_in, Length: 514, dtype: int64
```

In [ ]:
```

```

preprocessing of data - (unnesting fields like actor, director and country)

1. We have a lot of nested data in 4 columns, so we'll unnest/split the values in to more rows while all the other data remains same.
2. Strip all the processes columns of any white spaces
3. we wll convert the dtype of release_year to float (because we have null values),date_added to datetime format and extract numeric values from the duration column and convert to float value(we have null values).

In [18]:
```
nflix['cast'] = nflix['cast'].str.split(',')
nflix = nflix.explode(['cast'],ignore_index=True)
nflix['cast']
```

Out[18]:
```
0                           NaN
1                    Ama Qamata
2                   Khosi Ngema
3                 Gail Mabalane
4                Thabang Molaba
                  ...          
64946          Manish Chaudhary
64947              Meghna Malik
64948             Malkeet Rauni
64949            Anita Shabdish
64950     Chittaranjan Tripathy
Name: cast, Length: 64951, dtype: object
```

In [19]:
```
nflix['director'] = nflix['director'].str.split(',')
nflix = nflix.explode(['director'],ignore_index=True)
nflix['director']
```

Out[19]:
```
0        Kirsten Johnson
1                    NaN
2                    NaN
3                    NaN
4                    NaN
              ...       
70807        Mozez Singh
70808        Mozez Singh
70809        Mozez Singh
70810        Mozez Singh
70811        Mozez Singh
Name: director, Length: 70812, dtype: object
```

In [20]:
```
nflix['country'] = nflix['country'].str.split(',')
nflix = nflix.explode(['country'],ignore_index=True)
nflix['country']
```

Out[20]:
```
0        United States
1         South Africa
2         South Africa
3         South Africa
4         South Africa
             ...      
89410            India
89411            India
89412            India
89413            India
89414            India
Name: country, Length: 89415, dtype: object
```

In [21]:
```
nflix['country'].str.strip()
```

Out[21]:
```
0        United States
1         South Africa
2         South Africa
3         South Africa
4         South Africa
             ...      
89410            India
89411            India
89412            India
89413            India
89414            India
Name: country, Length: 89415, dtype: object
```

In [22]:
```
nflix['listed_in'] = nflix['listed_in'].str.split(',')
nflix = nflix.explode(['listed_in'],ignore_index=True)
nflix['listed_in']
```

Out[22]:
```
0                  Documentaries
1         International TV Shows
2                      TV Dramas
3                   TV Mysteries
4         International TV Shows
                   ...          
202060      International Movies
202061          Music & Musicals
202062                    Dramas
202063      International Movies
202064          Music & Musicals
Name: listed_in, Length: 202065, dtype: object
```

In [31]:
```
nflix['listed_in'] = nflix['listed_in'].str.strip()
nflix['director'] = nflix['director'].str.strip()
nflix['cast'] = nflix['cast'].str.strip()
nflix['country'] = nflix['country'].str.strip()
```

In [ ]:
```
# --> converting the duration to numeric dtype
```

In [35]:
```
nflix['duration'] = nflix['duration'].str.extract('(\d+)')
nflix['duration'] = pd.to_numeric(nflix['duration'])
```

In [ ]:
```
# --> converting date and year in to respective dtype
```

In [40]:
```
nflix['date_added'] = pd.to_datetime(nflix['date_added'],errors='co
```

In [42]:
```
nflix['release_year'] = pd.to_numeric(nflix['release_year'])
```

In [44]:
```
nflix.head()   ## reflection of changes made to the dataset
```

Out[44]:

	show_id	type	title	director	cast	country	date_added	release_year	rating
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	2021-09-25	2020	PG-13
1	s2	TV Show	Blood & Water	NaN	Ama Qamata	South Africa	2021-09-24	2021	TV-MA
2	s2	TV Show	Blood & Water	NaN	Ama Qamata	South Africa	2021-09-24	2021	TV-MA
3	s2	TV Show	Blood & Water	NaN	Ama Qamata	South Africa	2021-09-24	2021	TV-MA
4	s2	TV Show	Blood & Water	NaN	Khosi Ngema	South Africa	2021-09-24	2021	TV-MA

In [45]:

```
nflix.info()    ## reflection of changes made to the dataset
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 202065 entries, 0 to 202064
Data columns (total 12 columns):
 #   Column        Non-Null Count   Dtype         
---  ------        --------------   -----         
 0   show_id       202065 non-null  object        
 1   type          202065 non-null  object        
 2   title         202065 non-null  object        
 3   director      151422 non-null  object        
 4   cast          199916 non-null  object        
 5   country       190168 non-null  object        
 6   date_added    201907 non-null  datetime64[ns]
 7   release_year  202065 non-null  int64         
 8   rating        201998 non-null  object        
 9   duration      202062 non-null  float64       
 10  listed_in     202065 non-null  object        
 11  description   202065 non-null  object        
dtypes: datetime64[ns](1), float64(1), int64(1), object(9)
memory usage: 18.5+ MB
```

In [49]:

```
print(nflix['release_year'].min())
print(nflix['release_year'].max())
```

```
1925
2021
```

In [51]:

```
print(nflix['date_added'].min())
print(nflix['date_added'].max())
```

```
2008-01-01 00:00:00
2021-09-25 00:00:00
```

Note:

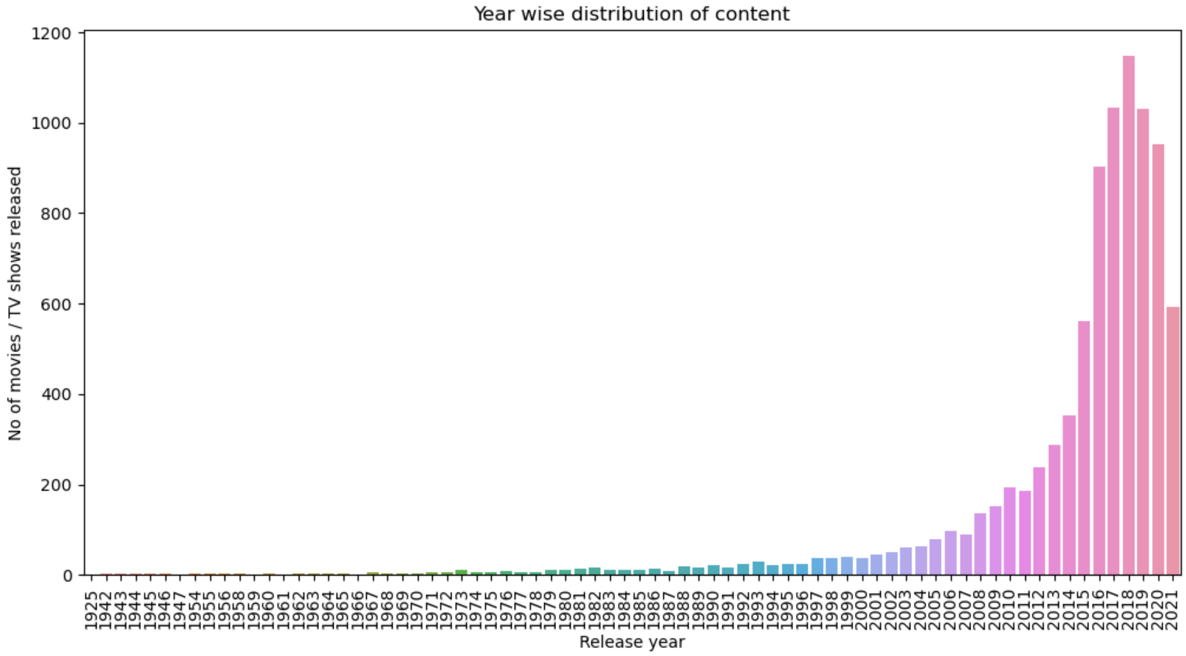
1. After splitting nested values we have 202065 rows
2. Our data ranges from Jan 2008 to Sept 2021 (we dont have the complete data for the year 2021)

univariate analysis

>> year wise distribution of content

In [33]:

```
# How has the number of movies released per year changed over the l

year_df = nflix.groupby(['release_year'])['title'].nunique().reset_

fig=plt.figure(figsize=(12,6))
sns.barplot(data=year_df,x='release_year',y='title')
plt.xlabel('Release year')
plt.ylabel('No of movies / TV shows released')
plt.xticks(rotation=90)
plt.title("Year wise distribution of content")
plt.show()
```



Insights:

1. We can observe that the movies/tv shows released steadily increased initially and then exponentially from 2015.
2. Quantity of movies released decreased comparitively after 2018.

>> distribution of duration

In [52]:

```
#  (should be done for tv and movies saperately)

movie_df = nflix.loc[nflix['type'] == 'Movie']
tv_df = nflix.loc[nflix['type'] == 'TV Show']
```

In [53]:

```
movie_df.head()
```

Out[53]:

	show_id	type	title	director	cast	country	date_added	release_year	rat
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	2021-09-25	2020	F
159	s7	Movie	My Little Pony: A New Generation	Robert Cullen	Vanessa Hudgens	NaN	2021-09-24	2021	
160	s7	Movie	My Little Pony: A New Generation	José Luis Ucha	Vanessa Hudgens	NaN	2021-09-24	2021	
161	s7	Movie	My Little Pony: A New Generation	Robert Cullen	Kimiko Glenn	NaN	2021-09-24	2021	
162	s7	Movie	My Little Pony: A New Generation	José Luis Ucha	Kimiko Glenn	NaN	2021-09-24	2021	

In [54]:

```
movie_df.shape
```

Out[54]:

```
(145917, 12)
```

In [55]:

```
movie_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 145917 entries, 0 to 202064
Data columns (total 12 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   show_id       145917 non-null  object
 1   type          145917 non-null  object
 2   title         145917 non-null  object
 3   director      144632 non-null  object
 4   cast          144586 non-null  object
 5   country       139718 non-null  object
 6   date_added    145917 non-null  datetime64[ns]
 7   release_year  145917 non-null  int64
 8   rating        145908 non-null  object
 9   duration      145914 non-null  float64
 10  listed_in     145917 non-null  object
 11  description   145917 non-null  object
dtypes: datetime64[ns](1), float64(1), int64(1), object(9)
memory usage: 14.5+ MB
```

In [56]:

```
median = movie_df['duration'].median()
nof_movies = movie_df['duration'].loc[movie_df['duration'] == media
```

In [57]:

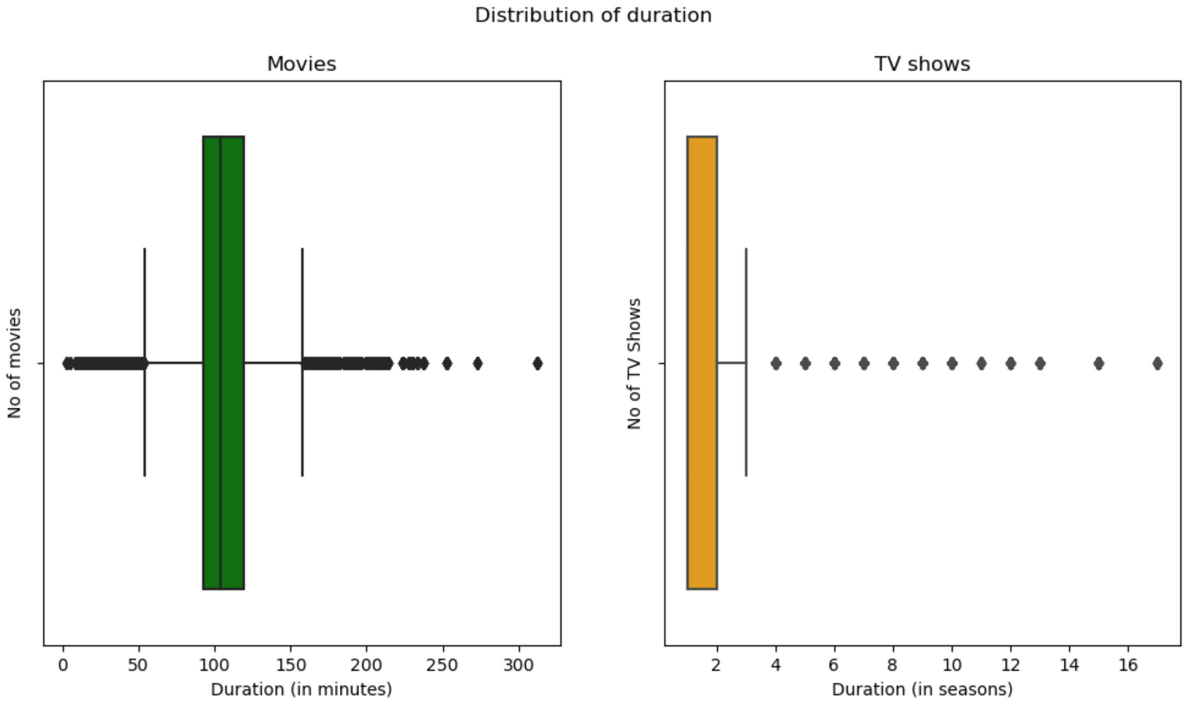
```
nof_movies
```

Out[57]:

```
2822
```

In [58]:

```
fig = plt.figure(figsize=(12,6))

plt.subplot(1,2,1)
sns.boxplot(data=movie_df,x='duration',color='green')
plt.xlabel('Duration (in minutes)')
plt.ylabel('No of movies')
plt.title("Movies")

plt.subplot(1,2,2)
sns.boxplot(data=tv_df,x='duration',color='orange')
plt.xlabel('Duration (in seasons)')
plt.ylabel('No of TV Shows')
plt.title("TV shows")
plt.suptitle("Distribution of duration")
plt.show()
```



Insights:

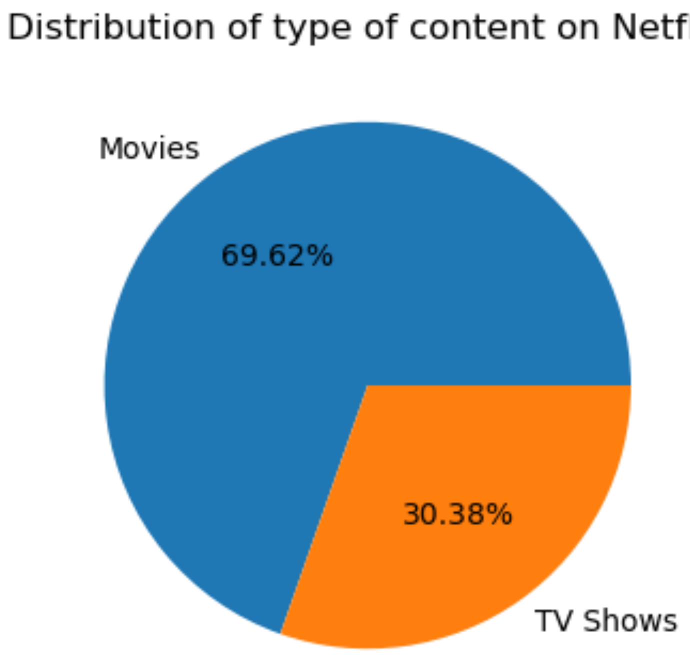
1. The median duration for movies is a little more than 100 minutes while the minimum and maximum is at 50 mins and 160 mins respectively.
2. The median duration for TV shows is 1 season.
3. There are a lot of outliers for the movies depending on what kind of content it is(example: documentaries).

>> content distribution pie chart (movie vs tv show)

In [59]:
```
type_count = nflix.groupby(['type'])['title'].nunique()
labels = ['Movies',"TV Shows"]
total_ = type_count.loc['Movie']+type_count.loc['TV Show']
```

In [60]:
```
m_percent = ((type_count.loc['Movie']/total_)*100).round(2)
tv_percent = ((type_count.loc['TV Show']/total_)*100).round(2)
```

In [61]:
```
plt.figure(figsize=(8,4))
plt.pie([m_percent,tv_percent],labels=labels,autopct='%1.2f%%')
plt.title('Distribution of type of content on Netflix')
plt.show()
```



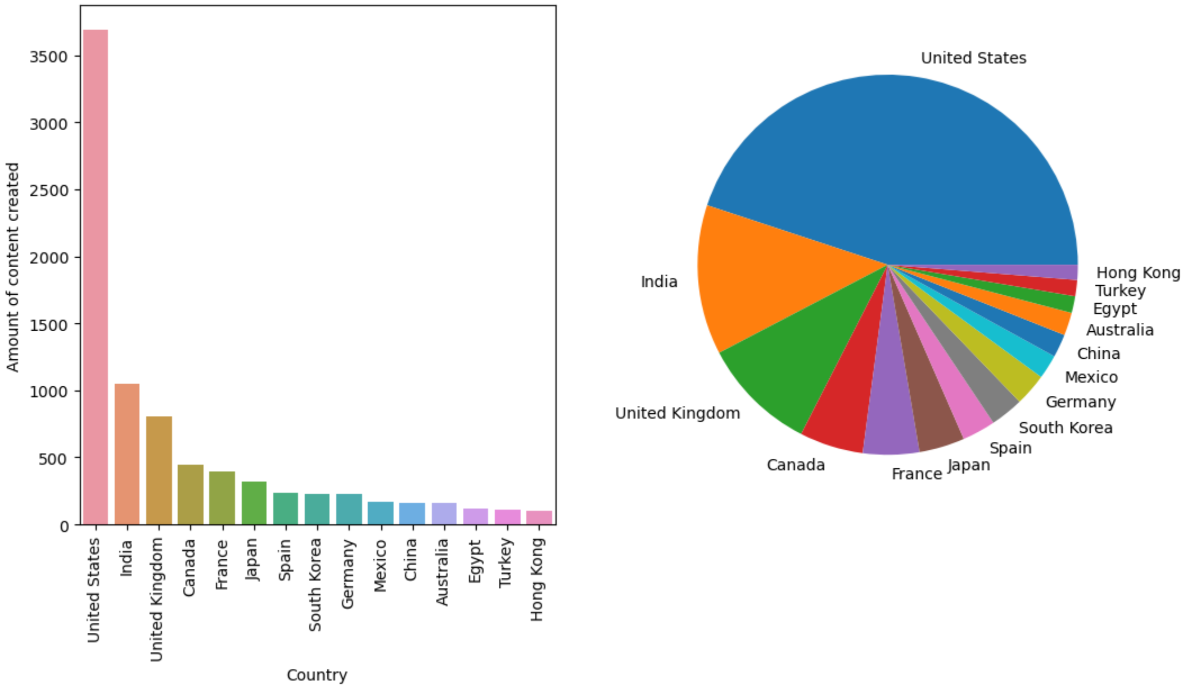
Insights:

1. Movies make up approximately 70% of content on Netflix where as TV shows make up 30% of the content.

>> country wise distribution of data

In [71]:
```
# - x axis(country list), y axis(title count)

