Problem Statement: Analyze the data and generate recomendations/insights that could help Netflix in deciding which type of shows/movies to produce and how they can grow the business in different countries.

In [2]:
```
# Basic Imports

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

In [3]:
```
# Import the Data
data = pd.read_csv("netflix_titles.csv")
data.head()
```

Out[3]:

	show_id	type	title	director	cast	country	date_added	release_year	rating	dur
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	9
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA	Se
2	s3	TV Show	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...	NaN	September 24, 2021	2021	TV-MA	1 S
3	s4	TV Show	Jailbirds New Orleans	NaN	NaN	NaN	September 24, 2021	2021	TV-MA	1 S
4	s5	TV Show	Kota Factory	NaN	Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...	India	September 24, 2021	2021	TV-MA	Se

In [4]:
```
# Lets drop the 'description' column as it a text data col..
data.drop('description',axis=1,inplace=True)
data.head(2)
```

Out[4]:

	show_id	type	title	director	cast	country	date_added	release_year	rating	durat
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA	Seas

In [5]:

```
data.shape
```

Out[5]:

```
(8807, 11)
```

In [6]:

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8807 entries, 0 to 8806
Data columns (total 11 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
dtypes: int64(1), object(10)
memory usage: 757.0+ KB
```

1. Seems like some data is missing in 'director','cast','country','date_added' columns
2. Except release_year all other columns seems to be object datatype.
3. We have 8807 data points and 11 features after dropping 'description' column

In [7]:

```
data.describe(include='all')
```

Out[7]:

	show_id	type	title	director	cast	country	date_added	release_year	ratir
count	8807	8807	8807	6173	7982	7976	8797	8807.000000	88(
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	T M
freq	1	6131	1	19	19	2818	109	NaN	32(
mean	NaN	NaN	NaN	NaN	NaN	NaN	NaN	2014.180198	Na
std	NaN	NaN	NaN	NaN	NaN	NaN	NaN	8.819312	Na
min	NaN	NaN	NaN	NaN	NaN	NaN	NaN	1925.000000	Na
25%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	2013.000000	Na
50%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	2017.000000	Na
75%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	2019.000000	Na
max	NaN	NaN	NaN	NaN	NaN	NaN	NaN	2021.000000	Na

Lets explore each feature:

type

In [8]:

```
data['type'].unique()
```

Out[8]:

```
array(['Movie', 'TV Show'], dtype=object)
```

In [9]:

```
data['type'].value_counts()
```

Out[9]:

```
Movie      6131
TV Show    2676
Name: type, dtype: int64
```

1. Given data has only two types of records.. i. Movie, ii.Tv Show.
2. And our data seems to be imbalanced, as we have more data points wrt Movie.

Title

In [10]:

```
data['title'].value_counts()
# Ttitle seems to be unique for all
```

Out[10]:

```
Dick Johnson Is Dead                     1
Ip Man 2                                 1
Hannibal Buress: Comedy Camisado         1
Turbo FAST                               1
Masha's Tales                            1
                                        ..
Love for Sale 2                          1
ROAD TO ROMA                             1
Good Time                                1
Captain Underpants Epic Choice-o-Rama    1
Zubaan                                   1
Name: title, Length: 8807, dtype: int64
```

Director

In [11]:

```
data['director'].value_counts()
```

Out[11]:

```
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
```

1. As mentioned above, Director column has many missing values.
2. We could also observe that each Movie/Tv Show has multiple directors. We need to split them across multiple rows.

In [12]:

```
# Unnesting director columns:
dirs = data['director'].apply(lambda x:str(x).split(',')).tolist()
dir_df = pd.DataFrame(dirs,index=data['title']).stack().reset_index()
dir_df.rename(columns = {0:'directors'},inplace=True)
dir_df.drop('level_1',axis=1,inplace=True)
dir_df
```

Out[12]:

	title	directors
0	Dick Johnson Is Dead	Kirsten Johnson
1	Blood & Water	nan
2	Ganglands	Julien Leclercq
3	Jailbirds New Orleans	nan
4	Kota Factory	nan
...	...	...
9607	Zodiac	David Fincher
9608	Zombie Dumb	nan
9609	Zombieland	Ruben Fleischer
9610	Zoom	Peter Hewitt
9611	Zubaan	Mozez Singh

9612 rows × 2 columns

Cast

In [13]:

```
data['cast'].value_counts()
```

Out[13]:

```
David Attenborough
19
Vatsal Dubey, Julie Tejwani, Rupa Bhimani, Jigna Bhardwaj, Rajesh Kava, Mousam, Sw
apnil
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 Le
tscher, Alyssa Diaz
1
Nick Lachey, Vanessa Lachey
1
Takeru Sato, Kasumi Arimura, Haru, Kentaro Sakaguchi, Takayuki Yamada, Kendo Kobay
ashi, Ken Yasuda, Arata Furuta, Suzuki Matsuo, Koichi Yamadera, Arata Iura, Chikak
o Kaku, Kotaro Yoshida     1
Toyin Abraham, Sambasa Nzeribe, Chioma Chukwuka Akpotha, Chioma Omeruah, Chiwetalu
Agu, Dele Odule, Femi Adebayo, Bayray McNwizu, Biodun Stephen
1
Vicky Kaushal, Sarah-Jane Dias, Raaghav Chanana, Manish Chaudhary, Meghna Malik, M
alkeet Rauni, Anita Shabdish, Chittaranjan Tripathy
1
Name: cast, Length: 7692, dtype: int64
```

1. Cast Columns also have multiple/nested information. We have to unnest the information.

In [14]:

```
castSplit = data['cast'].apply(lambda x:str(x).split(', ')).tolist()
cast_df = pd.DataFrame(castSplit,index=data['title']).stack().reset_index()
cast_df.drop('level_1',axis=1,inplace=True)
cast_df.rename(columns={0:'cast'},inplace=True)
cast_df
```

Out[14]:

```
                      title                   cast
    0   Dick Johnson Is Dead                   nan
    1          Blood & Water            Ama Qamata
    2          Blood & Water           Khosi Ngema
    3          Blood & Water         Gail Mabalane
    4          Blood & Water        Thabang Molaba
  ...                    ...                   ...
64946                 Zubaan      Manish Chaudhary
64947                 Zubaan          Meghna Malik
64948                 Zubaan         Malkeet Rauni
64949                 Zubaan        Anita Shabdish
64950                 Zubaan  Chittaranjan Tripathy
```

64951 rows × 2 columns

Country

In [15]:

```
data['country'].unique()
# Country Columns also needs to be unnested
```

```
Out[15]: array(['United States', 'South Africa', nan, 'India',
                'United States, Ghana, Burkina Faso, United Kingdom, Germany, Ethiopia',
                'United Kingdom', 'Germany, Czech Republic', 'Mexico', 'Turkey',
                'Australia', 'United States, India, France', 'Finland',
                'China, Canada, United States',
                'South Africa, United States, Japan', 'Nigeria', 'Japan',
                'Spain, United States', 'France', 'Belgium',
                'United Kingdom, United States', 'United States, United Kingdom',
                'France, United States', 'South Korea', 'Spain',
                'United States, Singapore', 'United Kingdom, Australia, France',
                'United Kingdom, Australia, France, United States',
                'United States, Canada', 'Germany, United States',
                'South Africa, United States', 'United States, Mexico',
                'United States, Italy, France, Japan',
                'United States, Italy, Romania, United Kingdom',
                'Australia, United States', 'Argentina, Venezuela',
                'United States, United Kingdom, Canada', 'China, Hong Kong',
                'Russia', 'Canada', 'Hong Kong', 'United States, China, Hong Kong',
                'Italy, United States', 'United States, Germany',
                'United Kingdom, Canada, United States', ', South Korea',
                'Ireland', 'India, Nepal',
                'New Zealand, Australia, France, United States', 'Italy',
                'Italy, Brazil, Greece', 'Argentina', 'Jordan', 'Colombia',
                'United States, Japan', 'Belgium, United Kingdom',
                'Switzerland, United Kingdom, Australia', 'Israel, United States',
                'Canada, United States', 'Brazil', 'Argentina, Spain', 'Taiwan',
                'United States, Nigeria', 'Bulgaria, United States',
                'Spain, United Kingdom, United States', 'United States, China',
                'United States, France',
                'Spain, France, United Kingdom, United States',
                ', France, Algeria', 'Poland', 'Germany',
                'France, Israel, Germany, United States, United Kingdom',
                'New Zealand', 'Saudi Arabia', 'Thailand', 'Indonesia',
                'Egypt, Denmark, Germany', 'United States, Switzerland',
                'Hong Kong, Canada, United States', 'Kuwait, United States',
                'France, Canada, United States, Spain',
                'France, Netherlands, Singapore', 'France, Belgium',
                'Ireland, United States, United Kingdom', 'Egypt', 'Malaysia',
                'Israel', 'Australia, New Zealand', 'United Kingdom, Germany',
                'Belgium, Netherlands', 'South Korea, Czech Republic',
                'Australia, Germany', 'Vietnam', 'United Kingdom, Belgium',
                'United Kingdom, Australia, United States',
                'France, Japan, United States',
                'United Kingdom, Germany, Spain, United States',
                'United Kingdom, United States, France, Italy',
                'United States, Germany, Canada',
                'United States, France, Italy, United Kingdom',
                'United States, United Kingdom, Germany, Hungary',
                'United States, New Zealand', 'Sweden', 'China', 'Lebanon',
                'Romania', 'Finland, Germany', 'Lebanon, Syria', 'Philippines',
                'Iceland', 'Denmark', 'United States, India',
                'Philippines, Singapore, Indonesia',
                'China, United States, Canada', 'Lebanon, United Arab Emirates',
                'Canada, United States, Denmark', 'United Arab Emirates',
                'Mexico, France, Colombia', 'Netherlands',
                'Germany, United States, France', 'United States, Bulgaria',
                'United Kingdom, France, Germany, United States',
                'Norway, Denmark', 'Syria, France, Lebanon, Qatar',
                'United States, Czech Republic', 'Mauritius',
                'Canada, South Africa', 'Austria', 'Mexico, Brazil',
                'Germany, France', 'Mexico, United States',
                'United Kingdom, France, Spain, United States',
                'United States, Australia',
                'United States, United Kingdom, France', 'United States, Russia',
        'United States, United Kingdom, New Zealand',
        'Australia, United Kingdom', 'Canada, Nigeria, United States',
        'France, United States, United Kingdom, Canada',
        'France, United Kingdom', 'India, United Kingdom',
        'Canada, United States, Mexico',
        'United Kingdom, Germany, United States',
        'Czech Republic, United Kingdom, United States',
        'China, United Kingdom', 'Italy, United Kingdom', 'China, Taiwan',
        'United States, Brazil, Japan, Spain, India',
        'United States, China, United Kingdom', 'Cameroon',
        'Lebanon, Palestine, Denmark, Qatar', 'Japan, United States',
        'Uruguay, Germany', 'Egypt, Saudi Arabia',
        'United Kingdom, France, Poland, Germany, United States',
        'Ireland, Switzerland, United Kingdom, France, United States',
        'United Kingdom, South Africa, France',
        'Ireland, United Kingdom, France, Germany',
        'Russia, United States', 'United Kingdom, United States, France',
        'United Kingdom,', 'United States, India, United Kingdom', 'Kenya',
        'Spain, Argentina', 'India, United Kingdom, France, Qatar',
        'Belgium, France', 'Argentina, Chile', 'United States, Thailand',
        'Chile, Brazil', 'United States, Colombia',
        'Canada, United States, United Kingdom', 'Uruguay', 'Luxembourg',
        'United States, Cambodia, Romania', 'Bangladesh',
        'Spain, Belgium, United States',
        'United Kingdom, United States, Australia',
        'Canada, United States, France', 'Portugal, United States',
        'Portugal, Spain', 'India, United States',
        'United Kingdom, Ireland', 'United Kingdom, Spain, United States',
        'Hungary, United States', 'United States, South Korea',
        'Canada, United States, Cayman Islands', 'India, France',
        'France, Canada', 'Canada, Hungary, United States', 'Norway',
        'Canada, United Kingdom, United States',
        'United Kingdom, Germany, France, United States',
        'Denmark, United States', 'Senegal', 'France, Algeria',
        'United Kingdom, Finland, Germany, United States, Australia, Japan, France,
Ireland',
        'Philippines, Canada, United Kingdom, United States',
        'Ireland, France, Iceland, United States, Mexico, Belgium, United Kingdom,
Hong Kong',
        'Singapore', 'Kuwait', 'United States, France, Serbia',
        'United States, Italy', 'Spain, Italy',
        'United States, Ireland, United Kingdom, India',
        'United Kingdom, Singapore', 'Hong Kong, United States',
        'United States, Malta, France, United Kingdom',
        'United States, China, Canada', 'Canada, United States, Ireland',
        'Lebanon, Canada, France', 'Japan, Canada, United States',
        'Spain, France, Canada',
        'Denmark, Singapore, Canada, United States',
        'United States, France, Denmark', 'United States, China, Colombia',
        'Spain, Thailand, United States', 'Mexico, Spain',
        'Ireland, Luxembourg, Belgium', 'China, United States',
        'Canada, Belgium', 'Canada, United Kingdom',
        'Lebanon, United Arab Emirates, France, Switzerland, Germany',
        'France, Belgium, Italy',
        'Lebanon, United States, United Arab Emirates', 'Lebanon, France',
        'France, Lebanon', 'France, Lebanon, United Kingdom',
        'France, Norway, Lebanon, Belgium',
        'Sweden, Czech Republic, United Kingdom, Denmark, Netherlands',
        'United States, United Kingdom, India', 'Indonesia, Netherlands',
        'Turkey, South Korea', 'Serbia, United States', 'Namibia',
        'United Kingdom, Kenya', 'United Kingdom, France, Germany, Spain',
        'United Kingdom, France, United States, Belgium, Luxembourg, China, German
y',
        'Thailand, United States',
        'United States, France, Canada, Belgium', 'United Kingdom, China',
        'Germany, China, United Kingdom',
        'Australia, New Zealand, United States',
        'Hong Kong, Iceland, United States', 'France, Australia, Germany',
        'United States, Belgium, Canada, France', 'South Africa, Angola',
        'United States, Philippines',
        'United States, United Kingdom, Canada, China',
        'United States, Canada, United Kingdom', 'Turkey, United States',
        'Peru, Germany, Norway', 'Mozambique', 'Brazil, France',
        'China, Spain, South Korea, United States', 'Spain, Germany',
        'Hong Kong, China', 'France, Belgium, Luxembourg, Cambodia,',
        'United Kingdom, Australia', 'Belarus',
        'Indonesia, United Kingdom',
        'Switzerland, France, Belgium, United States', 'Ghana',
        'Spain, France, Canada, United States', 'Chile, Italy',
        'United Kingdom, Nigeria', 'Chile', 'France, Egypt',
        'Egypt, France', 'France, Brazil, Spain, Belgium',
        'Egypt, Algeria', 'Canada, South Korea, United States',
        'Nigeria, United Kingdom', 'United States, France, Canada',
        'Poland, United States',
        'United Arab Emirates, Jordan, Lebanon, Saudi Arabia',
        'United States, Mexico, Spain, Malta',
        'Saudi Arabia, United Arab Emirates', 'Zimbabwe',
        'United Kingdom, Germany, United Arab Emirates, New Zealand',
        'Romania, United States', 'Canada, Nigeria',
        'Saudi Arabia, Netherlands, Germany, Jordan, United Arab Emirates, United S
 tates',
        'United Kingdom, Spain', 'Finland, France',
        'United Kingdom, Germany, United States, France',
        'India, United Kingdom, China, Canada, Japan, South Korea, United States',
        'Italy, United Kingdom, France', 'United States, Mexico, Colombia',
        'Turkey, India', 'Italy, Turkey',
        'United Kingdom, United States, Japan',
        'France, Belgium, United States',
        'Puerto Rico, United States, Colombia', 'Uruguay, Argentina',
        'United States, United Kingdom, Japan', 'United States, Argentina',
        'United Kingdom, Italy', 'Ireland, United Kingdom',
        'United Kingdom, France, Belgium, Canada, United States',
        'Netherlands, Germany, Denmark, United Kingdom', 'Hungary',
        'Austria, Germany', 'Taiwan, China',
        'United Kingdom, United States, Ireland',
        'South Korea, United States', 'Brazil, United Kingdom',
        'Pakistan, United States', 'Romania, France, Switzerland, Germany',
        'Romania, United Kingdom', 'France, Malta, United States',
        'Cyprus',
        'United Kingdom, France, Belgium, Ireland, United States',
        'United States, Norway, Canada', 'Kenya, United States',
        'France, South Korea, Japan, United States', 'Taiwan, Malaysia',
        'Uruguay, Argentina, Germany, Spain',
        'United States, United Kingdom, France, Germany, Japan',
        'United States, France, Japan',
        'United Kingdom, France, United States',
        'Spain, France, United States',
        'Indonesia, South Korea, Singapore', 'United States, Spain',
        'Netherlands, Germany, Italy, Canada',
        'Spain, Germany, Denmark, United States', 'Norway, Sweden',
        'South Korea, Canada, United States, China',
        'Argentina, Uruguay, Serbia', 'France, Japan',
        'Mauritius, South Africa', 'United States, Poland',
        'United Kingdom, United States, Germany, Denmark, Belgium, Japan',
        'India, Germany', 'India, United Kingdom, Canada, United States',
        'Philippines, United States', 'Romania, Bulgaria, Hungary',
        'Uruguay, Guatemala', 'France, Senegal, Belgium',
        'United Kingdom, Canada', 'Mexico, United States, Spain, Colombia',
        'Canada, Norway', 'Singapore, United States',
        'Finland, Germany, Belgium', 'United Kingdom, France',
        'United States, Chile', 'United Kingdom, Japan, United States',
        'Spain, United Kingdom', 'Argentina, United States, Mexico',
        'United States, South Korea, Japan', 'Canada, Australia',
        'United Kingdom, Hungary, Australia', 'Italy, Belgium',
        'United States, United Kingdom, Germany', 'Switzerland',
        'Singapore, Malaysia',
        'France, Belgium, Luxembourg, Romania, Canada, United States',
        'South Africa, Nigeria', 'Spain, France',
        'United Kingdom, Hong Kong', 'Pakistan', 'Brazil, United States',
        'Denmark, Brazil, France, Portugal, Sweden', 'India, Turkey',
        'Malaysia, Singapore, Hong Kong', 'Philippines, Singapore',
        'Australia, Canada', 'Taiwan, China, France, United States',
        'Germany, Italy', 'Colombia, Peru, United Kingdom',
        'Thailand, China, United States', 'Argentina, United States',
        'Sweden, United States', 'Uruguay, Spain, Mexico',
        'France, Luxembourg, Canada', 'Denmark, Spain', 'Chile, Argentina',
        'United Kingdom, Belgium, Sweden', 'Canada, Brazil',
        'Italy, France', 'Canada, Germany',
        'Pakistan, United Arab Emirates', 'Ghana, United States',
        'Mexico, Finland', 'United Arab Emirates, United Kingdom, India',
        'Netherlands, Belgium', 'United States, Taiwan',
        'Austria, Iraq, United States', 'United Kingdom, Malawi',
        'Paraguay, Argentina', 'United Kingdom, Russia, United States',
        'India, Pakistan', 'Indonesia, Singapore', 'Spain, Belgium',
        'Iceland, Sweden, Belgium', 'Croatia', 'Uruguay, Argentina, Spain',
        'United Kingdom, Ireland, United States',
        'Canada, Germany, France, United States', 'United Kingdom, Japan',
        'Norway, Denmark, Netherlands, Sweden',
        'Hong Kong, China, United States', 'Ireland, Canada',
        'Italy, Switzerland, France, Germany', 'Mexico, Netherlands',
        'United States, Sweden', 'Germany, France, Russia',
        'France, Iran, United States', 'United Kingdom, India',
        'Russia, Poland, Serbia', 'Spain, Portugal', 'Peru',
        'Mexico, Argentina',
        'United Kingdom, Canada, United States, Cayman Islands',
        'Indonesia, United States',
        'United States, Israel, United Kingdom, Canada',
        'Norway, Iceland, United States', 'Czech Republic, United States',
        'United Kingdom, India, United States',
        'United Kingdom, West Germany', 'India, Australia',
        'United States,', 'Belgium, United Kingdom, United States',
        'India, Germany, Austria',
        'United States, Brazil, South Korea, Mexico, Japan, Germany',
        'Spain, Mexico', 'China, Japan', 'Argentina, France',
        'China, United States, United Kingdom',
        'France, Luxembourg, United States',
        'China, United States, Australia', 'Colombia, Mexico',
        'United States, Canada, Ireland', 'Chile, Peru',
        'Argentina, Italy', 'Canada, Japan, United States',
        'United Kingdom, Canada, United States, Germany',
        'Italy, Switzerland, Albania, Poland',
        'United States, Japan, Canada', 'Cambodia',
        'Italy, United States, Argentina',
        'Saudi Arabia, Syria, Egypt, Lebanon, Kuwait',
        'United States, Canada, Indonesia, United Kingdom, China, Singapore',
        'Spain, Colombia',
        'United Kingdom, South Africa, Australia, United States',
        'Bulgaria', 'Argentina, Brazil, France, Poland, Germany, Denmark',
        'United Kingdom, Spain, United States, Germany',
        'Philippines, Qatar', 'Netherlands, Belgium, Germany, Jordan',
        'United Arab Emirates, United States', 'Norway, Germany, Sweden',
        'South Korea, China', 'Georgia', 'Soviet Union, India',
                'Australia, United Arab Emirates', 'Canada, Germany, South Africa',
                'South Korea, China, United States', 'India, Soviet Union',
                'India, Mexico', 'Georgia, Germany, France',
                'United Arab Emirates, Romania', 'India, Malaysia',
                'Germany, Jordan, Netherlands', 'Turkey, France, Germany, Poland',
                'Greece, United States', 'France, United Kingdom, United States',
                'Norway, Germany', 'France, Morocco', 'Cambodia, United States',
                'United States, Denmark', 'United States, Colombia, Mexico',
                'United Kingdom, Italy, Israel, Peru, United States',
                'Argentina, Uruguay, Spain, France',
                'United Kingdom, France, United States, Belgium',
                'France, Canada, China, Cambodia',
                'United Kingdom, France, Belgium, United States', 'Chile, France',
                'Netherlands, United States', 'France, United Kingdom, India',
                'Czech Republic, Slovakia', 'Singapore, France',
                'Spain, Switzerland', 'United States, Australia, China',
                'South Africa, United States, Germany',
                'United States, United Kingdom, Australia',
                'Spain, Italy, Argentina', 'Chile, Spain, Argentina, Germany',
                'West Germany', 'Austria, Czech Republic', 'Lebanon, Qatar',
                'United Kingdom, Jordan, Qatar, Iran',
                'France, South Korea, Japan', 'Israel, Germany, France',
                'Canada, Japan, Netherlands', 'United States, Hungary',
                'France, Germany', 'France, Qatar',
                'United Kingdom, Germany, Canada', 'Ireland, South Africa',
                'Chile, United States, France', 'Belgium, France, Netherlands',
                'United Kingdom, Ukraine, United States',
                'Germany, Australia, France, China', 'Norway, United States',
                'United States, Bermuda, Ecuador',
                'United States, Hungary, Ireland, Canada',
                'United Kingdom, Egypt, United States',
                'United States, France, United Kingdom', 'Spain, Mexico, France',
                'United States, South Africa', 'Hong Kong, China, Singapore',
                'South Africa, China, United States', 'Denmark, France, Poland',
                'New Zealand, United Kingdom',
                'Netherlands, Denmark, South Africa', 'Iran, France',
                'United Kingdom, United States, France, Germany',
                'Australia, France', 'Ireland, United Kingdom, United States',
                'United Kingdom, France, Germany', 'Canada, Luxembourg',
                'Brazil, Netherlands, United States, Colombia, Austria, Germany',
                'France, Canada, Belgium', 'Canada, France',
                'Bulgaria, United States, Spain, Canada', 'Sweden, Netherlands',
                'France, United States, Mexico',
                'Australia, United Kingdom, United Arab Emirates, Canada',
                'Australia, Armenia, Japan, Jordan, Mexico, Mongolia, New Zealand, Philippi
        nes, South Africa, Sweden, United States, Uruguay',
                'India, Iran', 'France, Belgium, Spain',
                'Denmark, Sweden, Israel, United States', 'United States, Iceland',
                'United Kingdom, Russia',
                'United States, Israel, Italy, South Africa',
                'Netherlands, Denmark, France, Germany', 'South Korea, Japan',
                'United Kingdom, Pakistan', 'France, New Zealand',
                'United Kingdom, Czech Republic, United States, Germany, Bahamas',
                'China, Germany, India, United States', 'Germany, Sri Lanka',
                'United States, India, Bangladesh',
                'United States, Canada, France', 'Brazil, France, Germany',
                'Germany, United States, Hong Kong, Singapore',
                'France, Germany, Switzerland',
                'Germany, France, Luxembourg, United Kingdom, United States',
                'United Kingdom, Canada, Italy', 'Czech Republic, France',
                'Taiwan, Hong Kong, United States, China', 'Germany, Australia',
                'United Kingdom, Poland, United States', 'Denmark, Zimbabwe',
                'United Kingdom, South Africa',
                'Finland, Sweden, Norway, Latvia, Germany',
               'South Africa, United States, New Zealand, Canada',
               'United States, Italy, United Kingdom, Liechtenstein',
               'Denmark, France, Belgium, Italy, Netherlands, United States, United Kingdo
        m',
               'United States, Australia, Mexico',
               'United Kingdom, Czech Republic, Germany, United States',
               'France, China, Japan, United States',
               'United States, South Korea, China', 'Germany, Belgium',
               'Pakistan, Norway, United States',
               'United States, Canada, Belgium, United Kingdom', 'Venezuela',
               'Canada, France, Italy, Morocco, United States',
               'Canada, Spain, France', 'United States, Indonesia',
               'Spain, France, Italy',
               'United Arab Emirates, United States, United Kingdom',
               'United Kingdom, Israel, Russia', 'Spain, Cuba',
               'United States, Brazil', 'United States, France, Mexico',
               'United States, Nicaragua',
               'United Kingdom, United States, Spain, Germany, Greece, Canada',
               'Italy, Canada, France',
               'United Kingdom, Denmark, Canada, Croatia', 'Italy, Germany',
               'United States, France, United Kingdom, Japan',
               'United States, United Kingdom, Denmark, Sweden',
               'United States, United Kingdom, Italy',
               'United States, France, Canada, Spain',
               'Russia, United States, China', 'United States, Canada, Germany',
               'Ireland, United States', 'United States, United Arab Emirates',
               'United States, Ireland',
               'Ireland, United Kingdom, Italy, United States', 'Poland,',
               'Slovenia, Croatia, Germany, Czech Republic, Qatar',
               'Canada, United Kingdom, Netherlands',
               'United States, Spain, Germany', 'India, Japan',
               'China, South Korea, United States',
               'United Kingdom, France, Belgium',
               'Canada, Ireland, United States',
               'United Kingdom, United States, Dominican Republic',
               'United States, Senegal', 'Germany, United Kingdom, United States',
               'South Africa, Germany, Netherlands, France',
               'Canada, United States, United Kingdom, France, Luxembourg',
               'Ireland, United States, France', 'Germany, United States, Canada',
               'United Kingdom, Germany, Canada, United States',
               'United States, France, Canada, Lebanon, Qatar',
               'Netherlands, Belgium, United Kingdom, United States',
               'France, Belgium, China, United States',
               'United States, Chile, Israel',
               'United Kingdom, Norway, Denmark, Germany, Sweden',
               'Norway, Denmark, Sweden', 'China, India, Nepal',
               'Colombia, Mexico, United States', 'United Kingdom, South Korea',
               'Denmark, China', 'United States, Greece, Brazil',
               'South Korea, France',
               'United States, Australia, Samoa, United Kingdom',
               'Germany, United Kingdom', 'Argentina, Chile, Peru',
               'Turkey, Azerbaijan', 'Poland, West Germany',
               'Germany, United States, Sweden', 'Canada, Spain',
               'United States, Cambodia', 'United States, Greece',
               'Norway, United Kingdom, France, Ireland',
               'United Kingdom, Poland', 'Israel, Sweden, Germany, Netherlands',
               'Switzerland, France', 'Italy, India', 'United States, Botswana',
               'Chile, Argentina, France, Spain, United States',
               'United States, India, South Korea, China',
               'Denmark, Germany, Belgium, United Kingdom, France',
               'Denmark, Germany, Belgium, United Kingdom, France, Sweden',
               'France, Switzerland, Spain, United States, United Arab Emirates',
               'Brazil, India, China, United States',
               'Denmark, France, United States, Sweden', 'Australia, Iraq',
               'China, Morocco, Hong Kong', 'Canada, United States, Germany',
               'United Kingdom, Thailand', 'Venezuela, Colombia',
               'Colombia, United States',
               'France, Germany, Czech Republic, Belgium',
               'Switzerland, Vatican City, Italy, Germany, France',
               'Portugal, France, Poland, United States',
               'United States, New Zealand, Japan',
               'United States, Netherlands, Japan, France', 'India, Switzerland',
               'Canada, India', 'United States, Morocco',
               'Singapore, Japan, France',
               'Canada, Mexico, Germany, South Africa',
               'United Kingdom, United States, Canada',
               'Germany, France, United States, Canada, United Kingdom',
               'United States, Uruguay', 'India, Canada',
               'Ireland, Canada, United Kingdom, United States',
               'United States, Germany, Australia', 'Australia, France, Ireland',
               'Australia, India', 'United States, United Kingdom, Canada, Japan',
               'Sweden, United Kingdom, Finland', 'Hong Kong, Taiwan',
               'United States, United Kingdom, Spain, South Korea', 'Guatemala',
               'Ukraine',
               'Italy, South Africa, West Germany, Australia, United States',
               'United States, Germany, United Kingdom, Australia',
               'Italy, France, Switzerland', 'Canada, France, United States',
               'Switzerland, United States', 'Thailand, Canada, United States',
               'China, Hong Kong, United States', 'United Kingdom, New Zealand',
               'Czech Republic, United Kingdom, France',
               'Australia, United Kingdom, Canada', 'Jamaica, United States',
               'Australia, United Kingdom, United States, New Zealand, Italy, France',
               'France, United States, Canada',
               'United Kingdom, France, Canada, Belgium, United States',
               'Denmark, United Kingdom, Sweden', 'United States, Hong Kong',
               'United States, Kazakhstan',
               'Argentina, France, United States, Germany, Qatar',
               'United States, Germany, United Kingdom',
               'United States, Germany, United Kingdom, Italy',
               'United States, New Zealand, United Kingdom',
               'Finland, United States', 'Spain, France, Uruguay',
               'France, Canada, United States', 'United States, Canada, China',
               'Ireland, Canada, Luxembourg, United States, United Kingdom, Philippines, I
        ndia',
               'United States, Czech Republic, United Kingdom', 'Israel, Germany',
               'Mexico, France',
               'Israel, Germany, Poland, Luxembourg, Belgium, France, United States',
               'Austria, United States', 'United Kingdom, Lithuania',
               'United States, Greece, United Kingdom',
               'United Kingdom, China, United States, India',
               'United States, Sweden, Norway',
               'United Kingdom, United States, Morocco',
               'United States, United Kingdom, Morocco',
               'Spain, Canada, United States',
               'United States, India, United Arab Emirates',
               'United Kingdom, Canada, France, United States',
               'India, Germany, France',
               'Belgium, Ireland, Netherlands, Germany, Afghanistan',
               'France, Canada, Italy, United States, China',
               'Ireland, United Kingdom, Greece, France, Netherlands',
               'Denmark, Indonesia, Finland, Norway, United Kingdom, Israel, France, Unite
        d States, Germany, Netherlands',
               'New Zealand, United States',
               'United States, Australia, South Africa, United Kingdom',
               'United States, Germany, Mexico',
               'Somalia, Kenya, Sudan, South Africa, United States',
               'United States, Canada, Japan, Panama',
               'United Kingdom, Spain, Belgium', 'Serbia, South Korea, Slovenia',
               'Denmark, United Kingdom, South Africa, Sweden, Belgium',
               'Germany, Canada, United States',
               'Ireland, Canada, United States, United Kingdom',
               'New Zealand, United Kingdom, Australia',
               'United Kingdom, Australia, Canada, United States',
               'Germany, United States, Italy', 'United States, Venezuela',
               'United Kingdom, Canada, Japan',
               'United Kingdom, United States, Czech Republic',
               'United Kingdom, China, United States',
               'United Kingdom, Brazil, Germany',
               'United Kingdom, Namibia, South Africa, Zimbabwe, United States',
               'Canada, United States, India, United Kingdom',
               'Switzerland, United Kingdom, United States',
               'United Kingdom, India, Sweden',
               'United States, Brazil, India, Uganda, China',
               'Peru, United States, United Kingdom',
               'Germany, United States, United Kingdom, Canada',
               'Canada, India, Thailand, United States, United Arab Emirates',
               'United States, East Germany, West Germany',
               'France, Netherlands, South Africa, Finland',
               'Egypt, Austria, United States', 'Russia, Spain',
               'Croatia, Slovenia, Serbia, Montenegro', 'Japan, Canada',
               'United States, France, South Korea, Indonesia',
               'United Arab Emirates, Jordan'], dtype=object)
```

In [16]:

```
country = data['country'].apply(lambda x:str(x).split(', ')).tolist()
country_df = pd.DataFrame(country,index = data['title']).stack().reset_index()
country_df.rename(columns={0:'country'},inplace=True)
country_df.drop('level_1',axis=1,inplace=True)
country_df
```

Out[16]:

	title	country
0	Dick Johnson Is Dead	United States
1	Blood & Water	South Africa
2	Ganglands	nan
3	Jailbirds New Orleans	nan
4	Kota Factory	India
...	...	...
10840	Zodiac	United States
10841	Zombie Dumb	nan
10842	Zombieland	United States
10843	Zoom	United States
10844	Zubaan	India

10845 rows × 2 columns

In [17]:

```
data.head()
```

Out[17]:

	show_id	type	title	director	cast	country	date_added	release_year	rating	du
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	9
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA	Se
2	s3	TV Show	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...	NaN	September 24, 2021	2021	TV-MA	1 S
3	s4	TV Show	Jailbirds New Orleans	NaN	NaN	NaN	September 24, 2021	2021	TV-MA	1 S
4	s5	TV Show	Kota Factory	NaN	Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...	India	September 24, 2021	2021	TV-MA	Se

Rating

In [18]:

```
data['rating'].unique()
```

Out[18]:

```
array(['PG-13', 'TV-MA', 'PG', 'TV-14', 'TV-PG', 'TV-Y', 'TV-Y7', 'R',
       'TV-G', 'G', 'NC-17', '74 min', '84 min', '66 min', 'NR', nan,
       'TV-Y7-FV', 'UR'], dtype=object)
```

1. There few rows with uncommon names. we need to remove it when do data preprocessing.

Listed_in

In [19]:

```
# Unnest the column listed_in

listed = data['listed_in'].apply(lambda x:str(x).split(', ')).tolist()
listed_df = pd.DataFrame(listed,index=data['title']).stack().reset_index()
listed_df.rename(columns={0:'listed_in'},inplace=True)
listed_df.drop('level_1',axis=1,inplace=True)

listed_df
```

Out[19]:

	title	listed_in
0	Dick Johnson Is Dead	Documentaries
1	Blood & Water	International TV Shows
2	Blood & Water	TV Dramas
3	Blood & Water	TV Mysteries
4	Ganglands	Crime TV Shows
...	...	...
19318	Zoom	Children & Family Movies
19319	Zoom	Comedies
19320	Zubaan	Dramas
19321	Zubaan	International Movies
19322	Zubaan	Music & Musicals

19323 rows × 2 columns

Merging all the unnested columns

In [20]:

```python
df = dir_df.merge(cast_df,on='title',how='inner')
df = df.merge(country_df,on='title',how='inner')
df = df.merge(listed_df,on='title',how='inner')
df
```

Out[20]:

	title	directors	cast	country	listed_in
0	Dick Johnson Is Dead	Kirsten Johnson	nan	United States	Documentaries
1	Blood & Water	nan	Ama Qamata	South Africa	International TV Shows
2	Blood & Water	nan	Ama Qamata	South Africa	TV Dramas
3	Blood & Water	nan	Ama Qamata	South Africa	TV Mysteries
4	Blood & Water	nan	Khosi Ngema	South Africa	International TV Shows
...	...	...	...	...	...
201986	Zubaan	Mozez Singh	Anita Shabdish	India	International Movies
201987	Zubaan	Mozez Singh	Anita Shabdish	India	Music & Musicals
201988	Zubaan	Mozez Singh	Chittaranjan Tripathy	India	Dramas
201989	Zubaan	Mozez Singh	Chittaranjan Tripathy	India	International Movies
201990	Zubaan	Mozez Singh	Chittaranjan Tripathy	India	Music & Musicals

201991 rows × 5 columns

In [21]:

```
#Dealing with Null avlues in df:

df['directors'].replace('nan','unknown directors',inplace=True)
df['cast'].replace('nan','unknown cast',inplace=True)
df['country'].replace('nan',np.nan,inplace=True)
```

In [22]:

```
df.head()
```

Out[22]:

	title	directors	cast	country	listed_in
0	Dick Johnson Is Dead	Kirsten Johnson	unknown cast	United States	Documentaries
1	Blood & Water	unknown directors	Ama Qamata	South Africa	International TV Shows
2	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Dramas
3	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Mysteries
4	Blood & Water	unknown directors	Khosi Ngema	South Africa	International TV Shows

In [23]:

```
df.isnull().sum()
```

Out[23]:

```
title            0
directors        0
cast             0
country      11897
listed_in        0
dtype: int64
```

In [24]:

```
data.columns
```

Out[24]:

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

In [25]:

```
df_final = df.merge(data[['show_id', 'type', 'title','date_added',
       'release_year', 'rating', 'duration']],on='title',how='left')

df_final
```

Out[25]:

	title	directors	cast	country	listed_in	show_id	type	date_added	rel
0	Dick Johnson Is Dead	Kirsten Johnson	unknown cast	United States	Documentaries	s1	Movie	September 25, 2021	
1	Blood & Water	unknown directors	Ama Qamata	South Africa	International TV Shows	s2	TV Show	September 24, 2021	
2	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Dramas	s2	TV Show	September 24, 2021	
3	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Mysteries	s2	TV Show	September 24, 2021	
4	Blood & Water	unknown directors	Khosi Ngema	South Africa	International TV Shows	s2	TV Show	September 24, 2021	
...	...	...	...	...	...	...	...	...	
201986	Zubaan	Mozez Singh	Anita Shabdish	India	International Movies	s8807	Movie	March 2, 2019	
201987	Zubaan	Mozez Singh	Anita Shabdish	India	Music & Musicals	s8807	Movie	March 2, 2019	
201988	Zubaan	Mozez Singh	Chittaranjan Tripathy	India	Dramas	s8807	Movie	March 2, 2019	
201989	Zubaan	Mozez Singh	Chittaranjan Tripathy	India	International Movies	s8807	Movie	March 2, 2019	
201990	Zubaan	Mozez Singh	Chittaranjan Tripathy	India	Music & Musicals	s8807	Movie	March 2, 2019	

201991 rows × 11 columns

Now lets deal with missing values

In [26]:

```
# once again check for missing values:
df_final.isnull().sum()
```

Out[26]:

```
title               0
directors           0
cast                0
country         11897
listed_in           0
show_id             0
type                0
date_added        158
release_year        0
rating             67
duration            3
dtype: int64
```

In [27]:

```
# First lets fill in missing values for  date_added

df_final.loc[df_final['date_added'].isna()]
```

Out[27]:

	title	directors	cast	country	listed_in	show_id	type	date_added	relea
136893	A Young Doctor's Notebook and Other Stories	unknown directors	Daniel Radcliffe	United Kingdom	British TV Shows	s6067	TV Show	NaN	
136894	A Young Doctor's Notebook and Other Stories	unknown directors	Daniel Radcliffe	United Kingdom	TV Comedies	s6067	TV Show	NaN	
136895	A Young Doctor's Notebook and Other Stories	unknown directors	Daniel Radcliffe	United Kingdom	TV Dramas	s6067	TV Show	NaN	
136896	A Young Doctor's Notebook and Other Stories	unknown directors	Jon Hamm	United Kingdom	British TV Shows	s6067	TV Show	NaN	
136897	A Young Doctor's Notebook and Other Stories	unknown directors	Jon Hamm	United Kingdom	TV Comedies	s6067	TV Show	NaN	
...	...	...	...	...	...	...	...	...	
186891	The Adventures of Figaro Pho	unknown directors	Charlotte Hamlyn	Australia	TV Comedies	s8183	TV Show	NaN	
186892	The Adventures of Figaro Pho	unknown directors	Stavroula Mountzouris	Australia	Kids' TV	s8183	TV Show	NaN	
186893	The Adventures of Figaro Pho	unknown directors	Stavroula Mountzouris	Australia	TV Comedies	s8183	TV Show	NaN	
186894	The Adventures of Figaro Pho	unknown directors	Aletheia Burney	Australia	Kids' TV	s8183	TV Show	NaN	
186895	The Adventures of Figaro Pho	unknown directors	Aletheia Burney	Australia	TV Comedies	s8183	TV Show	NaN	

158 rows × 11 columns

Imputation Idea : we can take when movie/show is released and take for mode of date_added of corresponding release_year and impute them with Null values

In [28]:

```
for year in df_final.loc[df_final['date_added'].isnull(),'release_year'].unique():
    imputer = df_final.loc[df_final['release_year']==year]['date_added'].mode().va
    df_final.loc[df_final['release_year']==year,'date_added'] = df_final.loc[df_fi
```

In [29]:

```
# We do the same logic for filling country missing values:

for director in df_final.loc[df_final['country'].isnull(),'directors'].unique():
    if director in df_final[~df_final['country'].isnull()]['directors'].unique():
        imputer = df_final.loc[df_final['directors']==director,['country']].mode()
        df_final.loc[df_final['directors']==director,'country']=df_final.loc[df_fi
```

In [30]:

```
# apply the same logic for country
df_final['country'].isnull().sum()
```

Out[30]:

```
4673
```

In [31]:

```
for cast in df_final.loc[df_final['country'].isnull(),'cast'].unique():
    if cast in df_final.loc[~df_final['country'].isnull(),'cast'].unique():
        imputer = df_final.loc[df_final['cast']==cast,'country'].mode().values[0]
        df_final.loc[df_final['cast']==cast,'country'] == df_final.loc[df_final['c
```

In [32]:

```
df_final.isnull().sum()
```

Out[32]:

```
title              0
directors          0
cast               0
country         4673
listed_in          0
show_id            0
type               0
date_added         0
release_year       0
rating            67
duration           3
dtype: int64
```

In [33]:

```
# Handling Duration column
df_final.loc[df_final['duration'].isnull(),'duration']=df_final.loc[df_final['dura
df_final.loc[df_final['rating'].str.contains('min', na=False),'rating']='NR'
```

In [34]:

```
# Seems like still there are empty country cells, we can replace it with some stri
df_final['country'].fillna('Unknown Country',inplace=True)
df_final.isnull().sum()
```

Out[34]:

```
title            0
directors        0
cast             0
country          0
listed_in        0
show_id          0
type             0
date_added       0
release_year     0
rating          67
duration         0
dtype: int64
```

In [35]:

```
# Lets deal with Rating column:
df_final['rating'].unique()
```

Out[35]:

```
array(['PG-13', 'TV-MA', 'PG', 'TV-14', 'TV-PG', 'TV-Y', 'TV-Y7', 'R',
       'TV-G', 'G', 'NC-17', 'NR', nan, 'TV-Y7-FV', 'UR'], dtype=object)
```

1. seems there are some rating values which does make sense: We can drop it off/ replace it with NR:

In [36]:

```
df_final.loc[df_final['rating'].str.contains('min',na=False),'rating'] = 'NR'
```

In [37]:

```
# Also replace Null values with NR:
df_final['rating'].fillna('NR',inplace = True)
```

In [38]:

```
df_final.isna().sum()
```

Out[38]:

```
title           0
directors       0
cast            0
country         0
listed_in       0
show_id         0
type            0
date_added      0
release_year    0
rating          0
duration        0
dtype: int64
```

In [39]:

```
# Lets explore Duration column:
df_final['duration'].value_counts()
```

Out[39]:

```
1 Season     35035
2 Seasons     9559
3 Seasons     5084
94 min        4343
106 min       4040
             ...  
3 min            4
5 min            3
11 min           2
8 min            2
9 min            2
Name: duration, Length: 220, dtype: int64
```

In [40]:

```
df_final_copy = df_final.copy()
```

In [41]:

```
# Lets remove 'mins' from duration column
df_final_copy['duration'] = df_final_copy['duration'].str.replace('min','')
df_final_copy
```

Out[41]:

	title	directors	cast	country	listed_in	show_id	type	date_added	rel
0	Dick Johnson Is Dead	Kirsten Johnson	unknown cast	United States	Documentaries	s1	Movie	September 25, 2021	
1	Blood & Water	unknown directors	Ama Qamata	South Africa	International TV Shows	s2	TV Show	September 24, 2021	
2	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Dramas	s2	TV Show	September 24, 2021	
3	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Mysteries	s2	TV Show	September 24, 2021	
4	Blood & Water	unknown directors	Khosi Ngema	South Africa	International TV Shows	s2	TV Show	September 24, 2021	
...	...	...	...	...	...	...	...	...	
201986	Zubaan	Mozez Singh	Anita Shabdish	India	International Movies	s8807	Movie	March 2, 2019	
201987	Zubaan	Mozez Singh	Anita Shabdish	India	Music & Musicals	s8807	Movie	March 2, 2019	
201988	Zubaan	Mozez Singh	Chittaranjan Tripathy	India	Dramas	s8807	Movie	March 2, 2019	
201989	Zubaan	Mozez Singh	Chittaranjan Tripathy	India	International Movies	s8807	Movie	March 2, 2019	
201990	Zubaan	Mozez Singh	Chittaranjan Tripathy	India	Music & Musicals	s8807	Movie	March 2, 2019	

201991 rows × 11 columns

In [42]:

```
# Replace duration column with seasons to 0.
df_final_copy.loc[df_final_copy['duration'].str.contains('Season'),'duration']=0
df_final_copy['duration'] = df_final_copy['duration'].astype('int')
```

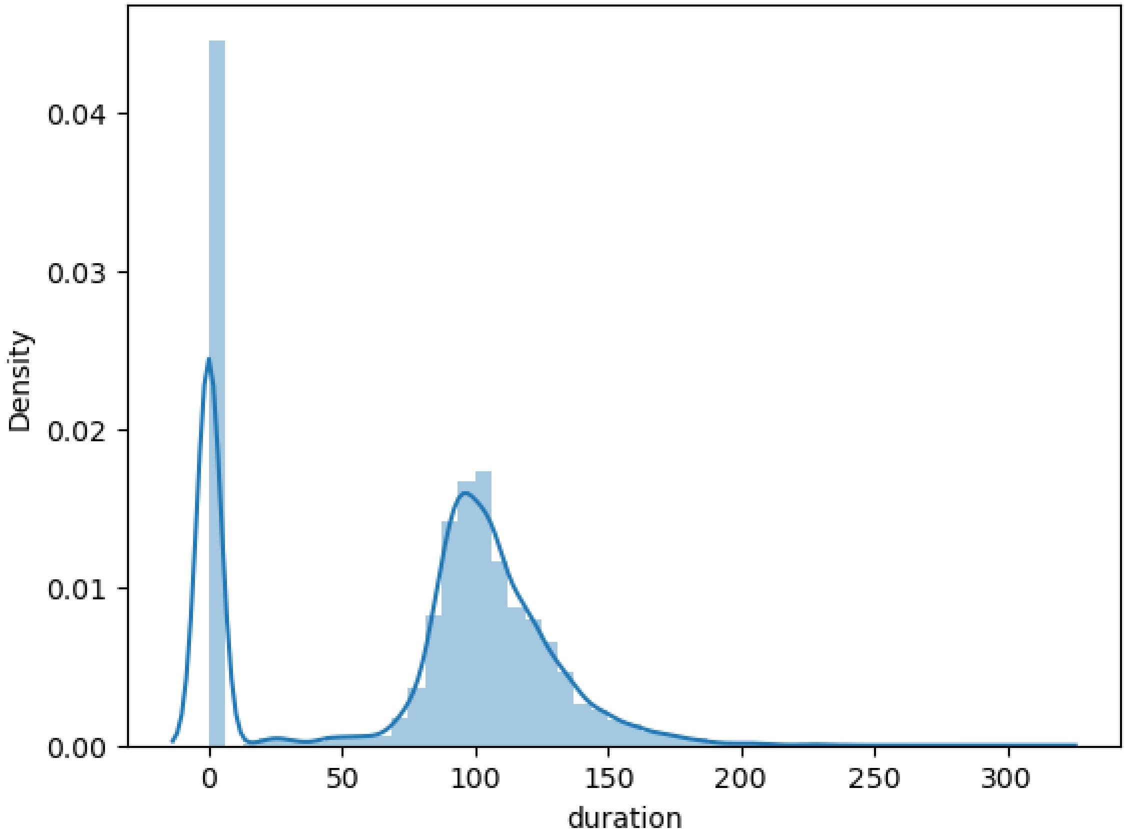
In [43]:

```
# Plotting above duration columns:
sns.distplot(df_final_copy['duration'],kde=True)
```

```
C:\Users\91709\AppData\Local\Temp\ipykernel_28156\2819687804.py:2: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(df_final_copy['duration'],kde=True)
```

Out[43]:

```
<Axes: xlabel='duration', ylabel='Density'>
```



In [44]:

```python
bins = [-1,1,50,80,100,120,150,200,315]
lables = ['<1','1-50','50-80','80-100','100-120','120-150','150-200','200-315']
df_final_copy['duration_copy'] = pd.cut(df_final_copy['duration'],bins = bins, lab
```

In [45]:

```python
df_final_copy.head()
```

Out[45]:

	title	directors	cast	country	listed_in	show_id	type	date_added	release_yea
0	Dick Johnson Is Dead	Kirsten Johnson	unknown cast	United States	Documentaries	s1	Movie	September 25, 2021	2020
1	Blood & Water	unknown directors	Ama Qamata	South Africa	International TV Shows	s2	TV Show	September 24, 2021	2021
2	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Dramas	s2	TV Show	September 24, 2021	2021
3	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Mysteries	s2	TV Show	September 24, 2021	2021
4	Blood & Water	unknown directors	Khosi Ngema	South Africa	International TV Shows	s2	TV Show	September 24, 2021	2021

In [46]:

```
df_final_copy.duration_copy.value_counts()
```

Out[46]:

```
<1          56148
80-100      52937
100-120     48724
120-150     26691
50-80        7700
150-200      6737
1-50         2530
200-315       524
Name: duration_copy, dtype: int64
```

In [47]:

```
# Lets explore date_Added column:
df_final_copy['modified_date_added'] = pd.to_datetime(df_final_copy['date_added'])
df_final_copy['month_added'] = df_final_copy['modified_date_added'].dt.month
df_final_copy['date_added'] = df_final_copy['modified_date_added'].dt.day
df_final_copy['year_added'] = df_final_copy['modified_date_added'].dt.year
```

In [48]:

```
df_final_copy.head()
```

Out[48]:

	title	directors	cast	country	listed_in	show_id	type	date_added	release_yea
0	Dick Johnson Is Dead	Kirsten Johnson	unknown cast	United States	Documentaries	s1	Movie	25	2020
1	Blood & Water	unknown directors	Ama Qamata	South Africa	International TV Shows	s2	TV Show	24	2021
2	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Dramas	s2	TV Show	24	2021
3	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Mysteries	s2	TV Show	24	2021
4	Blood & Water	unknown directors	Khosi Ngema	South Africa	International TV Shows	s2	TV Show	24	2021

Univariate Analysis:

In [49]:

```
# Lets explore genre: Top 20 genre's
df_genre = df_final_copy.groupby(['listed_in']).agg({'title':'nunique'}).sort_valu
df_genre
```

Out[49]:

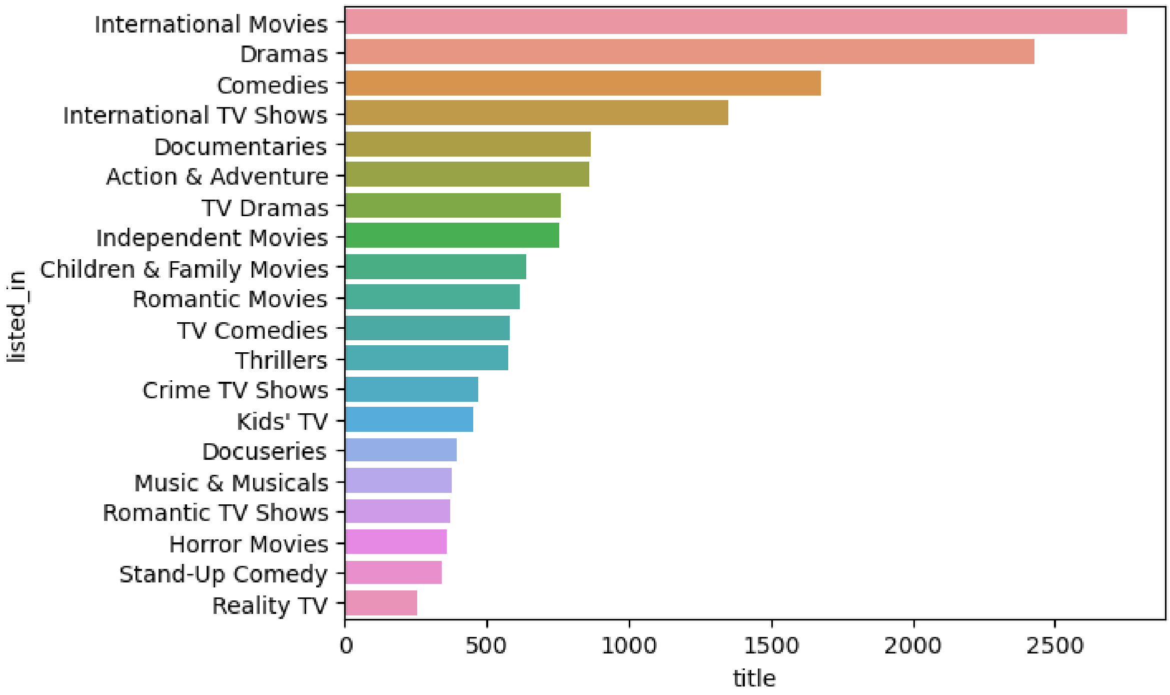
	listed_in	title
0	International Movies	2752
1	Dramas	2427
2	Comedies	1674
3	International TV Shows	1351
4	Documentaries	869
5	Action & Adventure	859
6	TV Dramas	763
7	Independent Movies	756
8	Children & Family Movies	641
9	Romantic Movies	616
10	TV Comedies	581
11	Thrillers	577
12	Crime TV Shows	470
13	Kids' TV	451
14	Docuseries	395
15	Music & Musicals	375
16	Romantic TV Shows	370
17	Horror Movies	357
18	Stand-Up Comedy	343
19	Reality TV	255

In [50]:

```
sns.barplot(data=df_genre,y = 'listed_in',x = 'title' ,orient='h')
```

Out[50]:

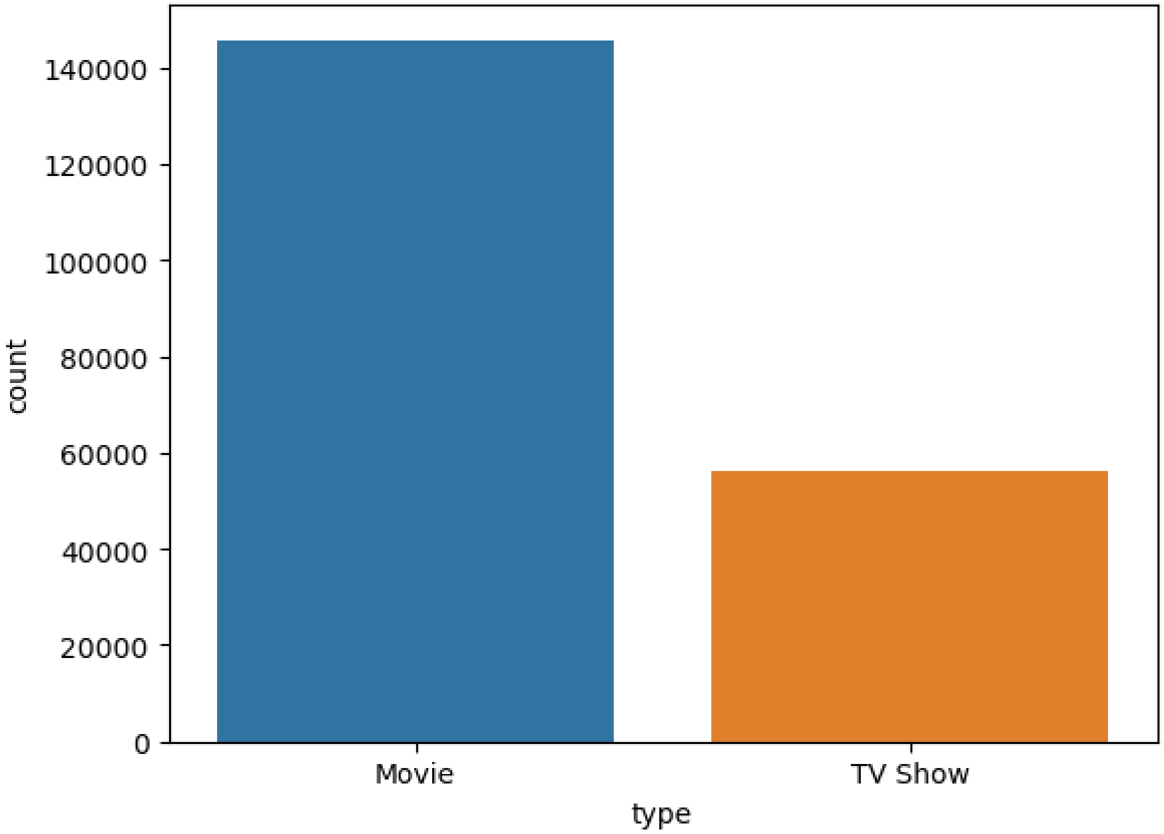
```
<Axes: xlabel='title', ylabel='listed_in'>
```



From Above barplot, we can infer that internal MOvies. dramas, comedies, Internatial TV show are more popular

In [51]:
```
# Type column:
sns.countplot(data = df_final_copy,x='type')
```

Out[51]:
```
<Axes: xlabel='type', ylabel='count'>
```



1. from above we can infer that Platform has more movies comapretively.

In [52]:

```
#COuntry column:
df_final_copy['country'].value_counts()
```

Out[52]:

```
United States     64632
India             23576
United Kingdom    12957
Japan              8864
France             8311
                  ...  
Palestine             2
Kazakhstan            1
Nicaragua             1
United States,        1
Uganda                1
Name: country, Length: 128, dtype: int64
```

If you observe above there are 2 different entries for same country 'United States' & 'United States,'. We handle them

In [53]:

```
df_final_copy['country'] = df_final_copy['country'].str.replace(',','')
```

In [54]:

```
df_final_copy['country'].value_counts()
```

Out[54]:

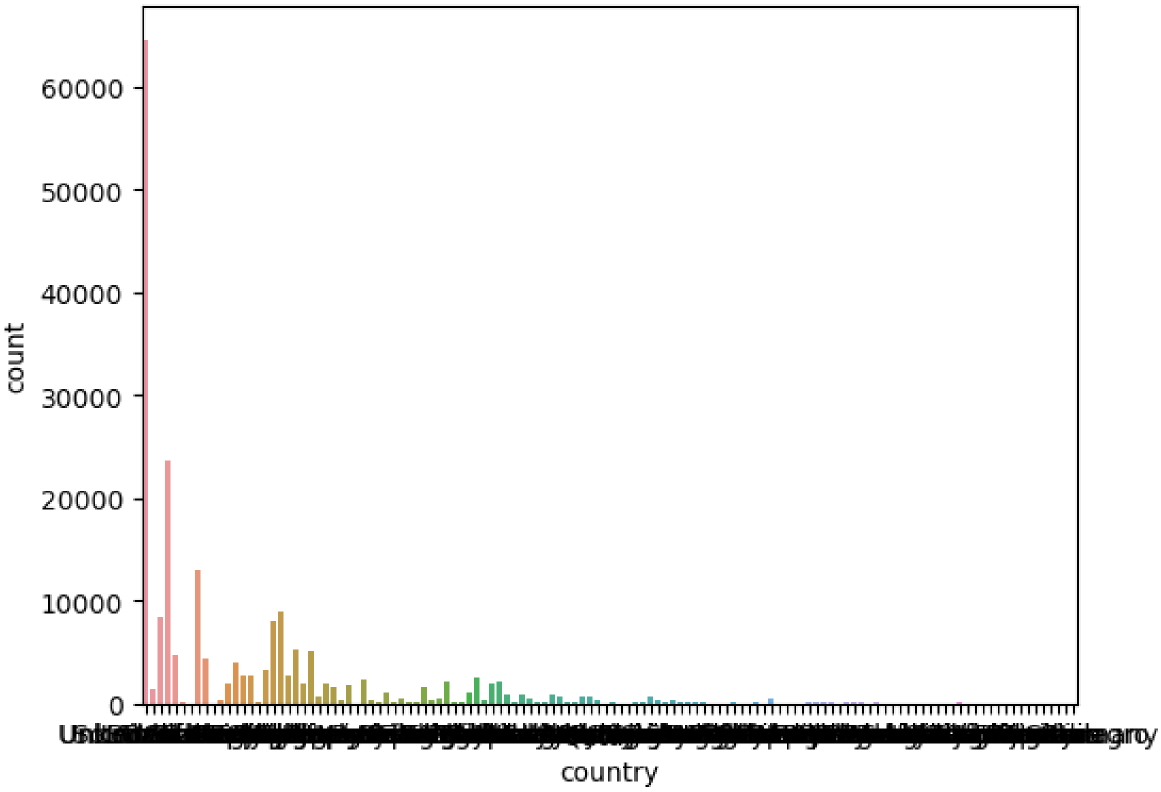
```
United States     64633
India             23576
United Kingdom    12977
Japan              8864
France             8311
                  ...  
Panama                2
Mongolia              2
Kazakhstan            1
Nicaragua             1
Uganda                1
Name: country, Length: 124, dtype: int64
```

In [55]:

```
sns.countplot(data=df_final_copy,x='country')
```

Out[55]:

```
<Axes: xlabel='country', ylabel='count'>
```

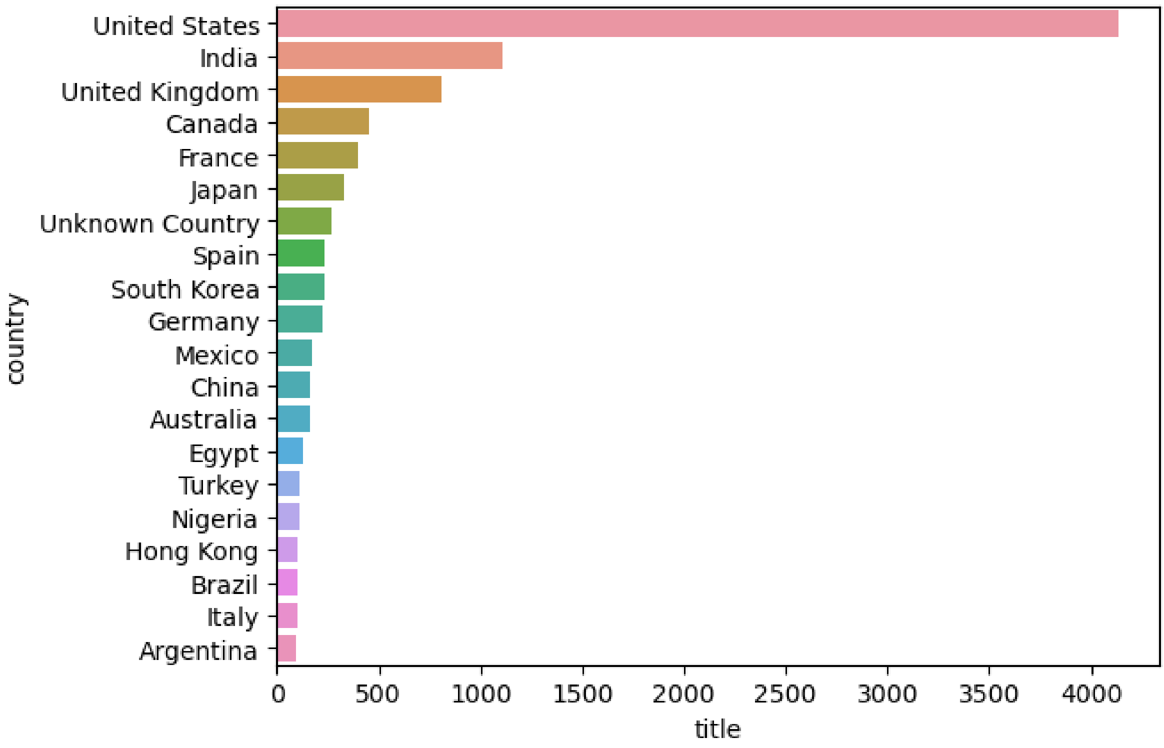


In [56]:

```
# :Lets plot only top 20 countries which use netflix much

countries = df_final_copy.groupby(['country']).agg({'title':'nunique'}).reset_inde
sns.barplot(data= countries,x='title',y='country',orient='h')
```

Out[56]:

```
<Axes: xlabel='title', ylabel='country'>
```



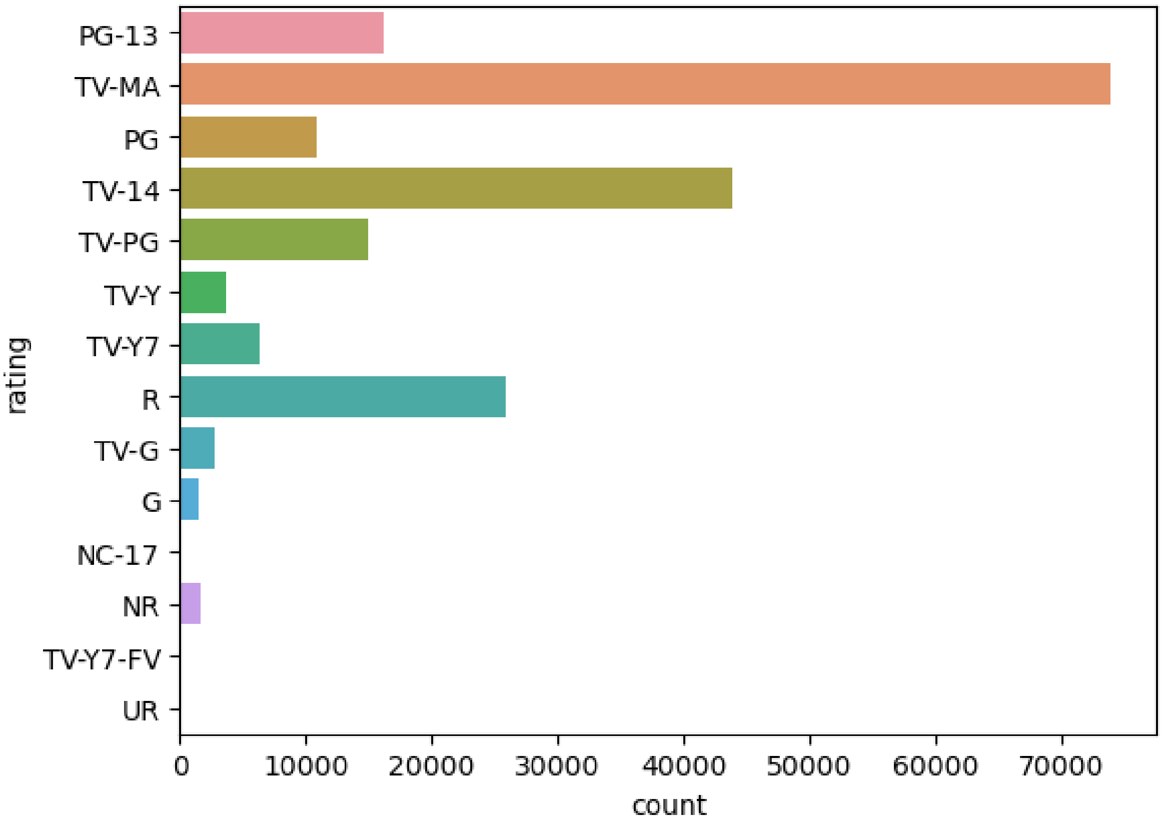
1. from above we can infer that platform is more popular in US, following India, Uk & canada

In [57]:

```
# EXplroe ratings column:
sns.countplot(data=df_final_copy,y='rating',orient='h')
```

Out[57]:

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



1. Most of the shows been rated under TV_MA, TV_14 & R

In [58]:

```
# Exploring DUration col from data:
df_final['duration'].value_counts()
```

Out[58]:

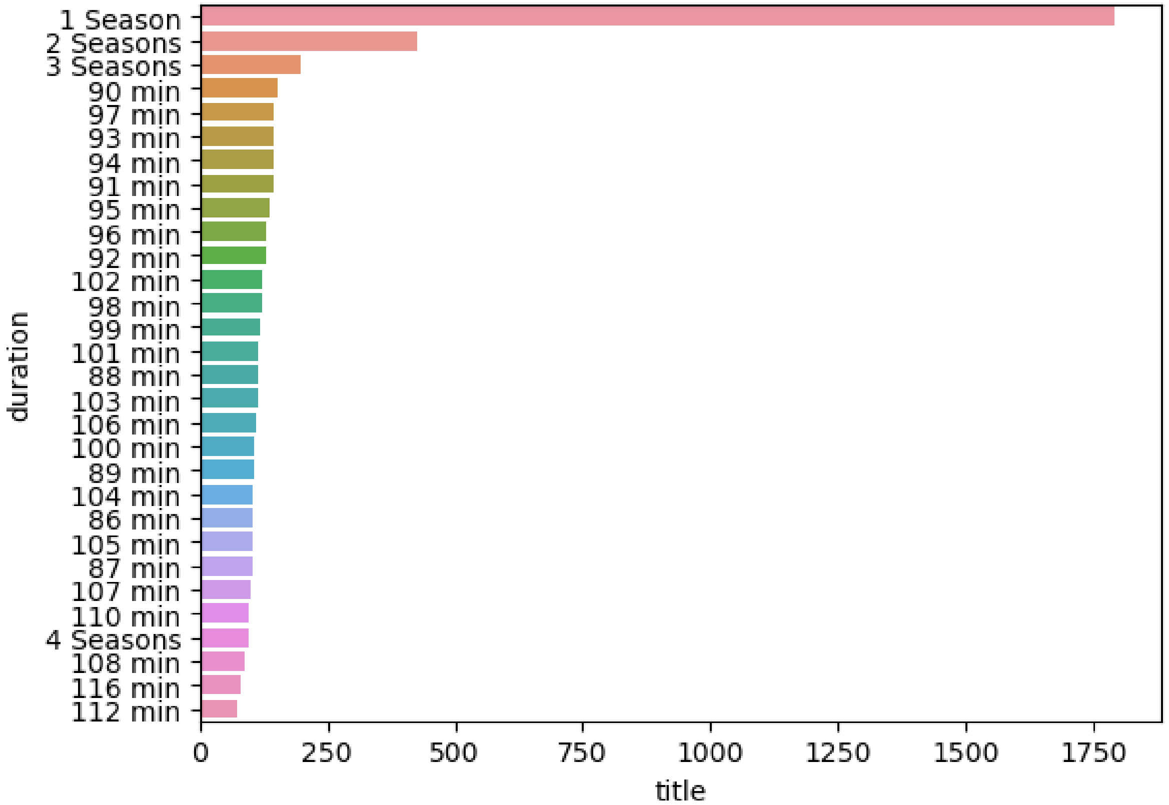
```
1 Season      35035
2 Seasons      9559
3 Seasons      5084
94 min         4343
106 min        4040
              ...
3 min             4
5 min             3
11 min            2
8 min             2
9 min             2
Name: duration, Length: 220, dtype: int64
```

In [59]:

```
duration_df  = df_final.groupby(['duration']).agg({'title':'nunique'}).reset_inde
sns.barplot(data=duration_df,x='title',y='duration',orient='h')
```

Out[59]:

```
<Axes: xlabel='title', ylabel='duration'>
```



1. From above graph we can infer that most of the Tv show have only one season.. Duration of movies lies in 90 to 110 mins.

In [60]:

```
# Lets explore Cast col:
df_final_copy['cast'].value_counts()
```

Out[60]:

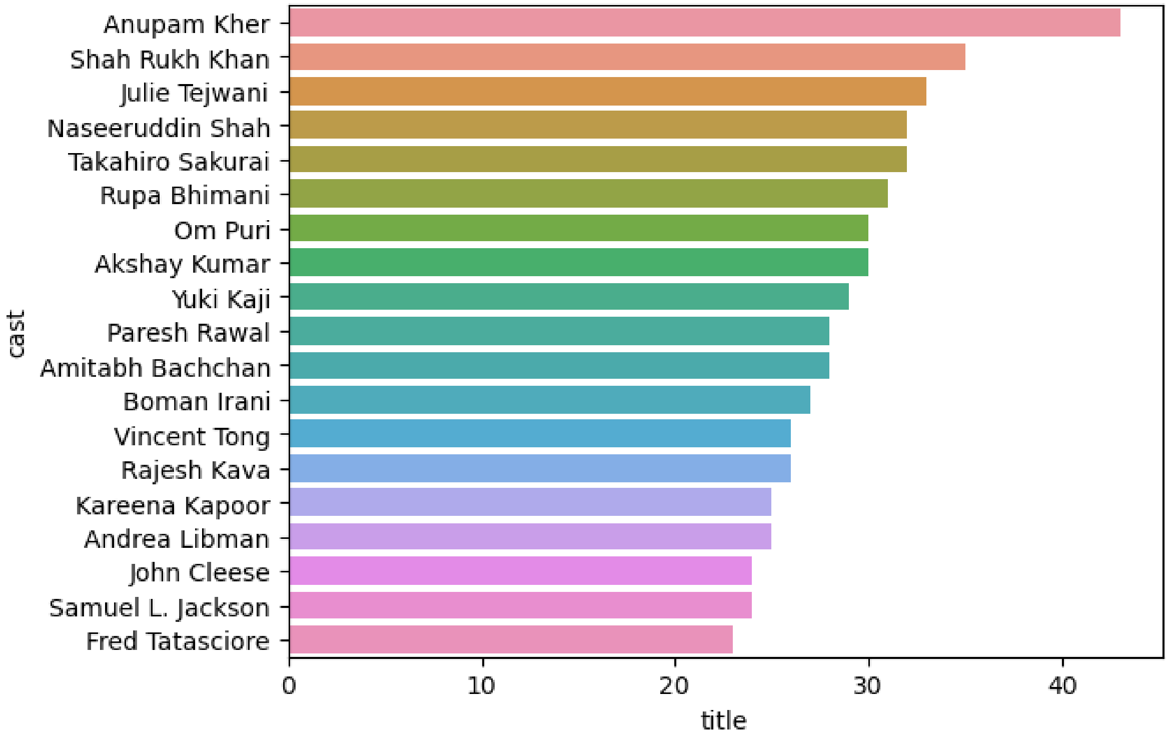
```
unknown cast      2146
Liam Neeson        161
Alfred Molina      160
John Krasinski     139
Salma Hayek        130
                  ... 
Dario Yazbek         1
Corinne Foxx         1
Jacob Craner         1
Laila Berzins        1
Richard Ryan         1
Name: cast, Length: 36440, dtype: int64
```

In [61]:

```
# top 10 popular actors
cast_df = df_final_copy.groupby(['cast']).agg({'title':'nunique'}).reset_index().s
sns.barplot(data=cast_df,x='title',y='cast',orient='h')
```

Out[61]:

```
<Axes: xlabel='title', ylabel='cast'>
```



1. Anupam Kher, Shah Rukh Khan, Hulie Tejwani, Naseeruddin Shah are popular actors

In [62]:

```
# Explore directors column:
df_final_copy['directors'].value_counts()
```

Out[62]:

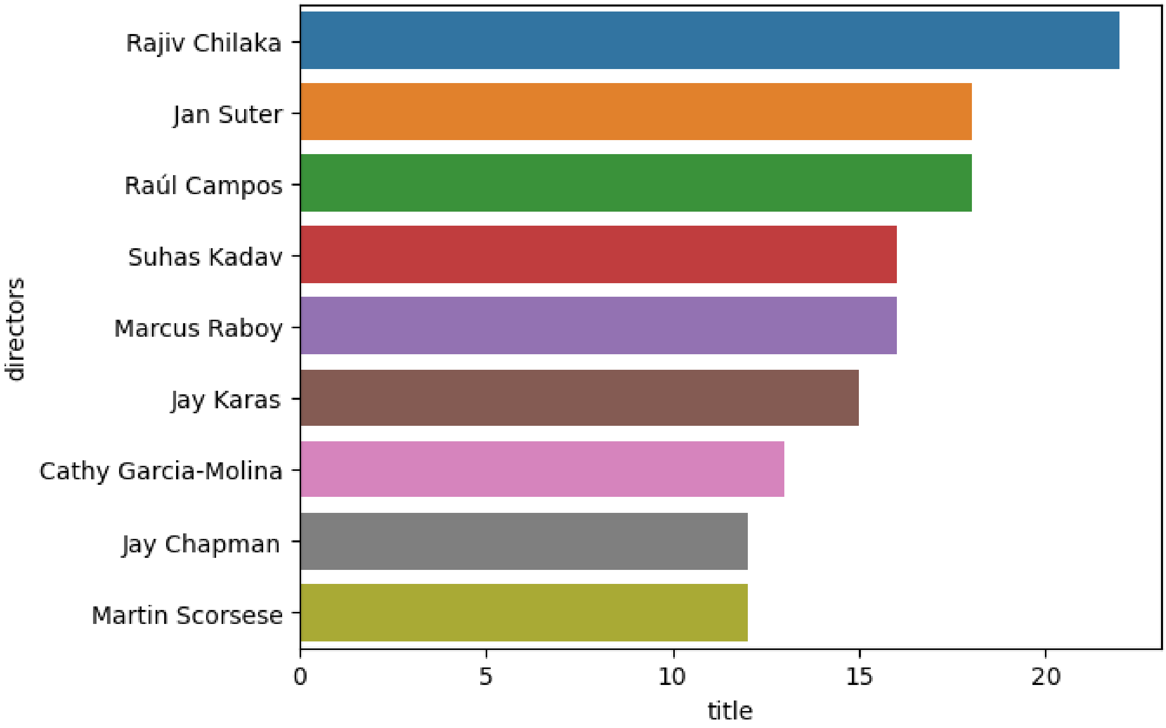
```
unknown directors      50643
Martin Scorsese          419
Youssef Chahine          409
Cathy Garcia-Molina      356
Steven Spielberg         355
                       ...  
Gautier & Leduc            1
Robb Dipple                1
Glenn Weiss                1
Lyric R. Cabral            1
Kirsten Johnson            1
Name: directors, Length: 5121, dtype: int64
```

In [63]:

```
# Getting top 10 directors
dirs = df_final_copy.groupby(['directors']).agg({'title':'nunique'}).reset_index()
sns.barplot(data = dirs,y='directors',x='title',orient='h')
```

Out[63]:

```
<Axes: xlabel='title', ylabel='directors'>
```



1. Rajiv Chilaka, Jan Suter, Raul Campos, Suhas Kadav are popular directors on the pltform.

In [64]:

```
# Year column:
df_final_copy.year_added.value_counts()
```

Out[64]:

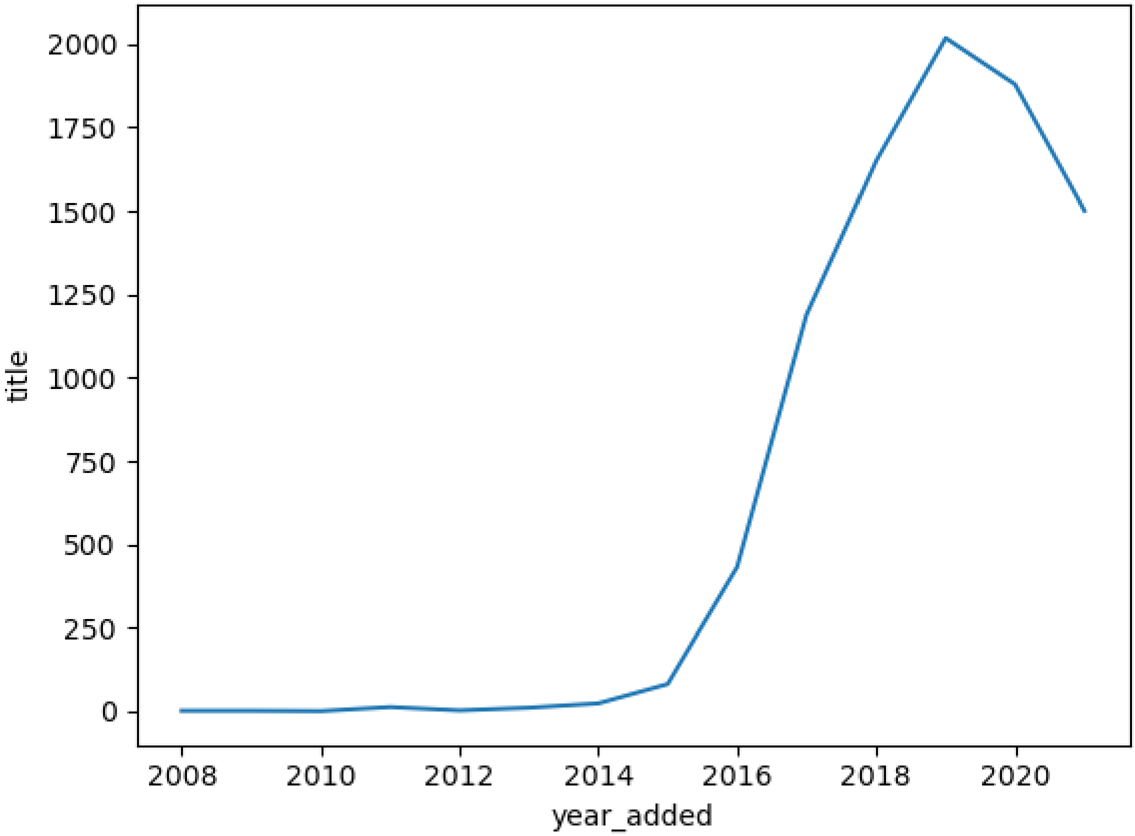
```
2019    47033
2020    46025
2021    36541
2018    35785
2017    25233
2016     8614
2015     1560
2014      450
2011      438
2013      207
2012       36
2009       30
2010       20
2008       19
Name: year_added, dtype: int64
```

In [65]:

```
 years = df_final_copy.groupby(['year_added']).agg({'title':'nunique'}).reset_inde
sns.lineplot(data=years,x='year_added',y='title')
```

Out[65]:

```
<Axes: xlabel='year_added', ylabel='title'>
```



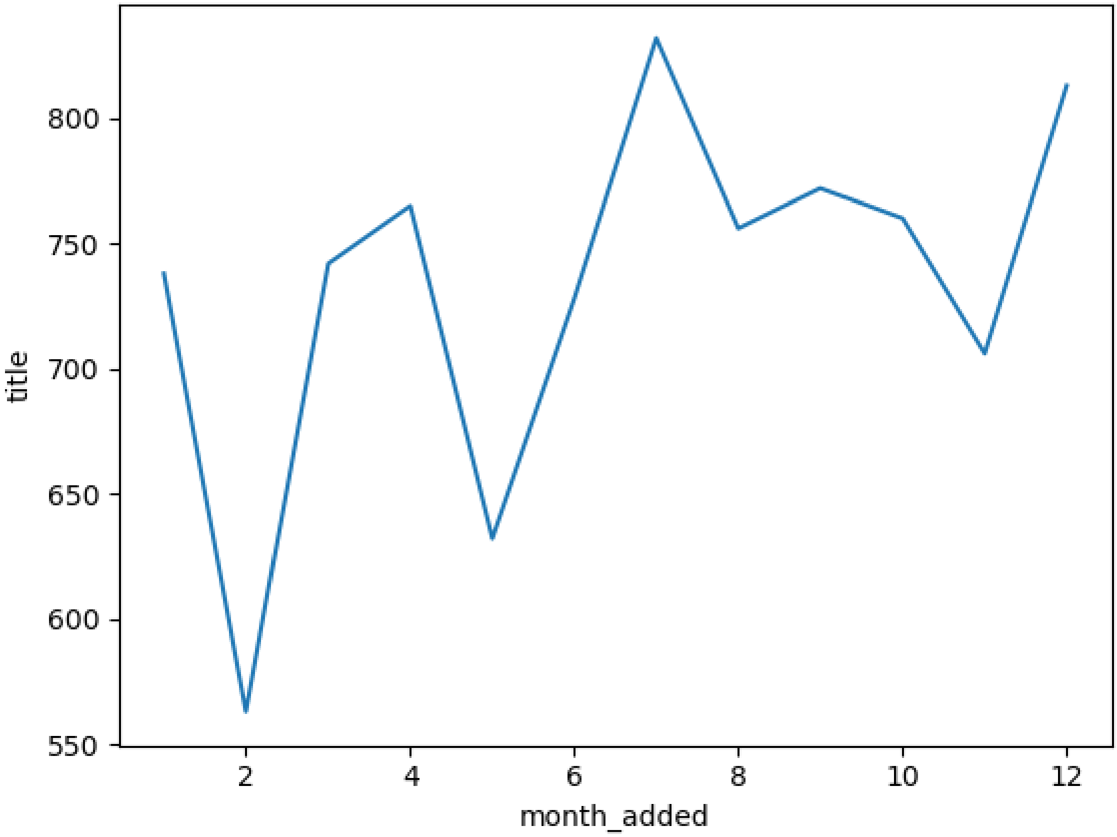
1. Due course of time movies/tv shows added increasing. but theres is a dip after 2018.

In [66]:

```
# Explore month col
month=df_final_copy.groupby(['month_added']).agg({"title":"nunique"}).reset_index(
sns.lineplot(data=month, x='month_added', y='title')
```

Out[66]:

```
<Axes: xlabel='month_added', ylabel='title'>
```



1. We can observe from above is first month & last month more content is added to platform.

Bivariate Analysis

In [67]:

```
df_final_copy['duration'] = df_final['duration']
df_final_copy.head()
```

Out[67]:

	title	directors	cast	country	listed_in	show_id	type	date_added	release_yea
0	Dick Johnson Is Dead	Kirsten Johnson	unknown cast	United States	Documentaries	s1	Movie	25	202
1	Blood & Water	unknown directors	Ama Qamata	South Africa	International TV Shows	s2	TV Show	24	202
2	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Dramas	s2	TV Show	24	202
3	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Mysteries	s2	TV Show	24	202
4	Blood & Water	unknown directors	Khosi Ngema	South Africa	International TV Shows	s2	TV Show	24	202

In [68]:

```
df_final_copy.isna().sum()
```

Out[68]:

```
title                 0
directors             0
cast                  0
country               0
listed_in             0
show_id               0
type                  0
date_added            0
release_year          0
rating                0
duration              0
duration_copy         0
modified_date_added   0
month_added           0
year_added            0
dtype: int64
```

From univariate Analysis, we can find/extract below insights:

```
1. Across all the countries, International movies, Dramas, Comedies,
INternational Tv shows are Popular. Using Bivariate we also find at
country level granularity i.e, popular gener's in a country.
2. Using Bivarite Analysis, we can analyse what the countries for
TVshow and MOvies resp.
3. Instead of doing granular analysis on all the countries, we can
do it on top 5 countries from where netflix is generating revenue
i,e. US, India, UK,canada, France.
4. We can also split movies and Tvshows, do analysis for specific
country.
```

```
5. popular directors across countries and its combination with
popular actor in a country.
```

In [69]:

```
# Lets Segregate data into mOvies & Tv shows:
movies = df_final_copy.loc[df_final_copy['type']=='Movie']
tvshows = df_final_copy.loc[df_final_copy['type']=='TV Show']
```

In [70]:

```
# Check for countries which are popular for movies
movies.groupby('country').agg({'title':'nunique'}).reset_index().sort_values(by='t
```

Out[70]:

```
            country  title
111   United States   2840
 42           India   1020
110  United Kingdom    538
 19          Canada    322
 33          France    304
...             ...    ...
 73       Nicaragua      1
 78          Panama      1
 31        Ethiopia      1
 29         Ecuador      1
100           Sudan      1

119 rows × 2 columns
```

Movies are popular across US, India, Uk, Canada, france

In [71]:

```
tvshows.groupby('country').agg({'title':'nunique'}).reset_index().sort_values(by='
```

Out[71]:

	country	title
63	United States	1293
62	United Kingdom	273
30	Japan	199
52	South Korea	170
8	Canada	126
...	...	...
55	Switzerland	1
23	Hungary	1
36	Malta	1
37	Mauritius	1
0		1

67 rows × 2 columns

Tvshows are popular across US,UK,Japan,South Korea, Canada

In [72]:

```
# Will filter moviesacross popular countries
movieCountries = ['United States','India','United Kingdom','Canada','France']
tvshowsCountries = ['United States','United Kingdom','Japan','South Korea','Canada
```

In [73]:

```
movies = movies.loc[movies['country'].apply(lambda x:x in movieCountries)]
tvshows = tvshows.loc[tvshows['country'].apply(lambda x:x in tvshowsCountries)]
```

In [74]:

```
movies.country.value_counts()
```

Out[74]:

```
United States     46361
India             22173
United Kingdom     8589
France             6637
Canada             5771
Name: country, dtype: int64
```

In [75]:

```
tvshows.country.value_counts()
```

Out[75]:

```
United States     18272
Japan              5154
United Kingdom     4388
South Korea        3754
Canada             2177
Name: country, dtype: int64
```

In [76]:

```
# Lets Explore movies at country granularity:
movies.head()
```

Out[76]:

	title	directors	cast	country	listed_in	show_id	type	date_added	release_y
0	Dick Johnson Is Dead	Kirsten Johnson	unknown cast	United States	Documentaries	s1	Movie	25	2
179	Sankofa	Haile Gerima	Kofi Ghanaba	United States	Dramas	s8	Movie	24	1
180	Sankofa	Haile Gerima	Kofi Ghanaba	United States	Independent Movies	s8	Movie	24	1
181	Sankofa	Haile Gerima	Kofi Ghanaba	United States	International Movies	s8	Movie	24	1
188	Sankofa	Haile Gerima	Kofi Ghanaba	United Kingdom	Dramas	s8	Movie	24	1

In [77]:

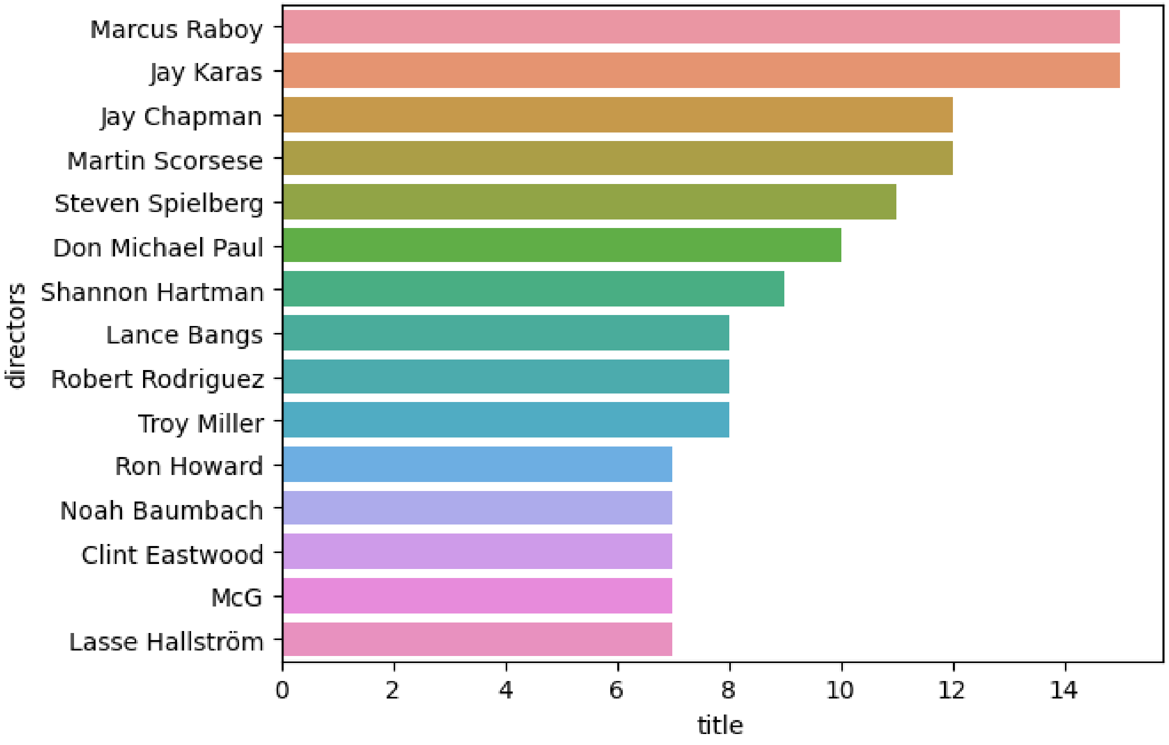
```
# Check for popular directors in US:
popularUsDirectors = movies.loc[movies['country']=='United States'].groupby('direc
```

In [78]:

```
sns.barplot(data=popularUsDirectors,x = 'title',y='directors',orient='h')
```

Out[78]:

```
<Axes: xlabel='title', ylabel='directors'>
```



1. Top directors in United States are Marcus Raboy, Jay Karas, Jay Chapman, MArtin Scorsese, steven spielberg

In [79]:

```
popularUsCast = movies.loc[movies['country']=='United States'].groupby('cast').agg
popularUsCast
```

Out[79]:

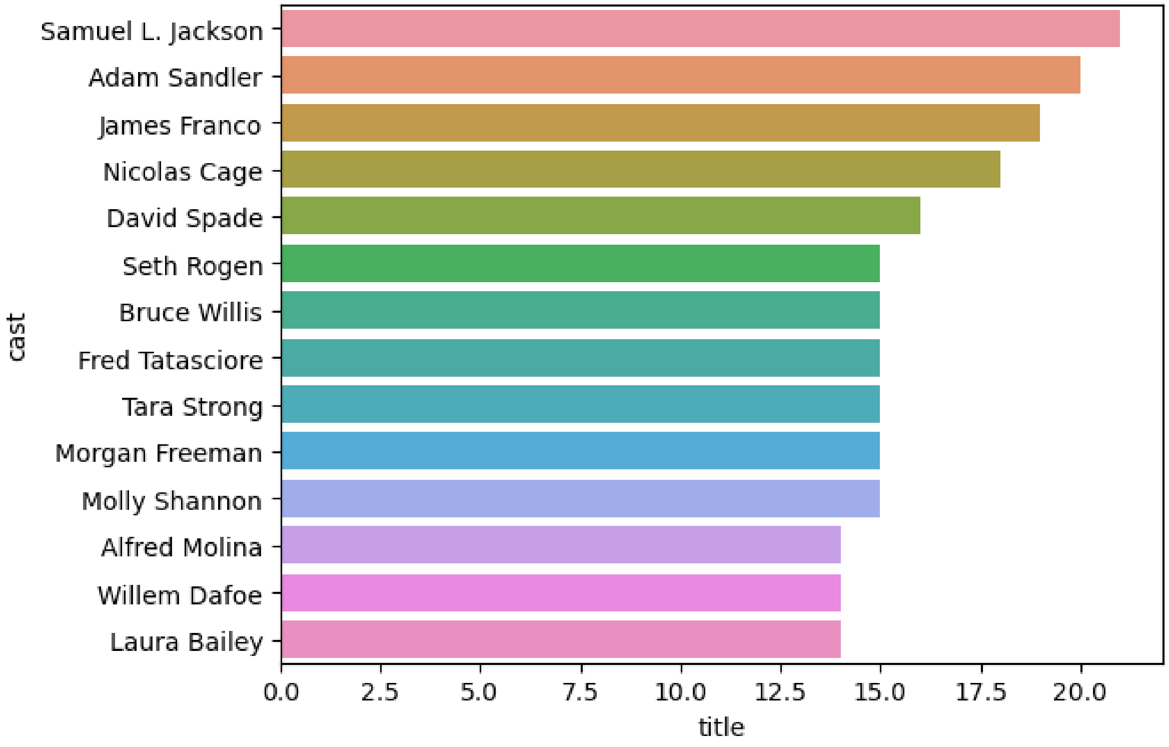
	cast	title
10083	Samuel L. Jackson	21
109	Adam Sandler	20
4794	James Franco	19
8562	Nicolas Cage	18
2869	David Spade	16
10310	Seth Rogen	15
1625	Bruce Willis	15
3857	Fred Tatasciore	15
10928	Tara Strong	15
8275	Morgan Freeman	15
8248	Molly Shannon	15
382	Alfred Molina	14
11707	Willem Dafoe	14
6729	Laura Bailey	14

In [80]:

```
sns.barplot(data = popularUsCast, x = 'title',y='cast',orient='h')
```

Out[80]:

```
<Axes: xlabel='title', ylabel='cast'>
```



1. Top actors are Samuel L.Jackson, Adam Sandler, James Franco, Nicolas Cage, David Spade

In [81]:

```
# Top genres in Unites states: Lets Take top 15
popularUsGenre = movies.loc[movies['country']=='United States'].groupby('listed_i
popularUsGenre
```

Out[81]:

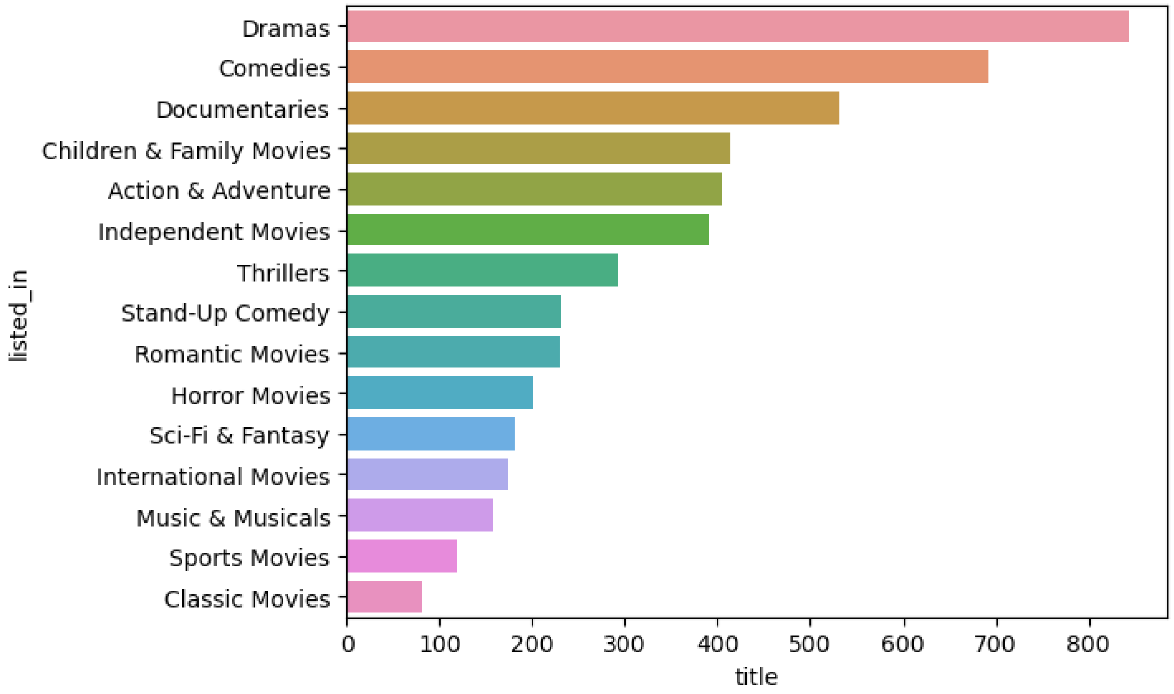
	listed_in	title
7	Dramas	843
4	Comedies	692
6	Documentaries	531
2	Children & Family Movies	413
0	Action & Adventure	404
10	Independent Movies	390
19	Thrillers	292
18	Stand-Up Comedy	232
15	Romantic Movies	230
9	Horror Movies	202
16	Sci-Fi & Fantasy	182
11	International Movies	175
14	Music & Musicals	158
17	Sports Movies	119
3	Classic Movies	81

In [82]:

```
sns.barplot(data=popularUsGenre,x='title',y='listed_in',orient='h')
```

Out[82]:

```
<Axes: xlabel='title', ylabel='listed_in'>
```



1. Popular gener in Us is Dramas, Comedies, Documentaries, Children & Family Movies, Action & Adventure

In [83]:

```
# Lets find top  5 rating in US that people watch:
popularRatings = movies.loc[movies['country']=='United States'].groupby('rating').
```

```
popularRatings
```

Out[83]:

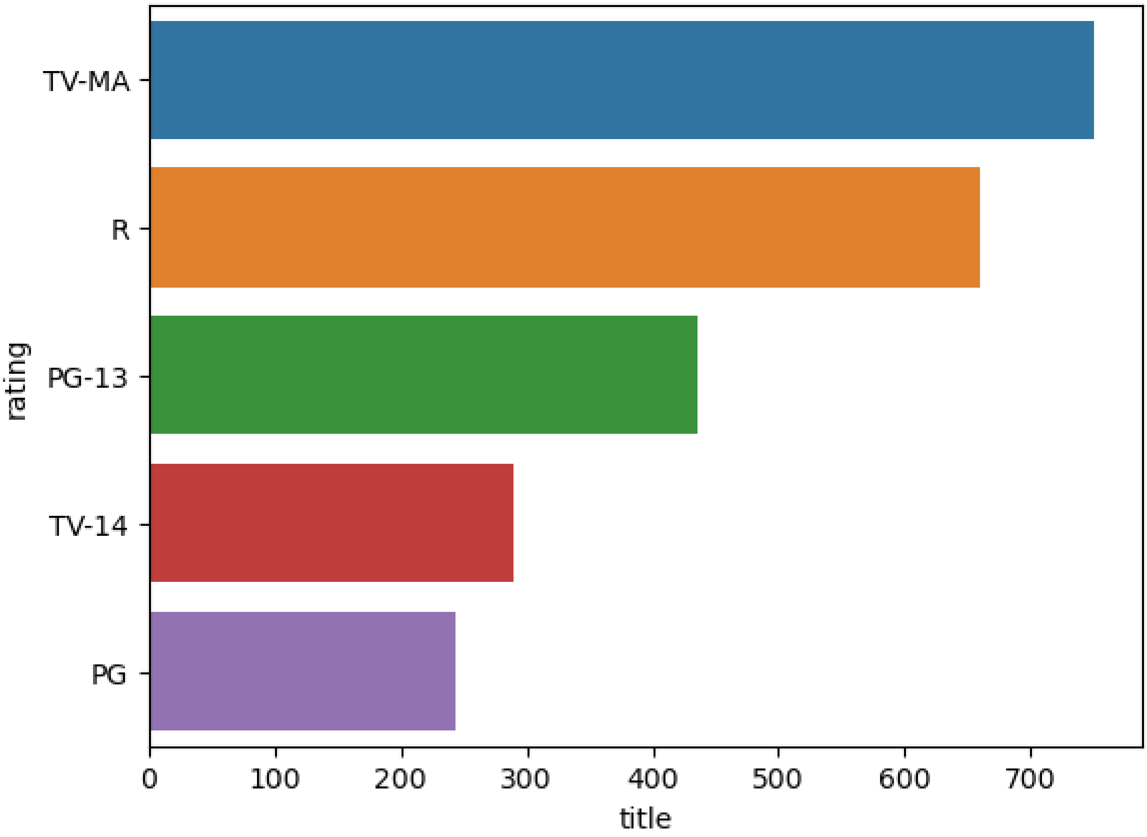
	rating	title
8	TV-MA	751
5	R	660
4	PG-13	436
6	TV-14	290
3	PG	244

In [84]:

```
sns.barplot(data=popularRatings,x='title',y='rating',orient='h')
```

Out[84]:

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



1. Top 5 Ratings in US are TV-MA, R, PG-13, TV-14,PG

In [85]:

```
# Length of the movies, people like to watch in Unites states:
duration = movies.loc[movies['country']=='United States'].groupby('duration').agg(
duration
```

Out[85]:

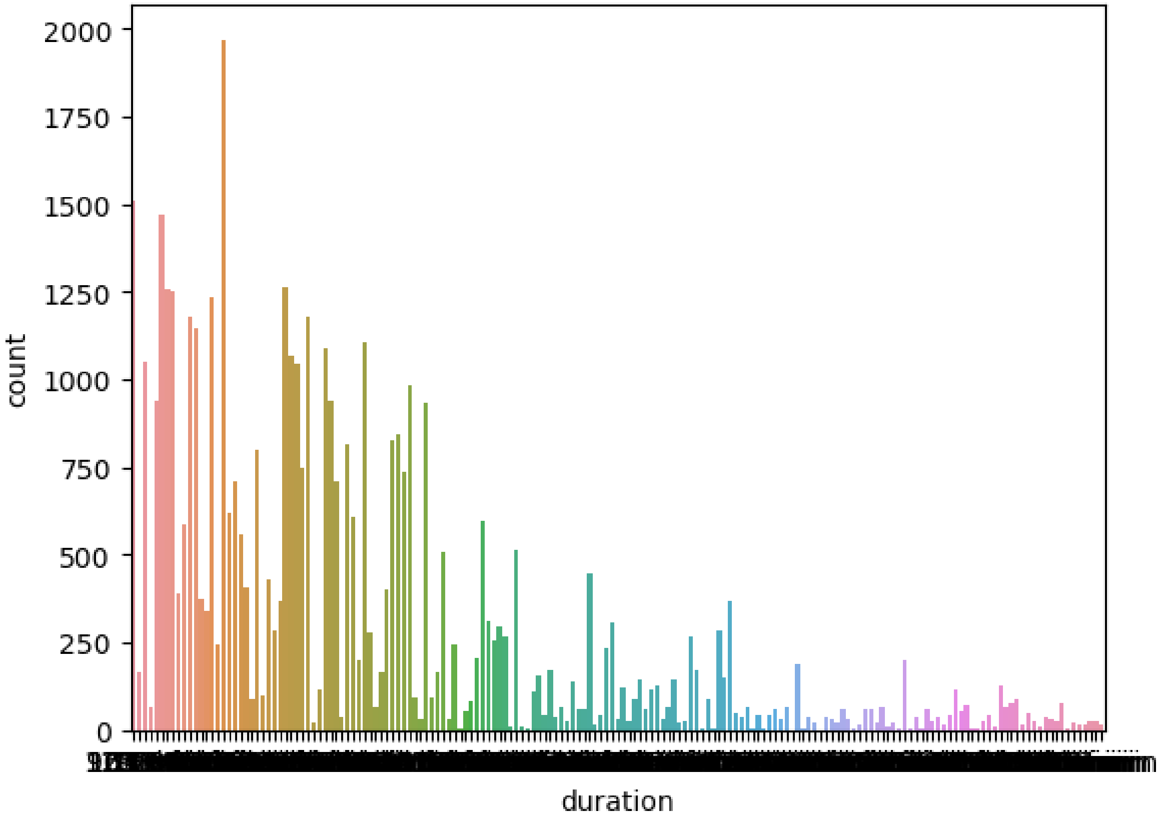
	duration	title
163	90 min	89

In [86]:

```
sns.countplot(data=movies.loc[movies['country']=='United States'],x = 'duration')
```

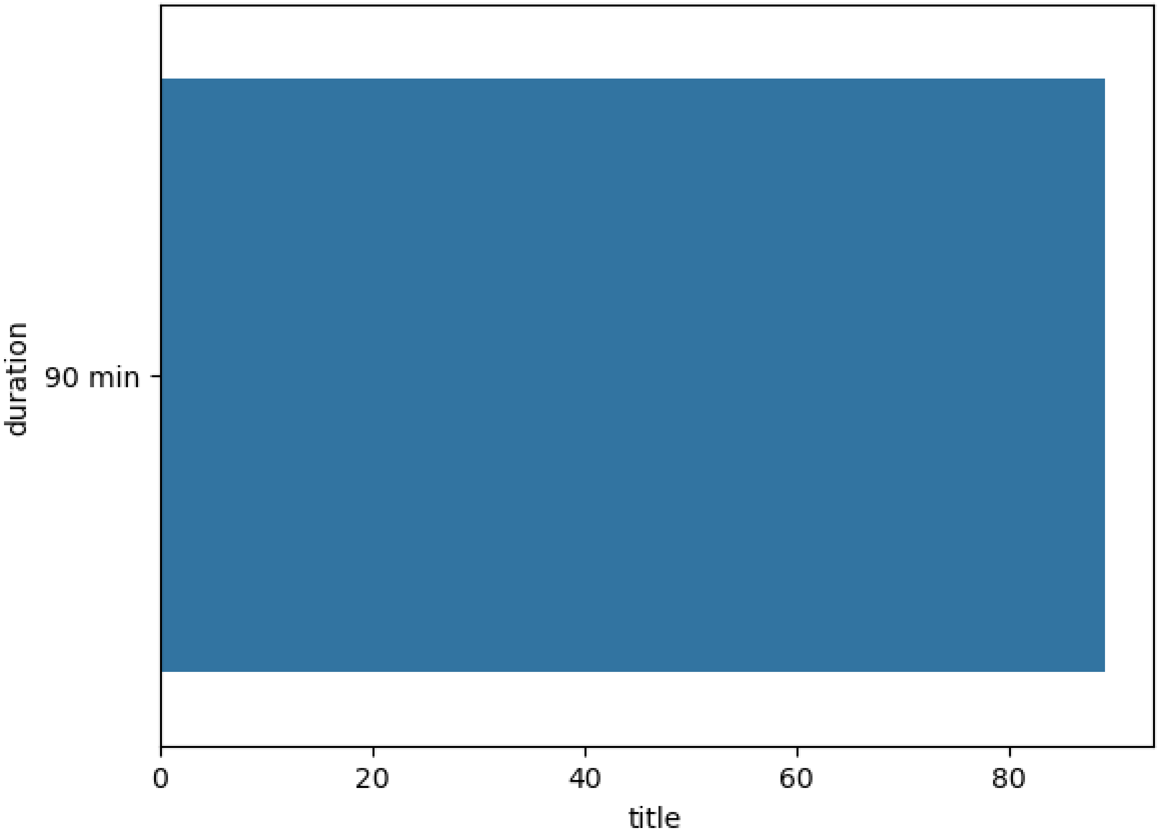
Out[86]:

```
<Axes: xlabel='duration', ylabel='count'>
```



```
In [87]: sns.barplot(data=duration,y='duration',x='title',orient='h')
```

```
Out[87]: <Axes: xlabel='title', ylabel='duration'>
```



1. Most of the movies in US are of 90min approx.

In [88]:

```
# when movies are added to platform  Unites states:
monthAdded = movies.loc[movies['country']=='United States'].groupby('month_added')
monthAdded
```

Out[88]:

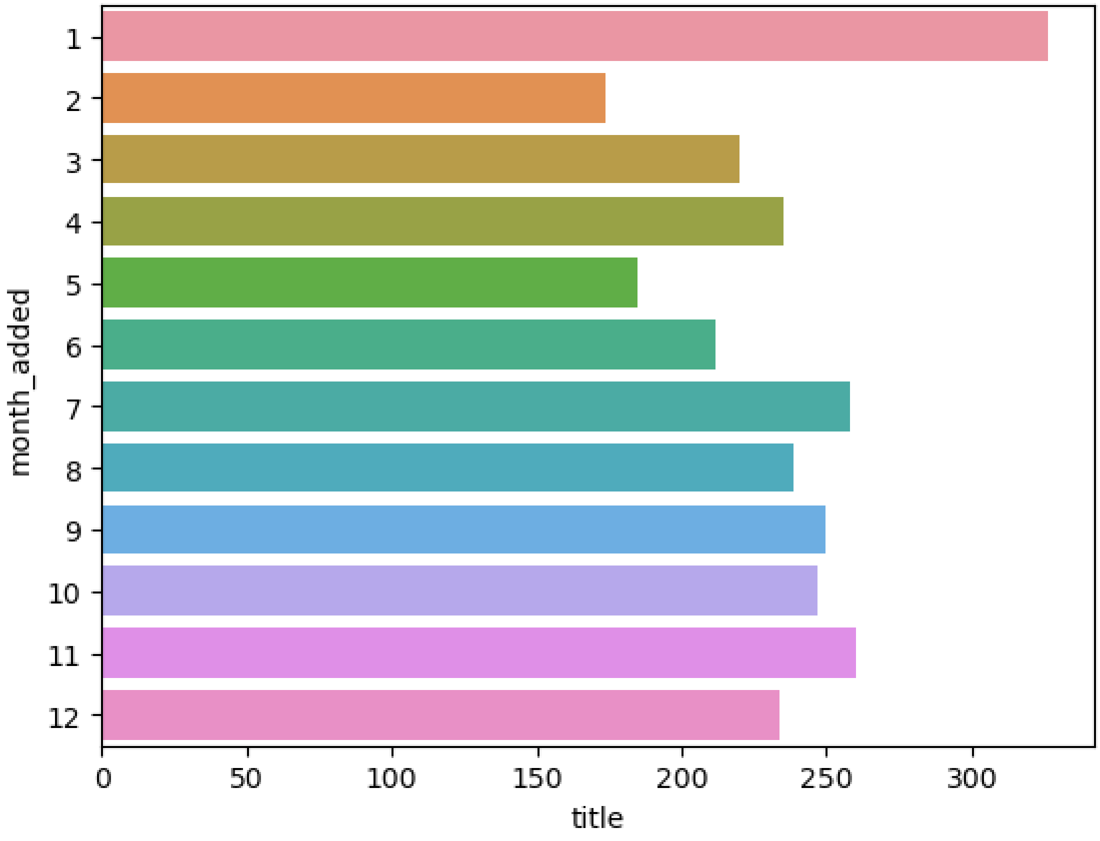
	month_added	title
0	1	326
10	11	260
6	7	258
8	9	250
9	10	247
7	8	239
3	4	235
11	12	234
2	3	220
5	6	212
4	5	185
1	2	174

In [89]:

```
sns.barplot(data=monthAdded,y='month_added',x='title',orient='h')
```

Out[89]:

```
<Axes: xlabel='title', ylabel='month_added'>
```



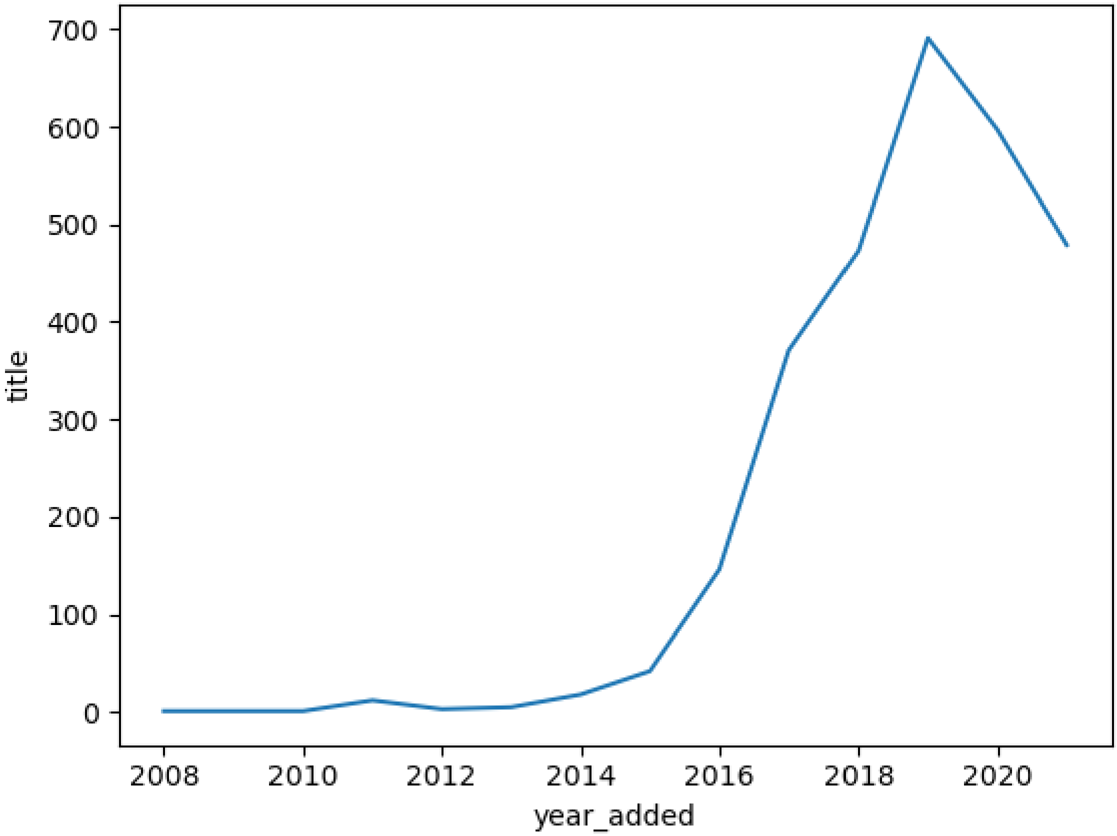
1. Most of the movies been in 1st month. but reletively netflix is adding movies evevry month, less comparetively to 1st month.

In [90]:

```
yearAdded = movies.loc[movies['country']=='United States'].groupby('year_added').a
sns.lineplot(data=yearAdded,x='year_added',y='title')
```

Out[90]:

```
<Axes: xlabel='year_added', ylabel='title'>
```



1. we could observe a much decrease in movies added in 2021

In [91]:

```
movies.head()
```

Out[91]:

	title	directors	cast	country	listed_in	show_id	type	date_added	release_y
0	Dick Johnson Is Dead	Kirsten Johnson	unknown cast	United States	Documentaries	s1	Movie	25	2
179	Sankofa	Haile Gerima	Kofi Ghanaba	United States	Dramas	s8	Movie	24	1
180	Sankofa	Haile Gerima	Kofi Ghanaba	United States	Independent Movies	s8	Movie	24	1
181	Sankofa	Haile Gerima	Kofi Ghanaba	United States	International Movies	s8	Movie	24	1
188	Sankofa	Haile Gerima	Kofi Ghanaba	United Kingdom	Dramas	s8	Movie	24	1

In [92]:

```
#Lets Observe for TV Shows in US:
tvshows.head()
```

Out[92]:

	title	directors	cast	country	listed_in	show_id	type	date_added	release_year
85	Jailbirds New Orleans	unknown directors	unknown cast	United States	Docuseries	s4	TV Show	24	2021
86	Jailbirds New Orleans	unknown directors	unknown cast	United States	Reality TV	s4	TV Show	24	2021
111	Midnight Mass	Mike Flanagan	Kate Siegel	United States	TV Dramas	s6	TV Show	24	2021
112	Midnight Mass	Mike Flanagan	Kate Siegel	United States	TV Horror	s6	TV Show	24	2021
113	Midnight Mass	Mike Flanagan	Kate Siegel	United States	TV Mysteries	s6	TV Show	24	2021

In [93]:

```
# popular directors for Tvshows in US:

poptvshowsDir = tvshows.loc[tvshows['country']=='United States'].groupby('director
poptvshowsDir
```

Out[93]:

	directors	title
91	unknown directors	1222
59	Ken Burns	3
54	Joe Berlinger	2
77	Rob Seidenglanz	2
81	Stan Lathan	2
...	...	...
28	Alex Gibney	1
27	Alejandro Lozano	1
26	Alastair Fothergill	1
25	Adrián García Bogliano	1
46	Iginio Straffi	1

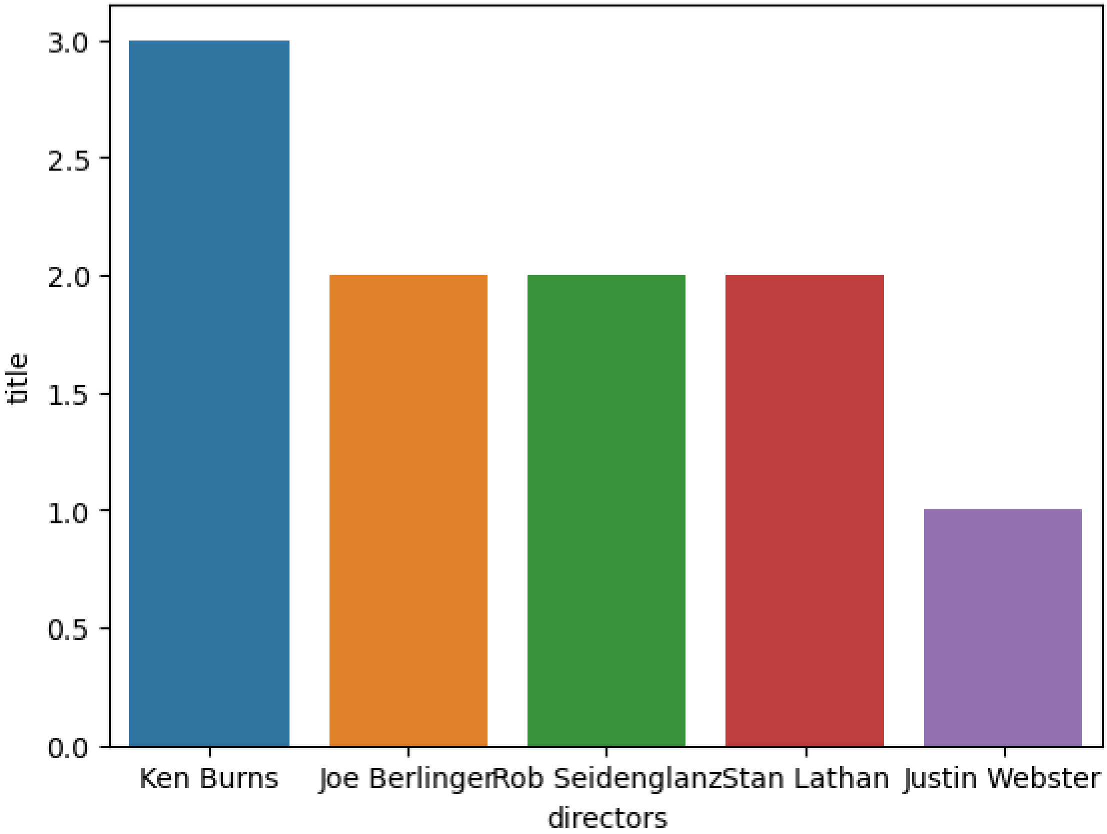
92 rows × 2 columns

In [94]:

```
sns.barplot(data=poptvshowsDir[1:6],x='directors',y='title')
```

Out[94]:

```
<Axes: xlabel='directors', ylabel='title'>
```



1. Ken Burns,Joe Berlinger, Rob Seidenglanz are the popular tvshow directors in US.

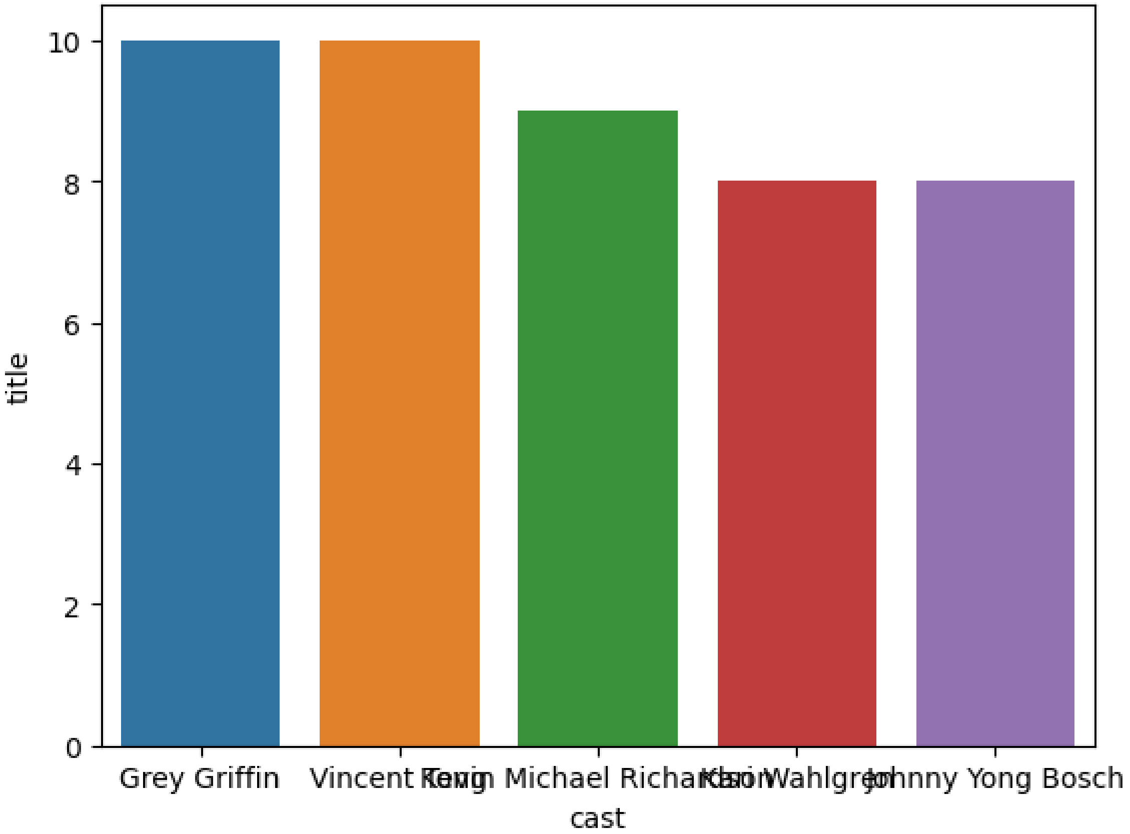
In [95]:

```
# popular cast for Tvshows in US:

poptvshowscast = tvshows.loc[tvshows['country']=='United States'].groupby('cast').
print(poptvshowscast)
sns.barplot(data=poptvshowscast[1:6],x='cast',y='title')
```

```
                          cast  title
6843              unknown cast    230
2304              Grey Griffin     10
6575              Vincent Tong     10
3574  Kevin Michael Richardson      9
3402             Kari Wahlgren      8
...                        ...    ...
2501         Hunter Reese Peña      1
2500            Hunter Parrish      1
2499      Hunter Page-Lochard       1
2497               Hunter Deno      1
6849             İlayda Akdoğan      1

[6850 rows x 2 columns]
```

Out[95]:

```
<Axes: xlabel='cast', ylabel='title'>
```



1. Grey Griffin,Vincent Tong,Kevin Michael Richardson,Kari Wahlgren are the popular cast/actors for TVhsows in US.

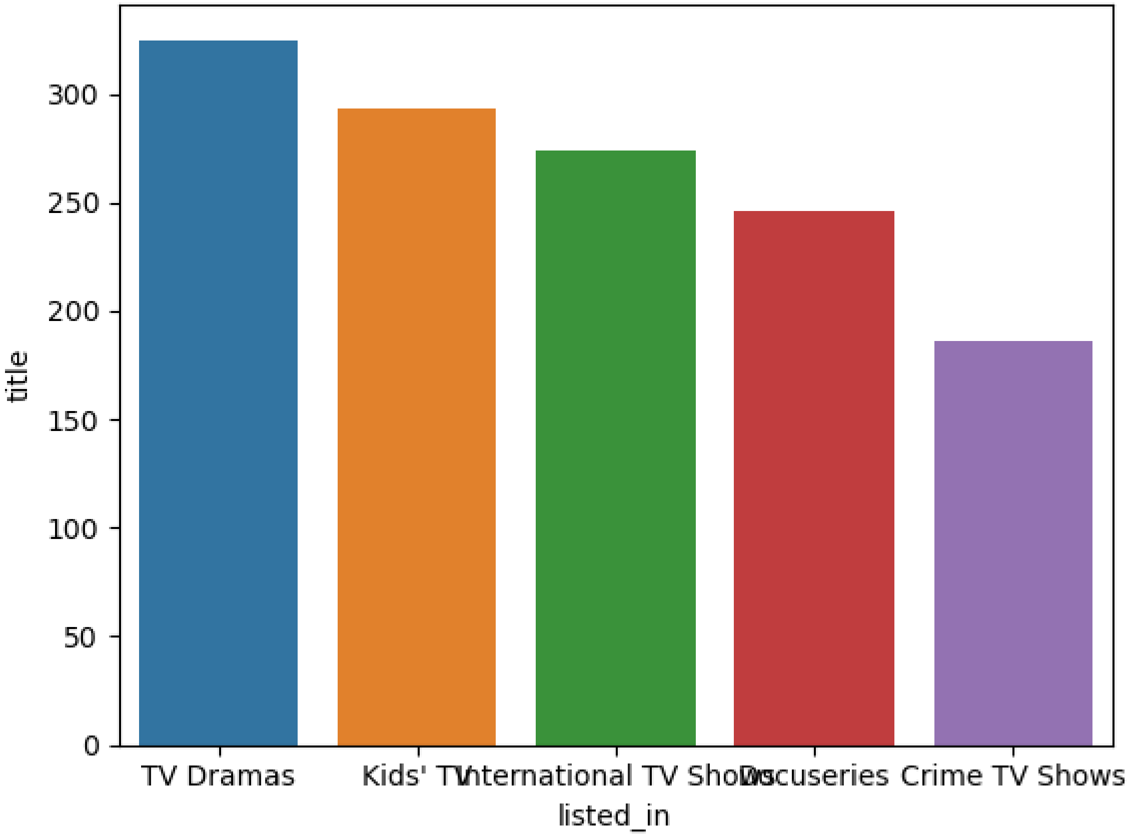
In [96]:

```
# 5 popular genre for Tvshows in US:

poptvshowsgenre = tvshows.loc[tvshows['country']=='United States'].groupby('listed
print(poptvshowsgenre)
sns.barplot(data=poptvshowsgenre[1:6],x='listed_in',y='title')
```

```
                      listed_in  title
14                  TV Comedies    328
15                    TV Dramas    325
6                      Kids' TV    293
5        International TV Shows    274
4                   Docuseries    246
3               Crime TV Shows    186
8                   Reality TV    173
9            Romantic TV Shows    108
13         TV Action & Adventure   106
18            TV Sci-Fi & Fantasy   64
10          Science & Nature TV     57
17                TV Mysteries      56
11     Spanish-Language TV Shows    54
12  Stand-Up Comedy & Talk Shows    41
16                    TV Horror     39
0                 Anime Series      39
1             British TV Shows      38
21               Teen TV Shows      36
20                TV Thrillers      31
7              Korean TV Shows      18
2            Classic & Cult TV      17
19                     TV Shows      9
```

Out[96]:

```
<Axes: xlabel='listed_in', ylabel='title'>
```



1. Popular Tvshow genre people watch in US are TV Dramas, Kids TV, International TV shows etc

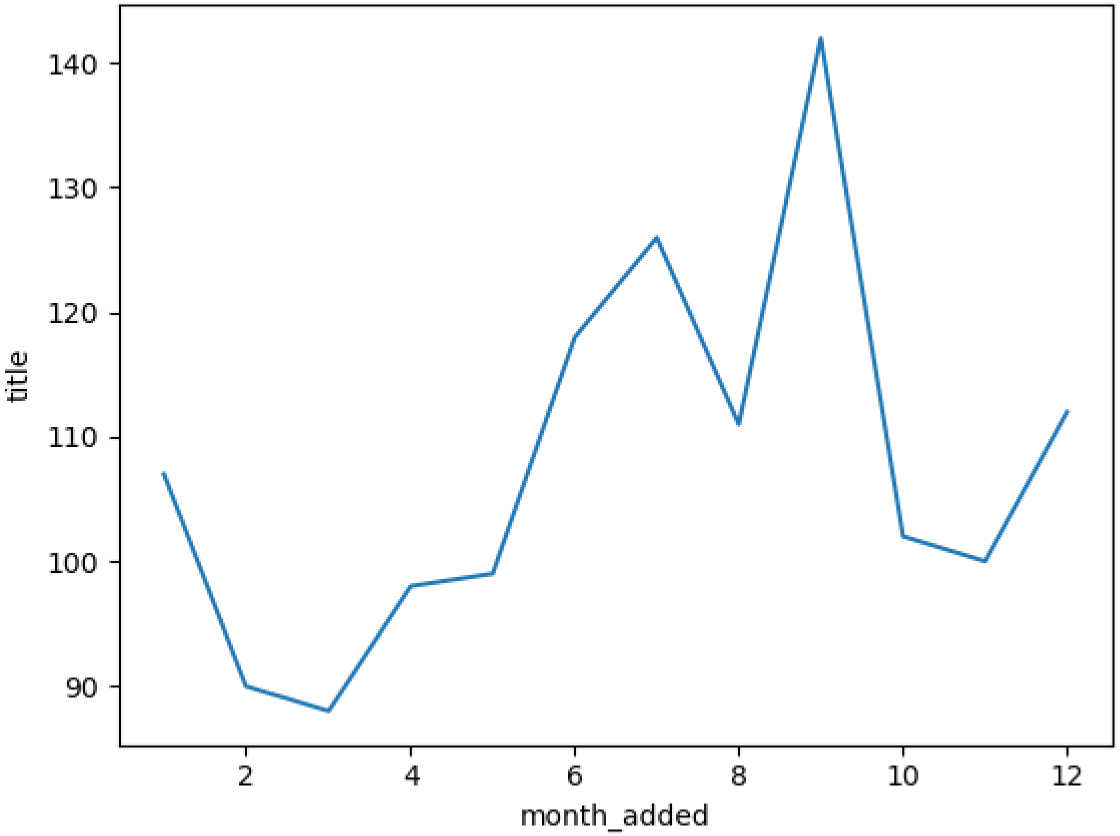
In [97]:

```
# what month is popular for Tvshows added in US:

poptvshowsmonthadded = tvshows.loc[tvshows['country']=='United States'].groupby('m
print(poptvshowsmonthadded)
sns.lineplot(data=poptvshowsmonthadded,x='month_added',y='title')
```

```
    month_added  title
8             9    142
6             7    126
5             6    118
11           12    112
7             8    111
0             1    107
9            10    102
10           11    100
4             5     99
3             4     98
1             2     90
2             3     88
```

Out[97]:

```
<Axes: xlabel='month_added', ylabel='title'>
```



1. more tvshows been added to netflix in the month of sept,july

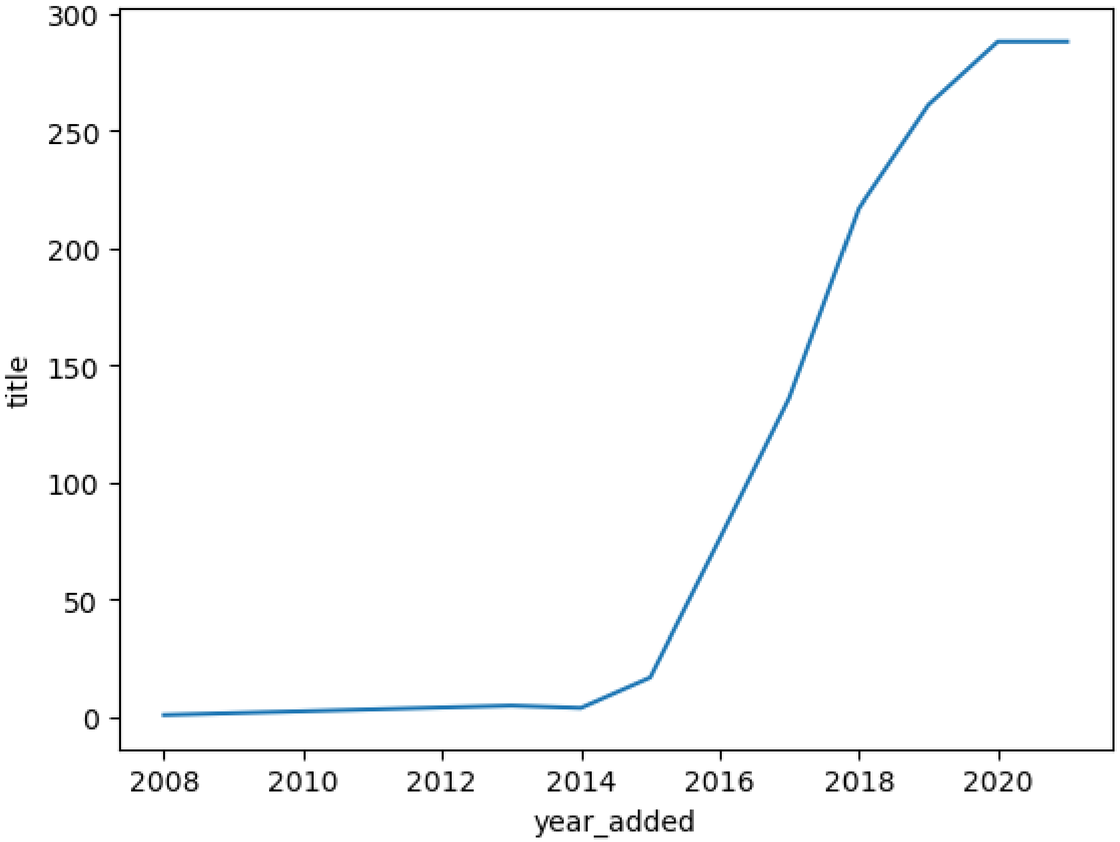
In [98]:

```
# what year is popular for Tvshows added in US:

poptvshowsyearadded = tvshows.loc[tvshows['country']=='United States'].groupby('ye
print(poptvshowsyearadded)
sns.lineplot(data=poptvshowsyearadded,x='year_added',y='title')
```

```
   year_added  title
8        2020    288
9        2021    288
7        2019    261
6        2018    217
5        2017    136
4        2016     76
3        2015     17
1        2013      5
2        2014      4
0        2008      1
```

Out[98]:

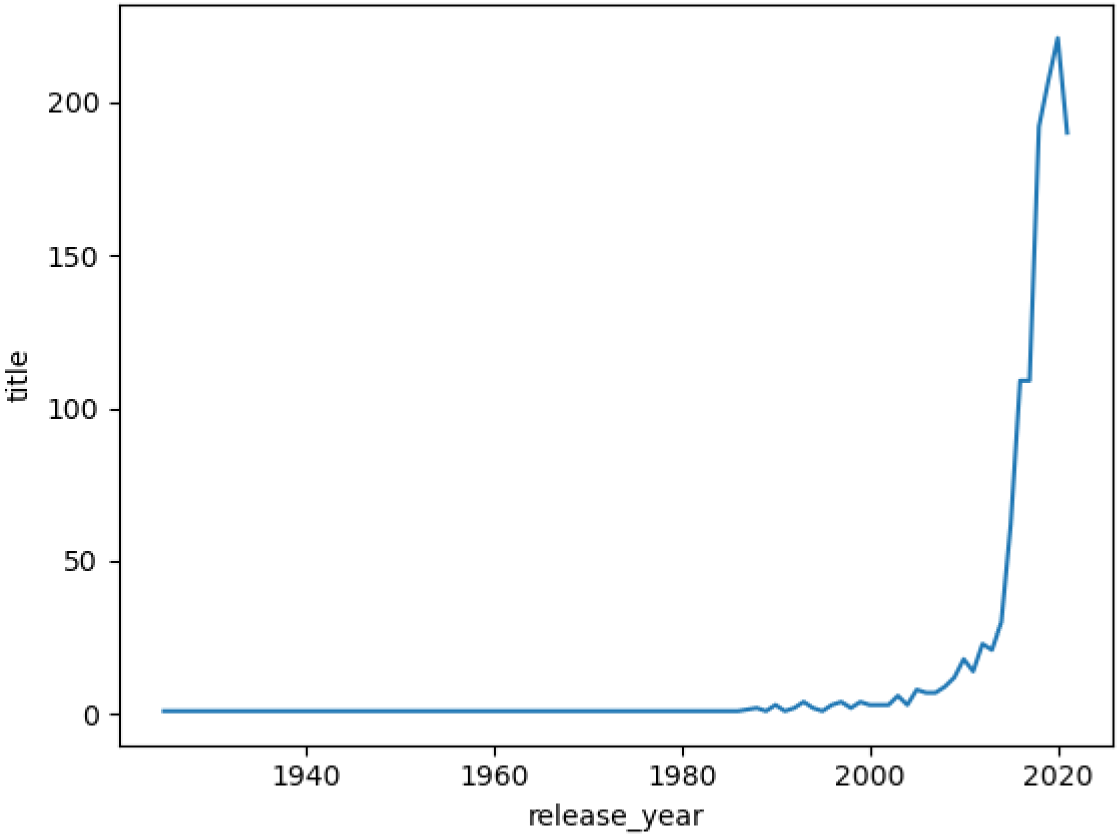
```
<Axes: xlabel='year_added', ylabel='title'>
```



1. We could see Tvhows added to netflix has good shape

In [99]:
```
# what year is popular for Tvshows added in US:

poptvshowsrelease_year = tvshows.loc[tvshows['country']=='United States'].groupby(
sns.lineplot(data=poptvshowsrelease_year,x='release_year',y='title')
```

Out[99]:
```
<Axes: xlabel='release_year', ylabel='title'>
```



1. less number of tvshows been added in 2021, comparetively <2020.

In [100…

```
# till now we extracted insights of Movies/TV shows of US. Now lets do analysis fo
```

In [101…

```
indianMovies = df_final_copy.loc[(df_final_copy['country']=='India') & (df_final_c
indianShows = df_final_copy.loc[(df_final_copy['country']=='India') & (df_final_cc
```

In [102…

```
indianMovies.head()
```

Out[102]:

	title	directors	cast	country	listed_in	show_id	type	date_added	release_year
641	Jeans	S. Shankar	Prashanth	India	Comedies	s25	Movie	21	1998
642	Jeans	S. Shankar	Prashanth	India	International Movies	s25	Movie	21	1998
643	Jeans	S. Shankar	Prashanth	India	Romantic Movies	s25	Movie	21	1998
644	Jeans	S. Shankar	Aishwarya Rai Bachchan	India	Comedies	s25	Movie	21	1998
645	Jeans	S. Shankar	Aishwarya Rai Bachchan	India	International Movies	s25	Movie	21	1998

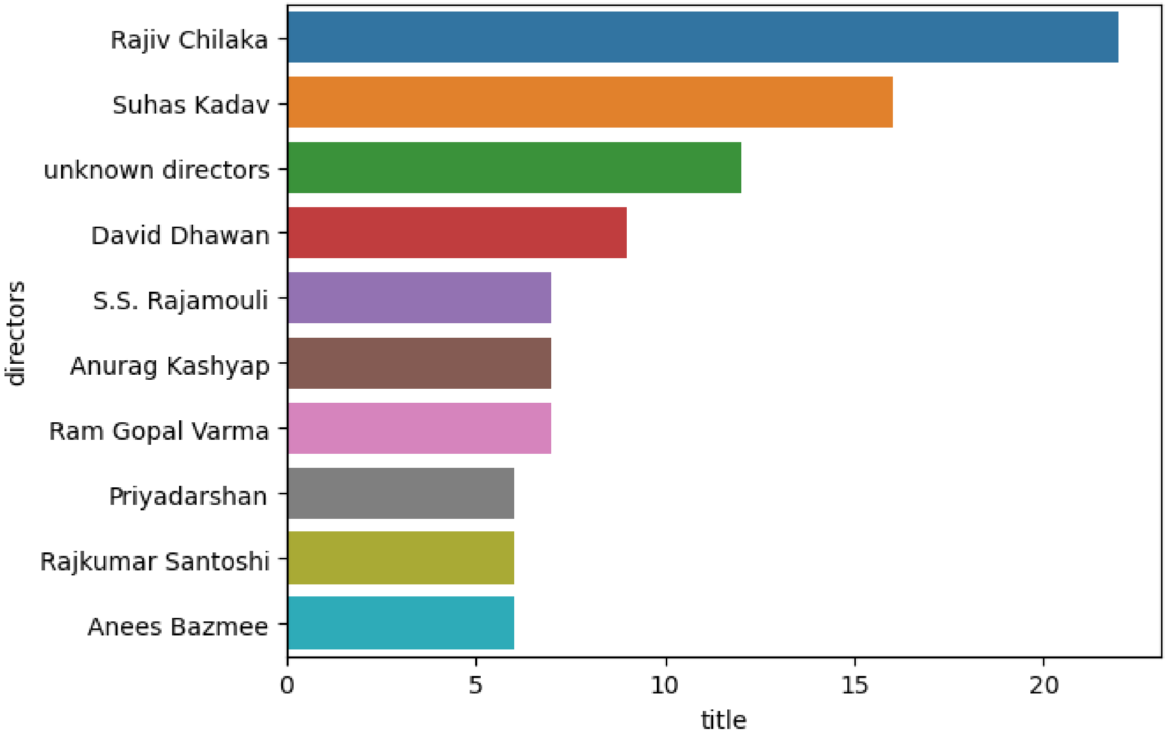
In [103…

```
# check for popular directors in India:
```

```
popIndDir = indianMovies.groupby('directors').agg({'title':'nunique'}).reset_inde
sns.barplot(data=popIndDir[:10],x='title',y='directors')
```

Out[103]:

```
<Axes: xlabel='title', ylabel='directors'>
```



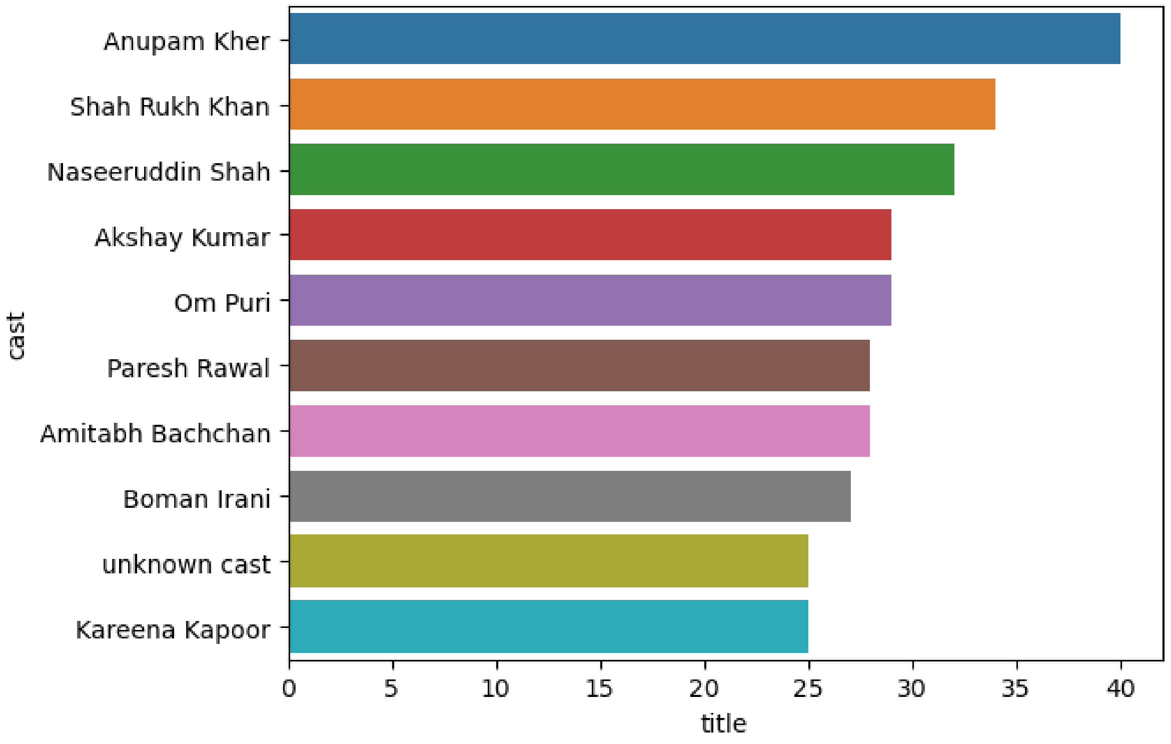
1. Popular directror in India are Rajiv Chilaka, Suhas Kadav, David Dhawan, S.S. Rajamouli, Anurah Kashyap

In [104…

```
# check for popular actor in India
popIndActors = indianMovies.groupby('cast').agg({'title':'nunique'}).reset_index(
sns.barplot(data=popIndActors[:10],x='title',y='cast')
```

Out[104]:

```
<Axes: xlabel='title', ylabel='cast'>
```



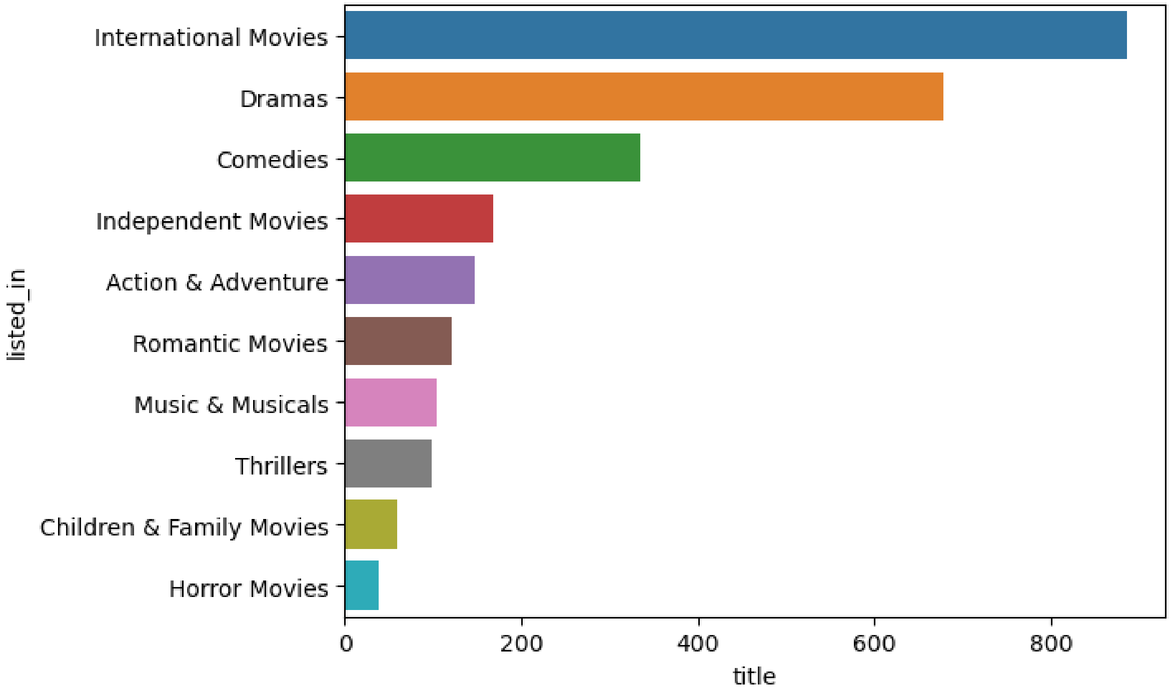
1. Popular director in india are Anupam Kher, Shah Rukh Khan, Naseeruddin Shah, Akshay Kumar

In [105…

```
# check for popular genre in India
popIndGenre = indianMovies.groupby('listed_in').agg({'title':'nunique'}).reset_ind
sns.barplot(data=popIndGenre[:10],x='title',y='listed_in')
```

Out[105]:

```
<Axes: xlabel='title', ylabel='listed_in'>
```



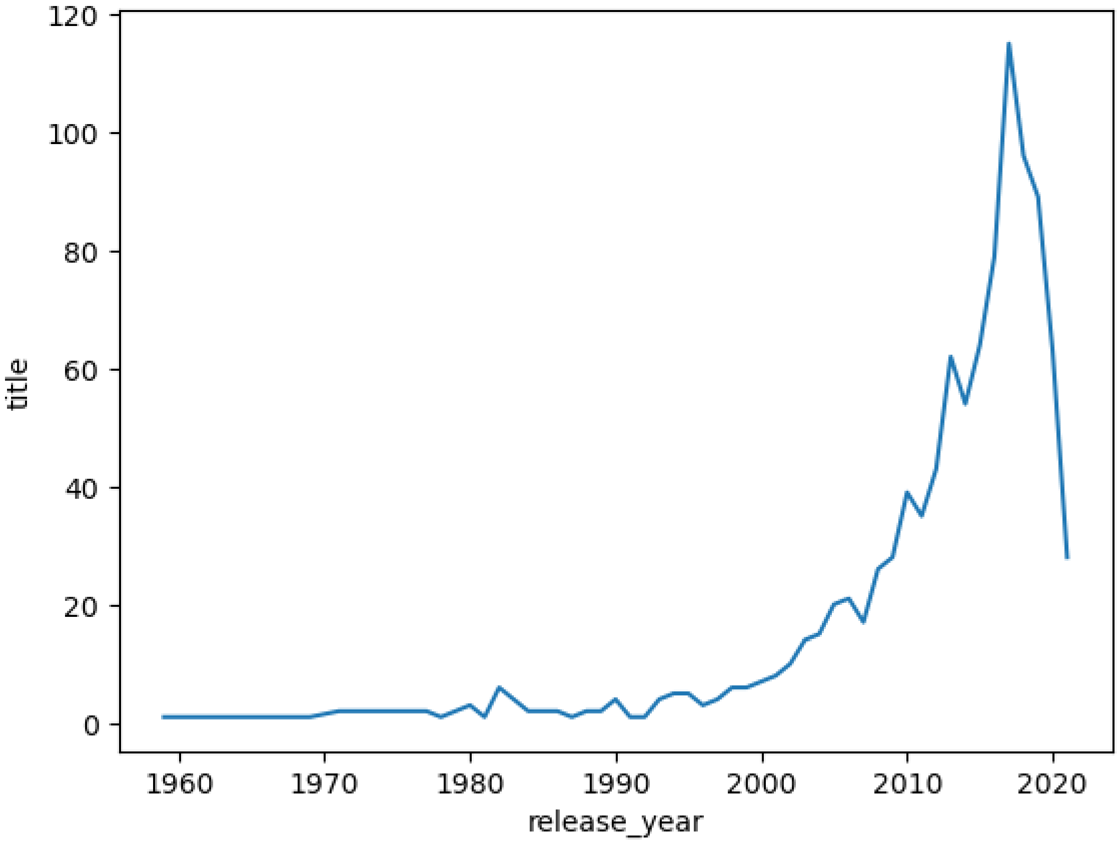
1. Popular genre in Indian Movies are International Movies, Dramas, Comedies, Independant Movies, Action & Adventure.

In [106…

```
# release Year
popInd = indianMovies.groupby('release_year').agg({'title':'nunique'}).reset_index
sns.lineplot(data=popInd,x='release_year',y='title')
```

Out[106]:

```
<Axes: xlabel='release_year', ylabel='title'>
```



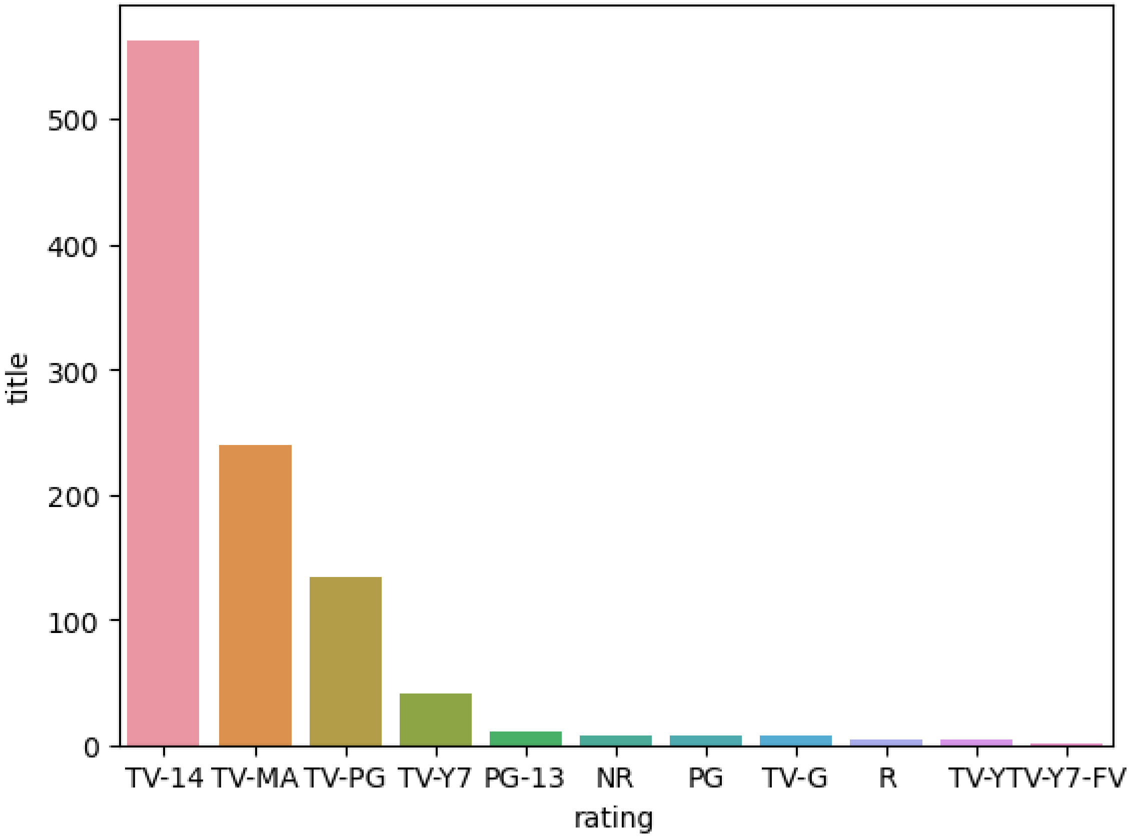
1. Due course of time movies released till 2010 added increasingly, we could see a dip from 2018 to 2021

In [107…

```
# Popular Ratigs in India
popIndRatings = indianMovies.groupby('rating').agg({'title':'nunique'}).reset_inde
sns.barplot(data=popIndRatings,x='rating',y='title')
```

Out[107]:

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



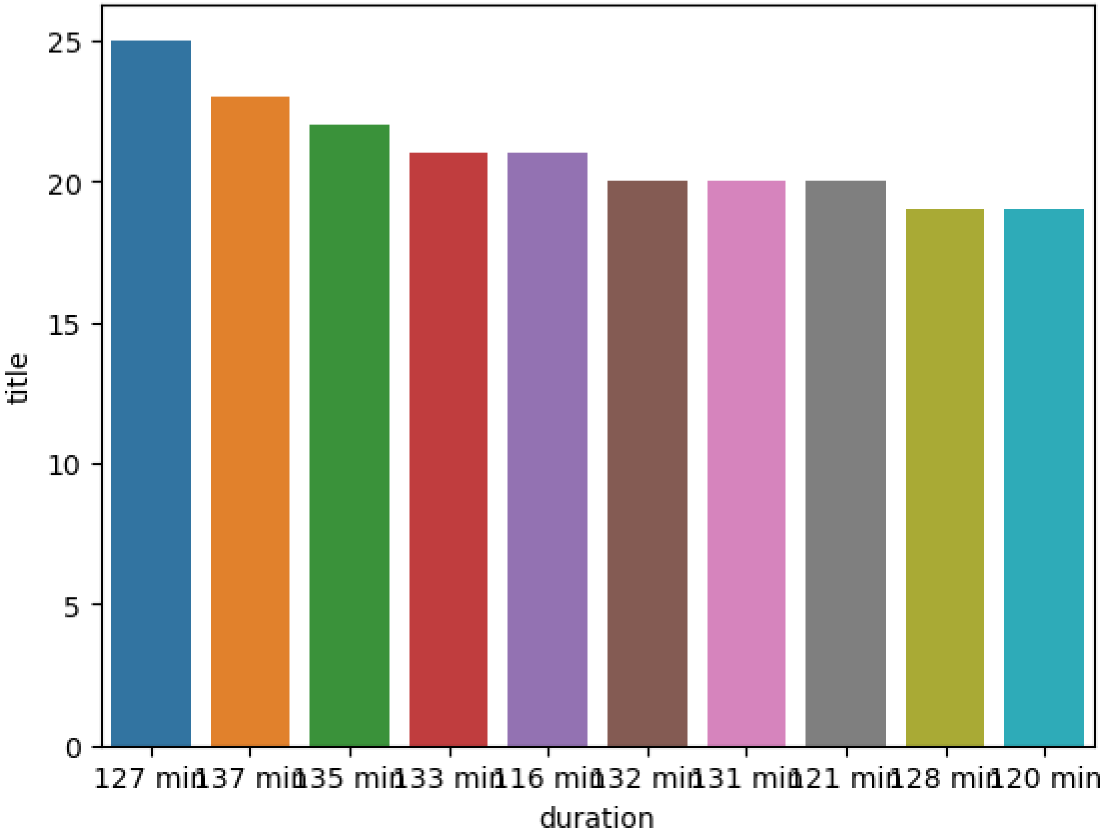
1. Popular ratings in india are TV-14, TV-MA, TV-PG

In [108…

```python
# Check for popular movie time generally people watch in INdia:
popIndDuation = indianMovies.groupby('duration').agg({'title':'nunique'}).reset_ir
sns.barplot(data=popIndDuation[:10],x='duration',y='title')
```

Out[108]:

```
<Axes: xlabel='duration', ylabel='title'>
```



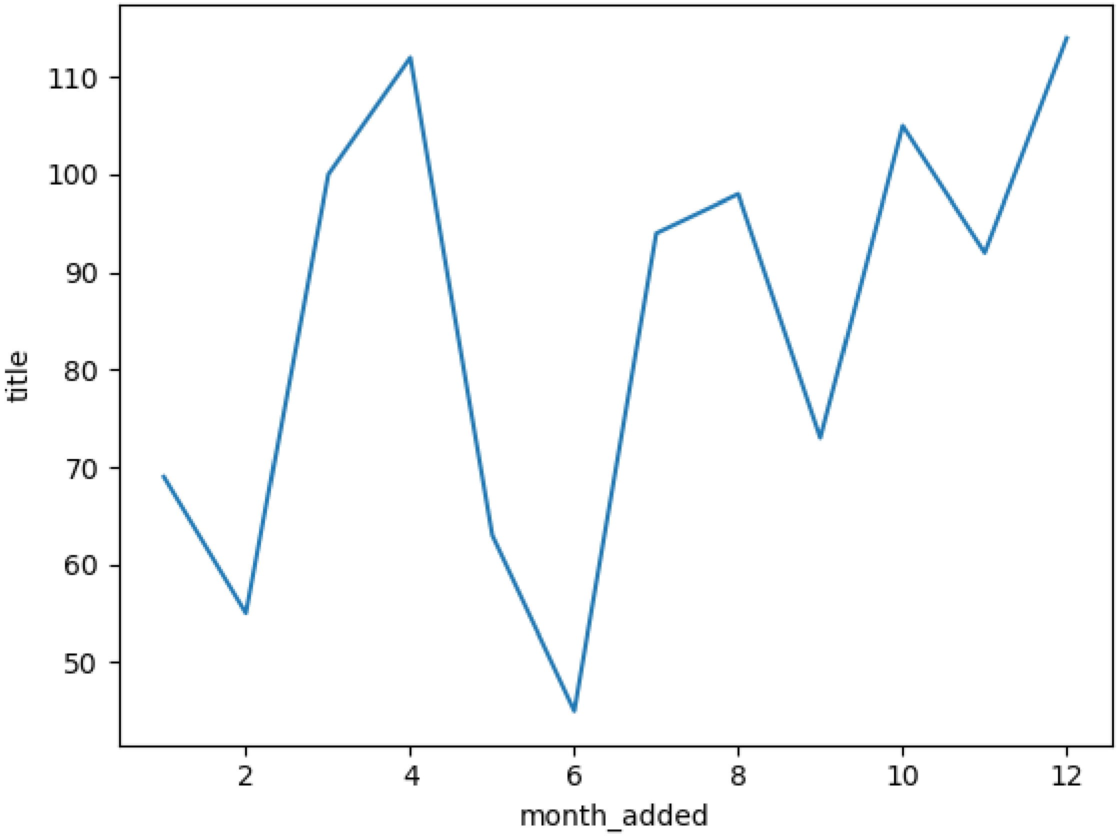
1. The watch time of indian movies are 127mins, 137mins, 135 mins etc.

In [109…

```
# check for month in which more indian movies been added to platform
popIndMonth =  indianMovies.groupby('month_added').agg({'title':'nunique'}).reset_
sns.lineplot(data=popIndMonth,x='month_added',y='title')
```

Out[109]:

```
<Axes: xlabel='month_added', ylabel='title'>
```