country_dist = nflix.groupby(['country'])['title'].nunique().reset_

fig=plt.figure(figsize=(12,6))

plt.subplot(1,2,1)
sns.barplot(data=country_dist,x='country',y='title')
plt.xticks(rotation=90)
plt.xlabel('Country')
plt.ylabel('Amount of content created')


plt.subplot(1,2,2)
plt.pie(country_dist['title'],labels=country_dist['country'])

plt.suptitle('Country wise distribution (Movies and TV shows)')
plt.show()
```

Country wise distribution (Movies and TV shows)



Insights:

1. The content that belongs to USA's artists is a little less than 50% (45% approximately).
2. After the US, India, UK, France and Canada contributes the most data to the Netflix platform.

Note: this data includes both movies and TV shows for each country

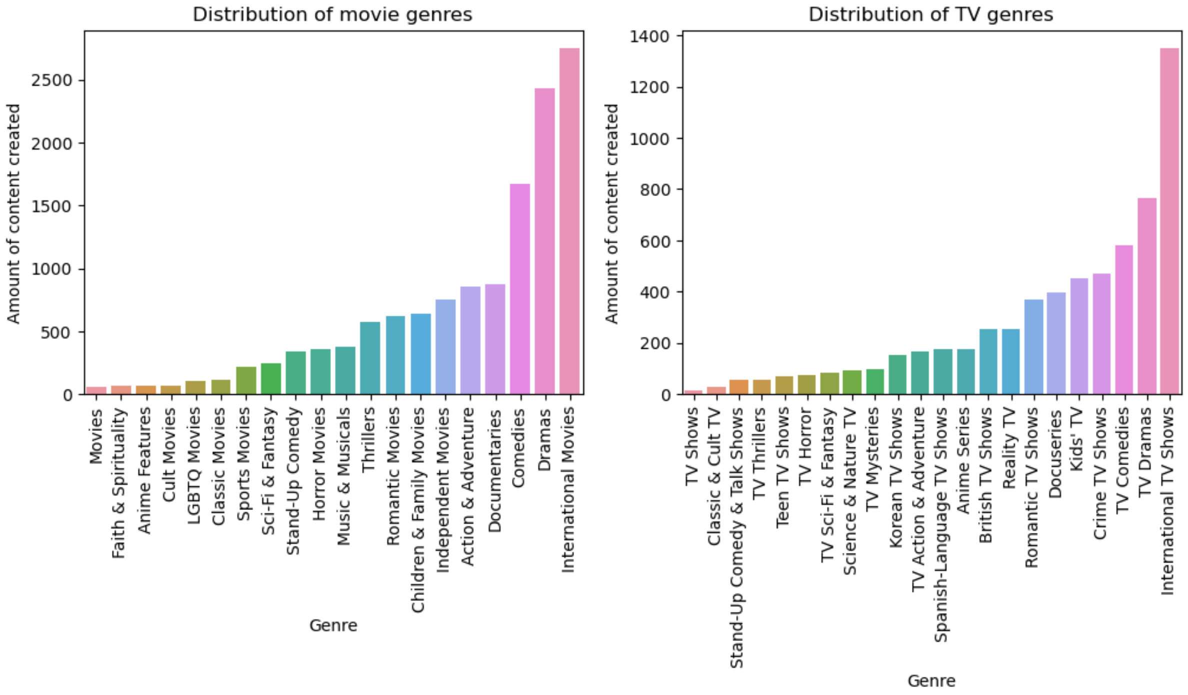
>> distribution of movies created across genres

In [75]:

```
genre = movie_df.groupby(['listed_in'])['show_id'].nunique().reset_

genre_tv = tv_df.groupby(['listed_in'])['show_id'].nunique().reset_
```

In [78]:

```
fig = plt.figure(figsize=(12,4))

plt.subplot(1,2,1)
sns.barplot(data=genre,x='listed_in',y='show_id')
plt.xticks(rotation=90)
plt.xlabel('Genre')
plt.ylabel('Amount of content created')
plt.title('Distribution of movie genres')

plt.subplot(1,2,2)
sns.barplot(data=genre_tv,x='listed_in',y='show_id')
plt.xticks(rotation=90)
plt.xlabel('Genre')
plt.ylabel('Amount of content created')
plt.title('Distribution of TV genres')

plt.show()
```



Insights:

1. Dramas and comedy as the genre thats trending in both movie type and TV show type of content.
2. International show/movie is any movie that is made outside of the USA and in the local language, so we cannot consider this genre to identify the kind of content that audience like to watch.
3. Documentaries is one genre that is fairly popular in both types.
4. Crime TV and kids TV shows seem to be at neck with each other in the amount of content being added (or trending for this business case).
5. Action and adventure movies are also mildly popular.

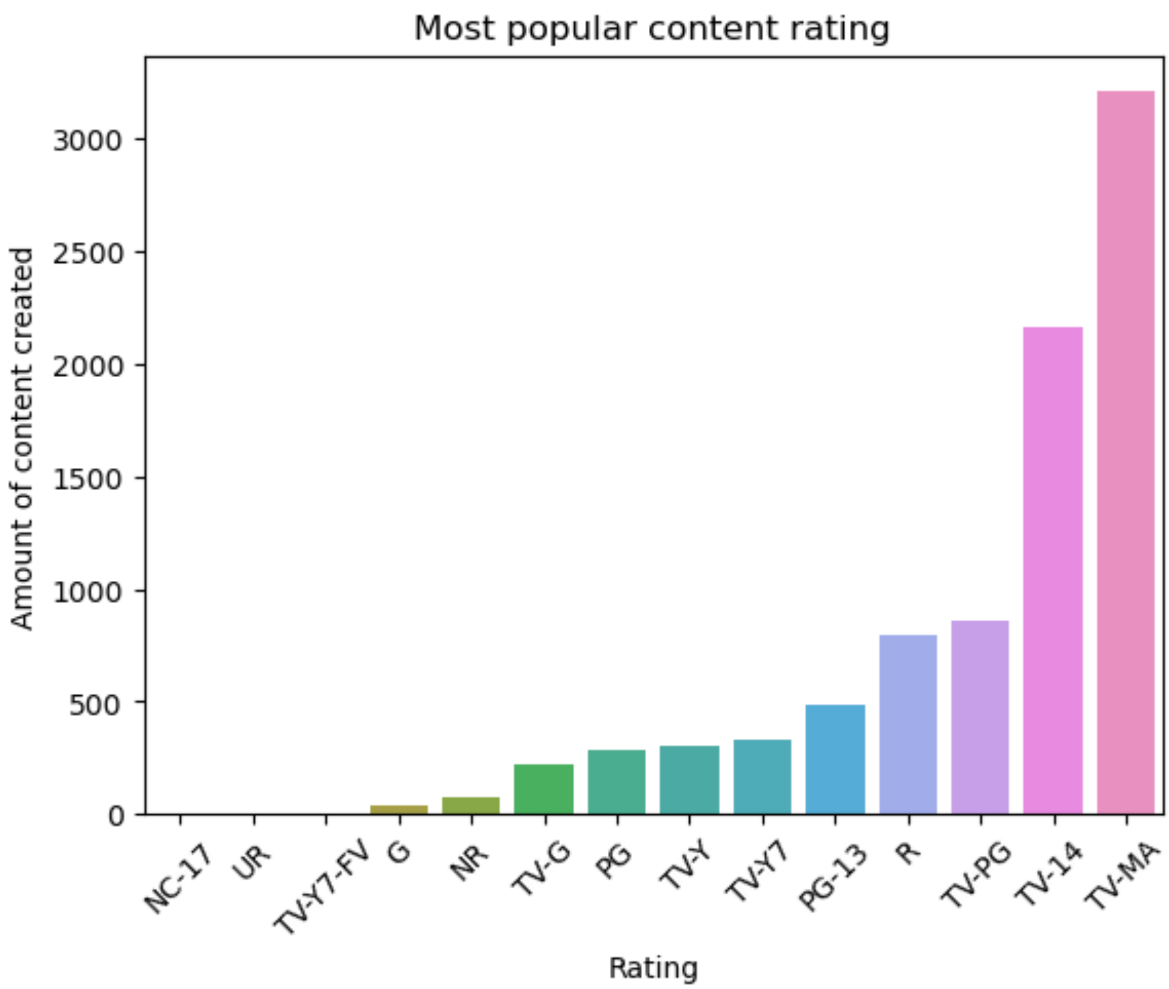
>> distribution of Rating

In [79]:
```
# (across all content - movies/TV shows)

rating = nflix.groupby(['rating'])['title'].nunique().reset_index()
```

In [80]:
```
temp = rating.loc[rating['rating'].isin(['74 min','84 min','66 min'
rating.drop(temp,inplace=True)
```

In [81]:

```
sns.barplot(data=rating,x='rating',y='title')
plt.xticks(rotation=45)
plt.xlabel('Rating')
plt.ylabel('Amount of content created')
plt.title("Most popular content rating")
plt.show()
```



Insights:

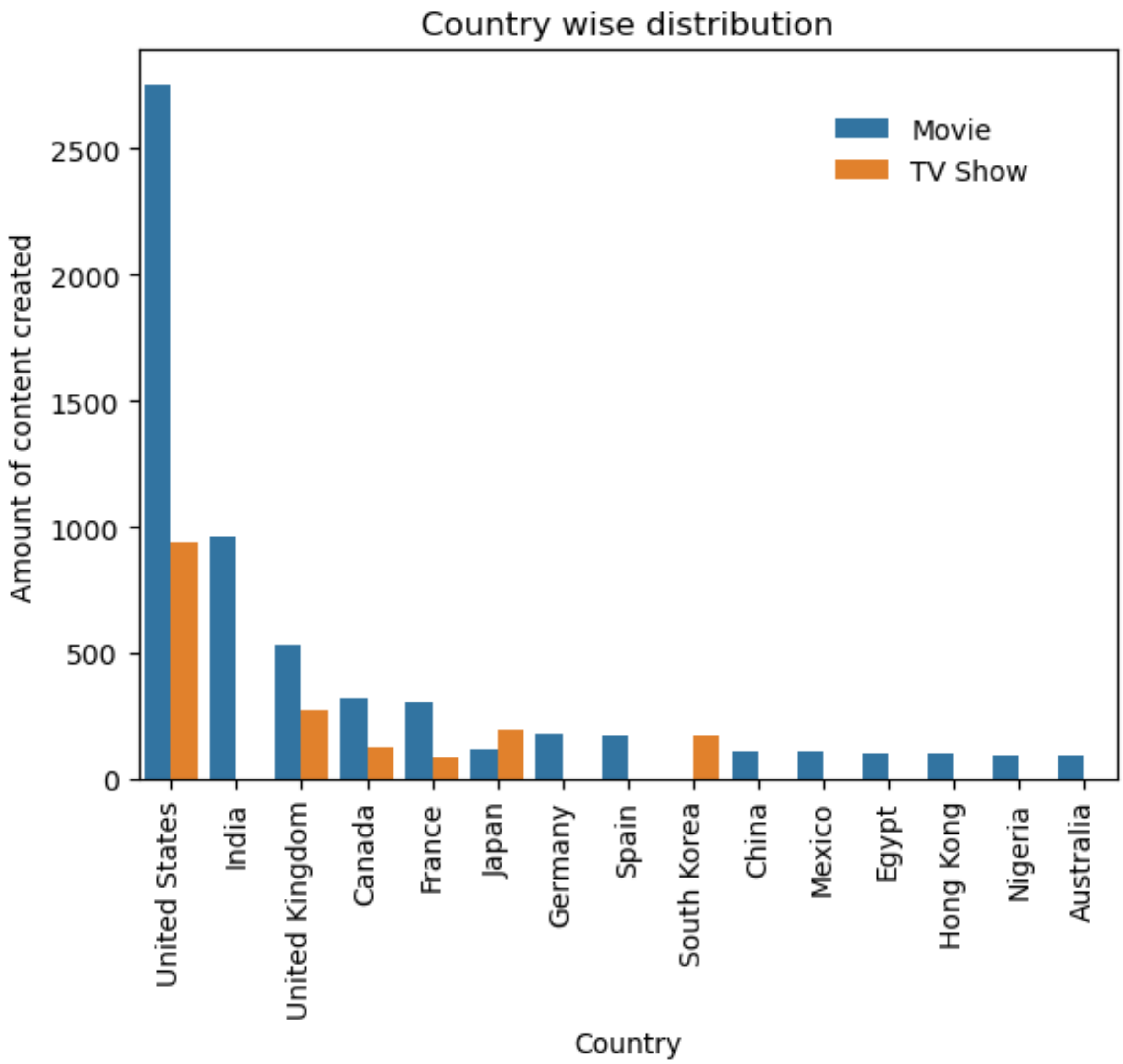
1. TV-MA and TV-14 are the rating categories that are most popular with the content in Netflix.TV-MA refers to mature and adult content that may not be suitable for ages under 17 and TV-14 refers to shows that are unsuitable for ages under 14.
2. TV-PG and R are the next two rating categories that are popular. R represents Restricted and TV-PG represents recommended parental guidence.

Bivariate analysis

>> What type of content is available in different countries

In [82]:

```
# how many movies and TV shows each country has released
# or


country_hue = nflix.groupby(['country','type'])['title'].nunique().

sns.barplot(data=country_hue,x='country',y='title',hue='type')
plt.xticks(rotation=90)
plt.xlabel('Country')
plt.ylabel('Amount of content created')
plt.legend(loc=(0.7,0.8),frameon=False)
plt.title('Country wise distribution')
plt.show()
```



Insights:

1. Movie content created in most countries is significantly more than TV content. Japan and South Korea are the exceptions to this observation.
2. TV show content from the countries from Germany to Australia have minimal to none (with the exception of South Korea).
3. India doesnt have any TV shows on Netflix.

Inferences:

1. It is possible that Indian webseries or TV shows not being on Netflix might be the reason for no TV series content from India.
2. South Korea and Japan is popular for TV series.

>> Trend of TV and movie genres

In [83]:

```
pick top 5 genres
genre vs release year () - line plot with count of titles on y axis

op5_movie_genre_list = movie_df['listed_in'].value_counts().reset_in
op5_movie_genre_df = movie_df.loc[movie_df['listed_in'].isin(top5_mo

enre_trnd = top5_movie_genre_df.groupby(['release_year','listed_in']
```

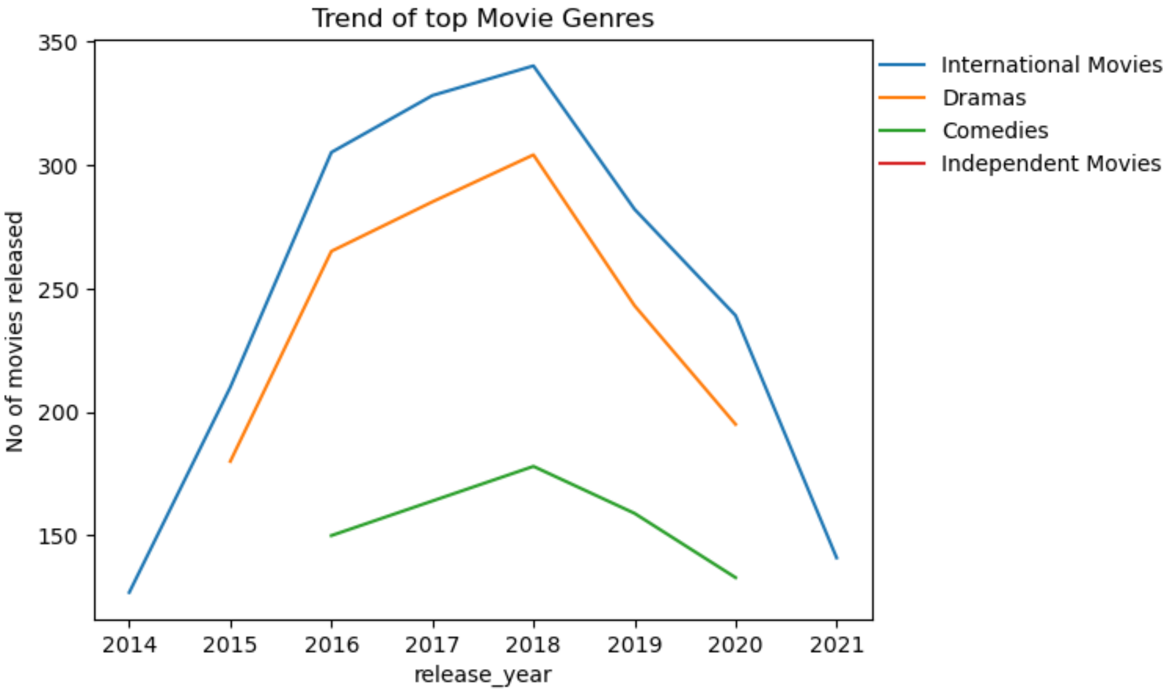
In [84]:

```
genre_trnd.head()
```

Out[84]:

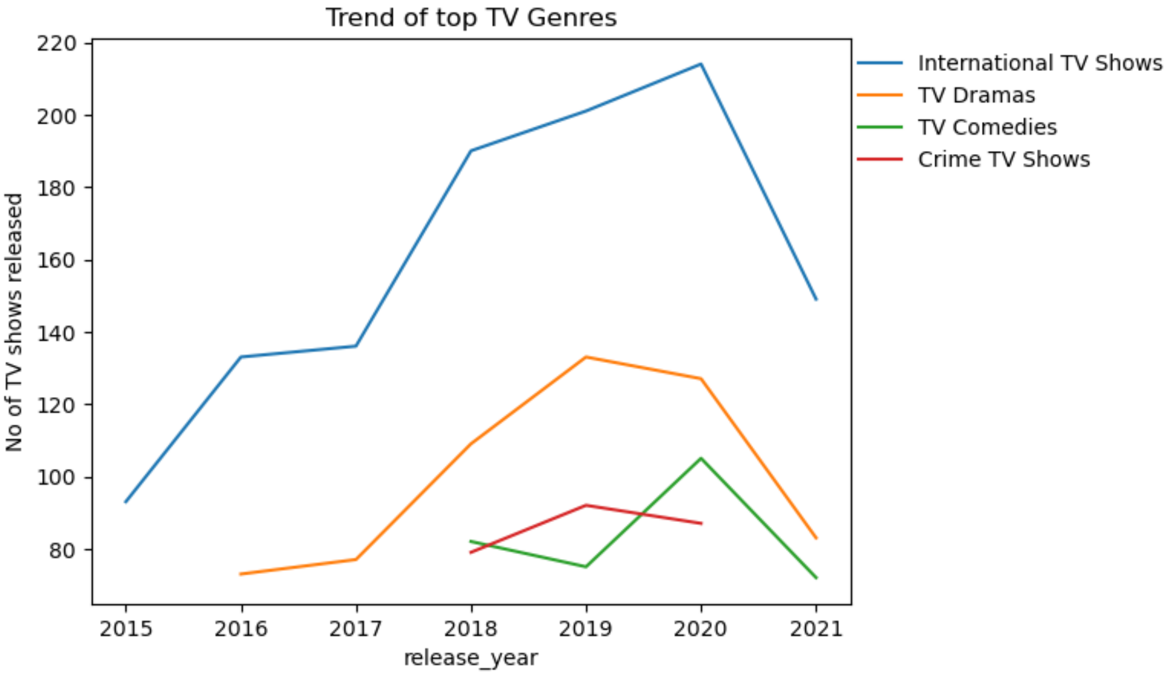
	release_year	listed_in	title
267	2018	International Movies	340
262	2017	International Movies	328
257	2016	International Movies	305
265	2018	Dramas	304
260	2017	Dramas	285

In [85]:
```
sns.lineplot(data = genre_trnd,x='release_year',y='title',hue='list
plt.legend(loc=(1,0.75),frameon=False,ncol=1)
plt.ylabel('No of movies released')
plt.title('Trend of top Movie Genres')
plt.show()
```



In [86]:
```
top5_tv_genre_list = tv_df['listed_in'].value_counts().reset_index(
top5_tv_genre_df = tv_df.loc[tv_df['listed_in'].isin(top5_tv_genre_

tv_genre_trnd = top5_tv_genre_df.groupby(['release_year','listed_in
```

In [87]:
```
sns.lineplot(data = tv_genre_trnd,x='release_year',y='title',hue='l
plt.legend(loc=(1,0.75),frameon=False,ncol=1)
plt.ylabel('No of TV shows released')
plt.title('Trend of top TV Genres')
plt.show()
```



Insights:

TV

1. Trend of the genre Dramas in both movie and TV categories have always been popular.
2. Meanwhile comedy genre has seen slow decline from 2018 to 2019 but steadily picked up after 2019.
3. Crime genre saw and overall increase in demand.
4. All the content being released saw a dip after the year 2020.

Movies

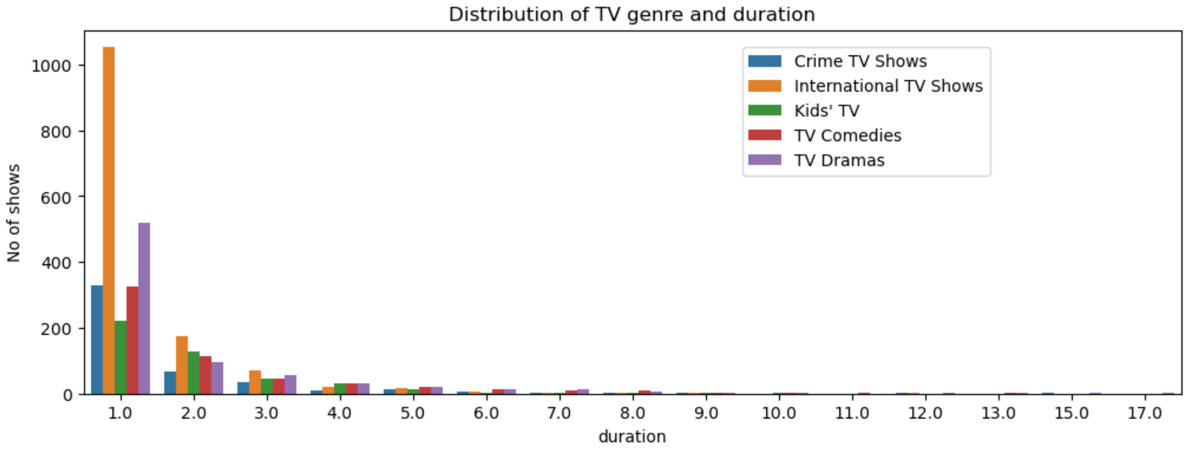
1. Dramas and comedy is the top genre.
2. Movie releases for these genres have decreased after 2018.

>> Distribution of duration with respect to genre

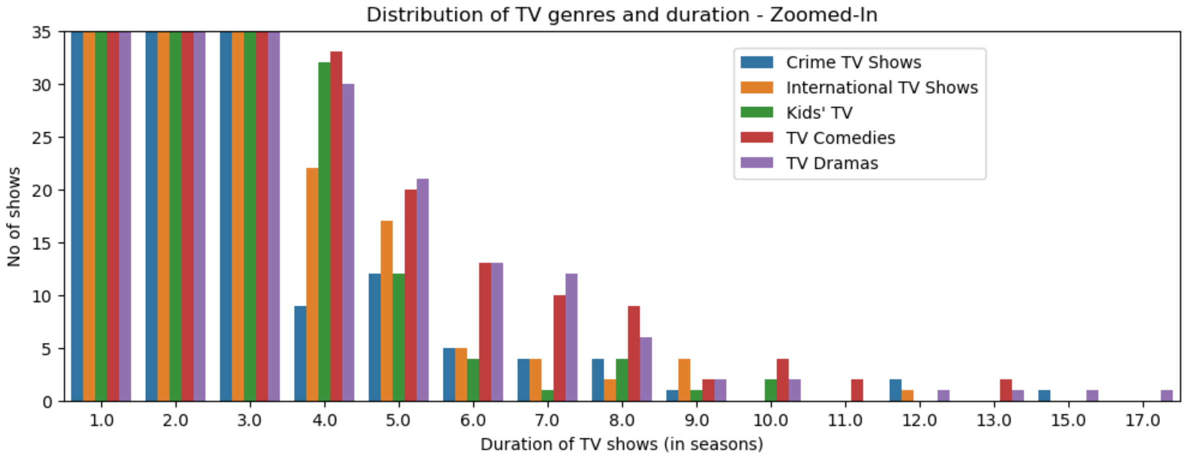
In [ ]:
```
# duration vs genre - duration on x axis and count of titles on y a
```

In [90]:
```
top5_tv_genre_list = tv_df['listed_in'].value_counts().reset_index(
top5_tv_genre_df = tv_df.loc[tv_df['listed_in'].isin(top5_tv_genre_

duration_genre = top5_tv_genre_df.groupby(['duration','listed_in'])
```

In [91]:
```
plt.figure(figsize=(12,4))
sns.barplot(data = duration_genre,x='duration',y='title',hue='liste
plt.ylabel('No of shows')
plt.legend(loc=(0.6,0.6))
plt.title('Distribution of TV genre and duration')
plt.show()
```



In [92]:
```

plt.figure(figsize=(12,4))
sns.barplot(data = duration_genre,x='duration',y='title',hue='liste
plt.ylabel('No of shows')
plt.xlabel("Duration of TV shows (in seasons)")
plt.legend(loc=(0.6,0.6))
plt.ylim(0,35)
plt.title("Distribution of TV genres and duration - Zoomed-In")
plt.show()
```



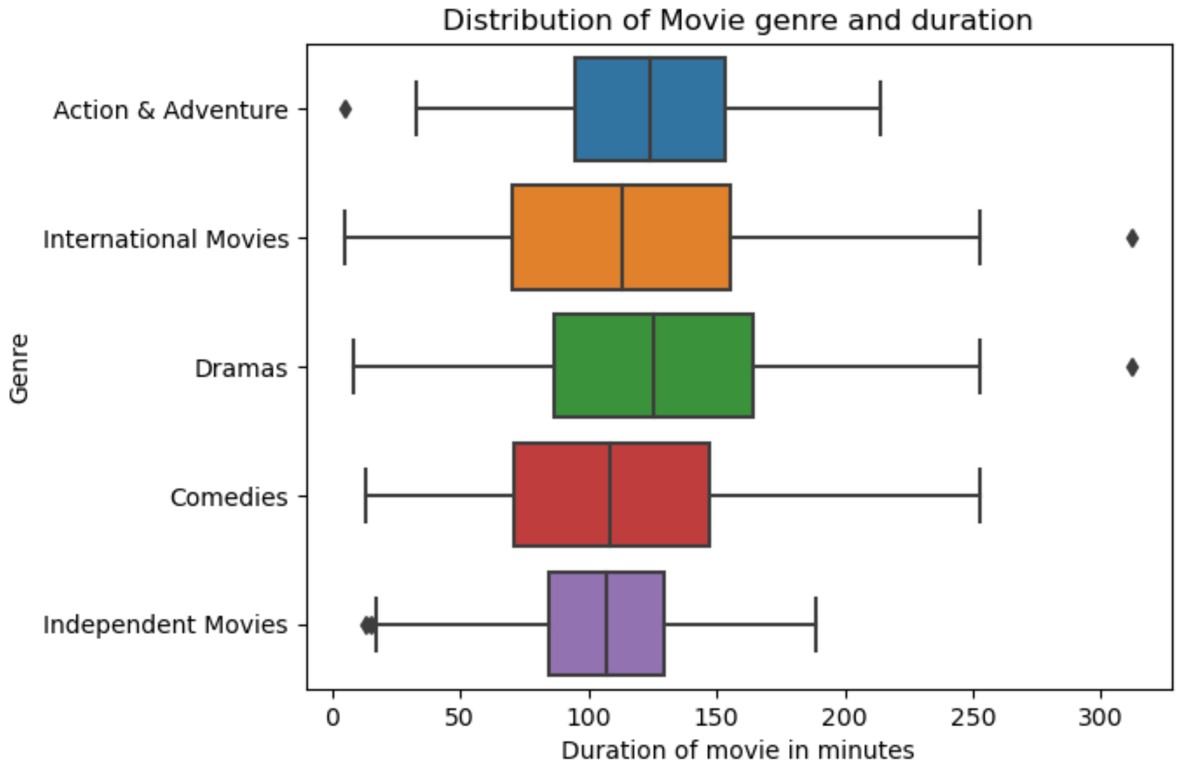
We are assuming that the TV series which have more seasons released are more popular compared to tv shoes with 1 or 2 sesons.

Insights:

1. We can see that the comedy, drama and Internation TV genres are the most popular and sustain for longer time.
2. If we internally compare between genres, the no of shows that came to sixth season are equal in number where as more no of comedy shows 8th, 10th and 13th seasons.

In [93]:
```
duration_genre_movie = top5_movie_genre_df.groupby(['duration','lis
```

In [94]:
```
sns.boxplot(data=duration_genre_movie,x='duration',y = 'listed_in')
plt.xlabel('Duration of movie in minutes')
plt.ylabel('Genre')
plt.title("Distribution of Movie genre and duration")
plt.show()
```



Insight:

1. most movies range between 75 mins to 175 mins and the median duration of different genres lies between 105 mins to 125 mins.

>> Does Netflix has more focus on TV Shows than movies in recent years

In [96]:
```
type_trend = nflix.groupby(['release_year','type'])['title'].nuniqu
```

In [99]:
```
type_trend
```

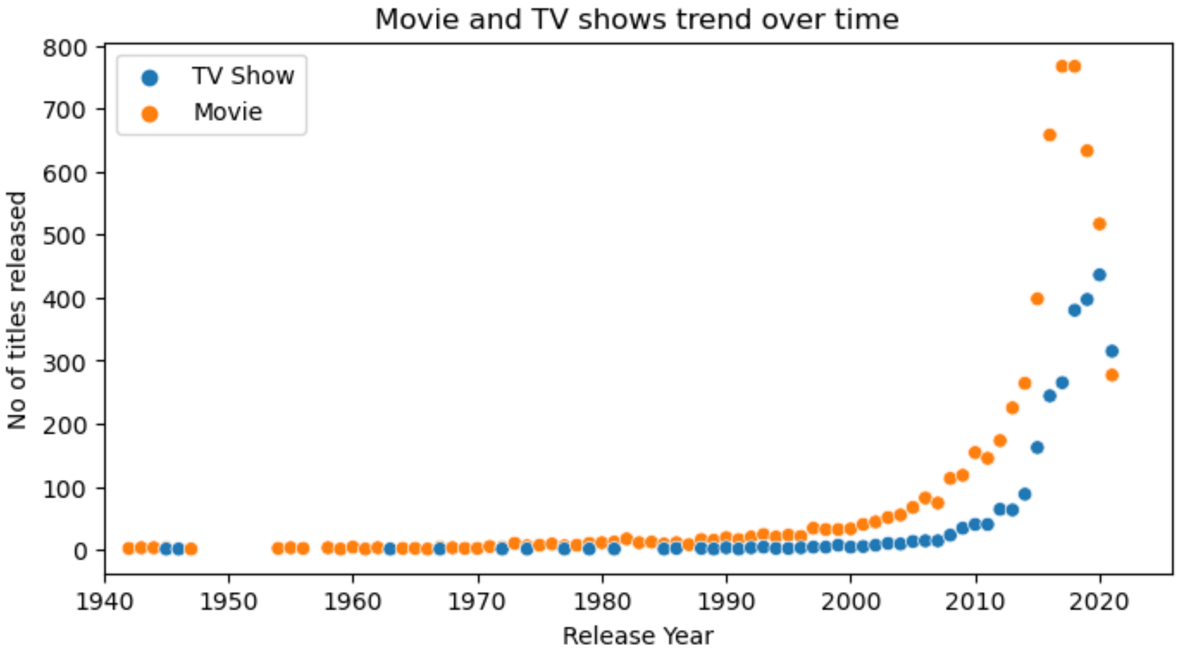
Out[99]:

	release_year	type	title
0	1925	TV Show	1
1	1942	Movie	2
2	1943	Movie	3
3	1944	Movie	3
4	1945	Movie	3
...	...	...	...
114	2019	TV Show	397
115	2020	Movie	517
116	2020	TV Show	436
117	2021	Movie	277
118	2021	TV Show	315

119 rows × 3 columns

In [98]:

```
plt.figure(figsize=(8,4))
sns.scatterplot(data=type_trend,x='release_year',y='title',hue='typ
plt.ylabel("No of titles released")
plt.xlabel("Release Year")
plt.title('Movie and TV shows trend over time')
plt.legend(title=None)
plt.xlim(1940)
plt.show()
```



Insigts:

1. adding Movies and TV shows to Netflix picked up pace after 2000 and grew exponentially after 2010.
2. the rate of growth of movies slowed down after 2018 while tv content started to slow only after 2020.
3. The data from 2019 and 2020 also suggests that the no of movies dropped significantly but more tv shows were lauched compared to its previous years.

Inference :

1. Netflix not only adds existing content but also produces under the name of 'Netflix Originals'.These started in 2011, which may have marked the growth of content since then. We can infer from the graph that more movies than TV shows have been added thoughout except in the year 2021.
2. Although we do not have the entire data of the year 2021, we could say that from Jan to Sept 2021, the no of TV shows added were greater than movies.
3. There was good amount of focus in launching TV shows.

-> What is the best time to launch a TV show?

In [100]:
```
tv_df.head()
```

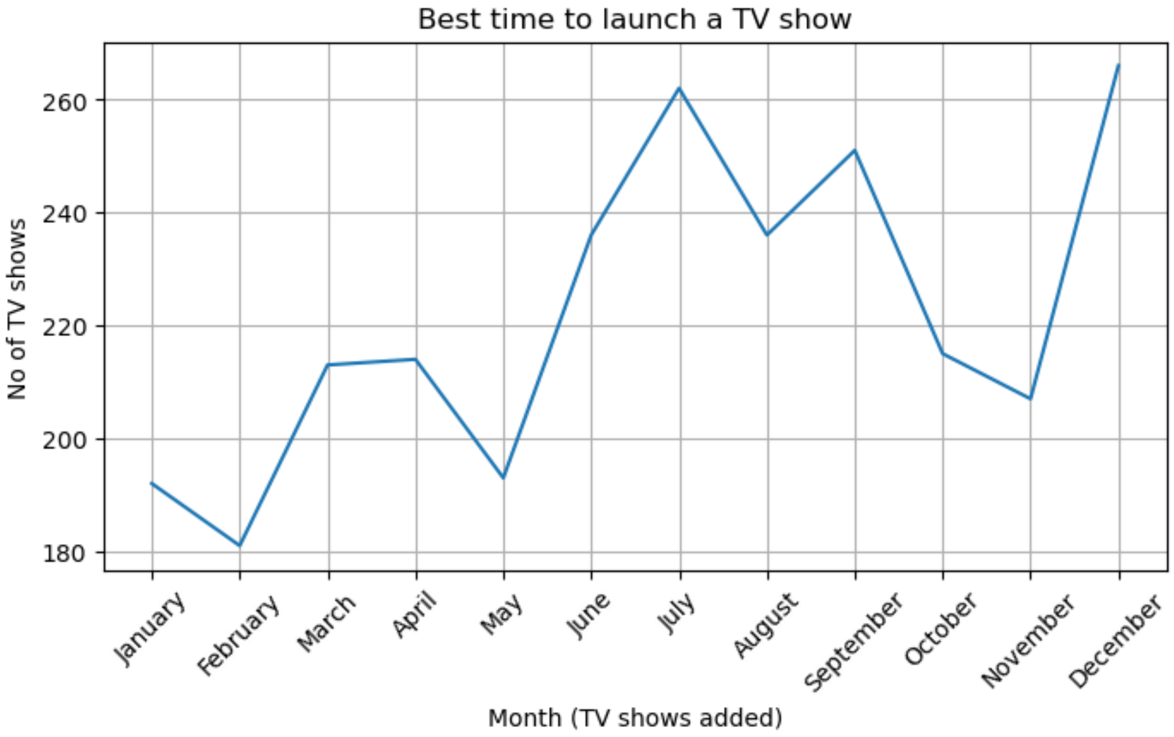
Out[100]:

	show_id	type	title	director	cast	country	date_added	release_year	rating	dur
1	s2	TV Show	Blood & Water	NaN	Ama Qamata	South Africa	2021-09-24	2021	TV-MA	
2	s2	TV Show	Blood & Water	NaN	Ama Qamata	South Africa	2021-09-24	2021	TV-MA	
3	s2	TV Show	Blood & Water	NaN	Ama Qamata	South Africa	2021-09-24	2021	TV-MA	
4	s2	TV Show	Blood & Water	NaN	Khosi Ngema	South Africa	2021-09-24	2021	TV-MA	
5	s2	TV Show	Blood & Water	NaN	Khosi Ngema	South Africa	2021-09-24	2021	TV-MA	

In [101]:
```
tv_df['date_added'] = pd.to_datetime(tv_df['date_added'])
```

In [102]:
```
tv_df['month_added'] = tv_df['date_added'].dt.month
month_names = ['January','February','March','April','May','June','J
monthly_data = tv_df.groupby('month_added')['title'].nunique().rese
```

In [103]:
```
plt.figure(figsize=(8,4))
sns.lineplot(data=monthly_data,x='month_added',y='title')
plt.title('Best time to launch a TV show')
plt.grid()
plt.xlabel('Month (TV shows added)')
plt.ylabel('No of TV shows')
plt.xticks([i for i in range(1,13)],month_names,rotation=45)

plt.show()
```



Insights:

1. Most number of TV shows were added in July or December

Inference:

1. Although having viewership data of the TV shows that ran each month would give more evidence to suggest an inference, from the popularity in no of tv shows being added each months we can deduce that Dec and July are the best months to launch TV shows.

>> What type of content is available in different countries?

genre vs country

as there are a lot of values in each of these fields, it is not possible to check the contribution of all genres for each country. For simplicity we are going to pick the top 5 genres generated by the top countries

In [104]:

```
top5_tv_genre_list = tv_df['listed_in'].value_counts().reset_index(
top5_tv_genre_df = tv_df.loc[tv_df['listed_in'].isin(top5_tv_genre_
tv_genre_cntry = top5_tv_genre_df.groupby(['country','listed_in'])[
```

In [105]:

```
tv_genre_cntry.head()
```

Out[105]:

	country	listed_in	title
235	United States	TV Comedies	258
236	United States	TV Dramas	232
234	United States	Kids' TV	214
190	South Korea	International TV Shows	152
112	Japan	International TV Shows	151

In [106]:

```
top5_movie_genre_list = movie_df['listed_in'].value_counts().reset_
top5_movie_genre_df = movie_df.loc[movie_df['listed_in'].isin(top5_

genre_country_trnd = top5_movie_genre_df.groupby(['country','listed
```

In [107]:

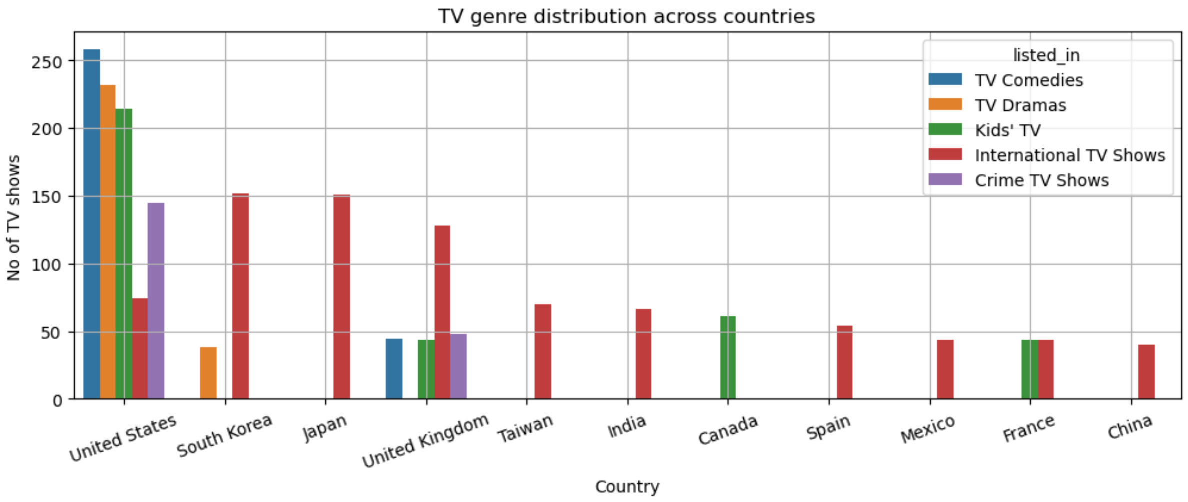
```
genre_country_trnd.head()
```

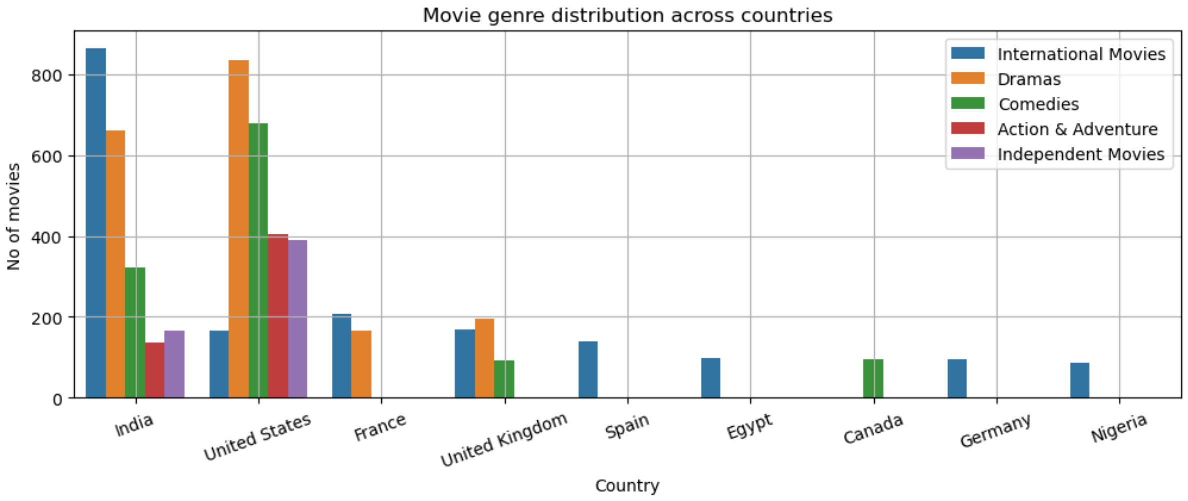
Out[107]:

	country	listed_in	title
143	India	International Movies	864
368	United States	Dramas	835
367	United States	Comedies	680
141	India	Dramas	662
366	United States	Action & Adventure	404

In [108]:

```
plt.figure(figsize=(12,4))
sns.barplot(data=tv_genre_cntry,x='country',y='title',hue='listed_i
plt.xlabel('Country')
plt.ylabel("No of TV shows")
plt.title('TV genre distribution across countries')
plt.xticks(rotation=20)
plt.grid()


plt.figure(figsize=(12,4))
sns.barplot(data=genre_country_trnd,x='country',y='title',hue='list
plt.legend(loc='upper right')
plt.xlabel('Country')
plt.ylabel("No of movies")
plt.title('Movie genre distribution across countries')
plt.xticks(rotation=20)
plt.grid()

plt.show()
```





Insights:

1. If any foreign movie made in its local language is being classified as an International movie, there wont be any scope to compare genres with country to understand what type of content is available in dirrerent countries.
2. We can see that in the top 4 countries, Dramas takes the lead with no of movies released, followed by comedy.

Inference:

1. Comedy is popular with India, US and UK whereas Drama is the type of content that popular with the the top 4 countries.

>> Analysis of actors/directors of different types of shows/movies.

In [109]:

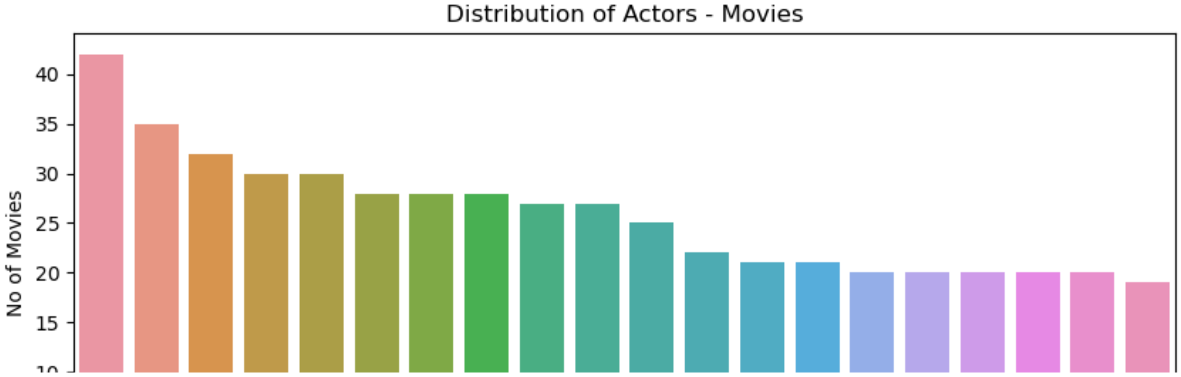
```
top15_tvcast = tv_df.groupby(['cast'])['title'].nunique().sort_valu
```

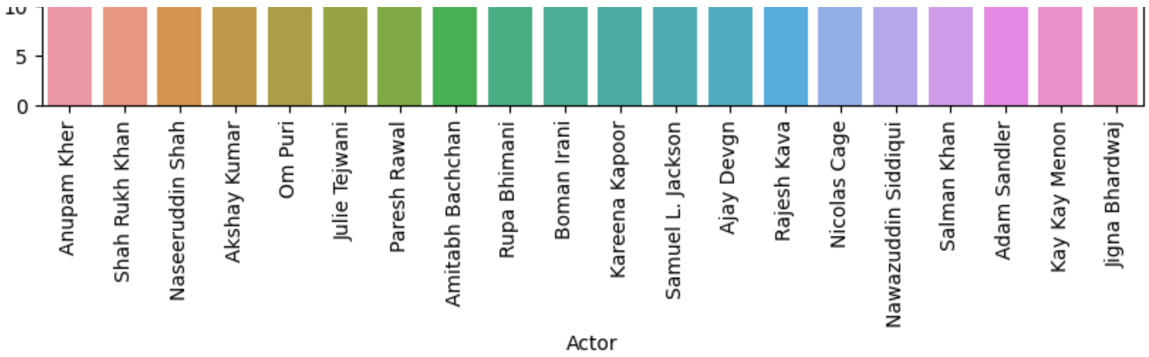
In [110]:

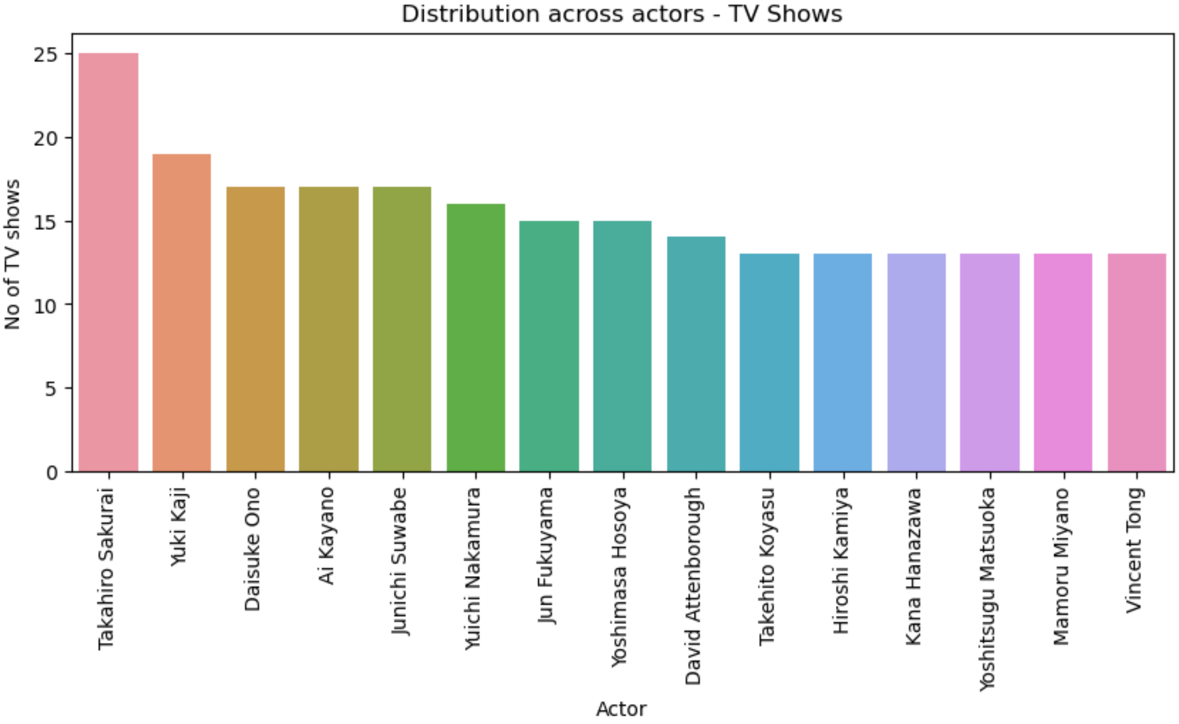
```
top20_cast = movie_df.groupby(['cast'])['title'].nunique().sort_val
```

In [111]:

```
plt.figure(figsize=(10,4))
sns.barplot(data=top20_cast,x='cast',y='title')
plt.xticks(rotation=90)
plt.xlabel("Actor")
plt.ylabel("No of Movies")
plt.title("Distribution of Actors - Movies")


plt.figure(figsize=(10,4))
sns.barplot(data=top15_tvcast,x='cast',y='title')
plt.xticks(rotation=90)
plt.xlabel("Actor")
plt.ylabel("No of TV shows")
plt.title("Distribution across actors - TV Shows")

plt.show()
```







Insights:

1. For movies, these are the top actors: Anupam Kher, Shah Rukh Khan, Naseeruddin Shah, Akshay Kumar, Om Puri, Julie Tejwani, Paresh Rawal, Amitabh Bachchan, Rupa Bhimani, Boman Irani,Kareena Kapoor.
2. For TV shows, the top actors are: Takahiro Sakurai, Yuki Kaji, Daisuke Ono, Ai Kayano, Junichi Suwabe,Yuichi Nakamura, Jun Fukuyama, Yoshimasa Hosoya, David Attenborough, Takehito Koyasu, Hiroshi Kamiya
3. We can see that most movie actors belong to india and most tv show actors belong to Japan with the exception of David Attenborough.

Recommendations:

1. Proper classification of international movies: Along with the generic title, it will enable us to perform accurate analysis if we classified international movies based on its content type/genre. In the present dataset, most foreign movies/TV shows are classified as International movies/TV shows which can help us accurately identify exactly how many movies/TV shows belong to each genre.
2. According to the given data, drama and comedy are the most popular genre with the top countries. While simultaneously creating content in comedy and drama genres, we should also focus on adding/producing content from genres with potential like crime TV, action and adventure movies, kids movies and TV shows and documentaries/docuSeries etc.
3. Any TV show releases should be done in the months of July or December.
4. There are not many TV shows in Indian content. India being a huge market for content consumption, we could tie-up with local actors to create netflix originals for not only India, for other countries like UK, Spain, Canada etc.

In [ ]: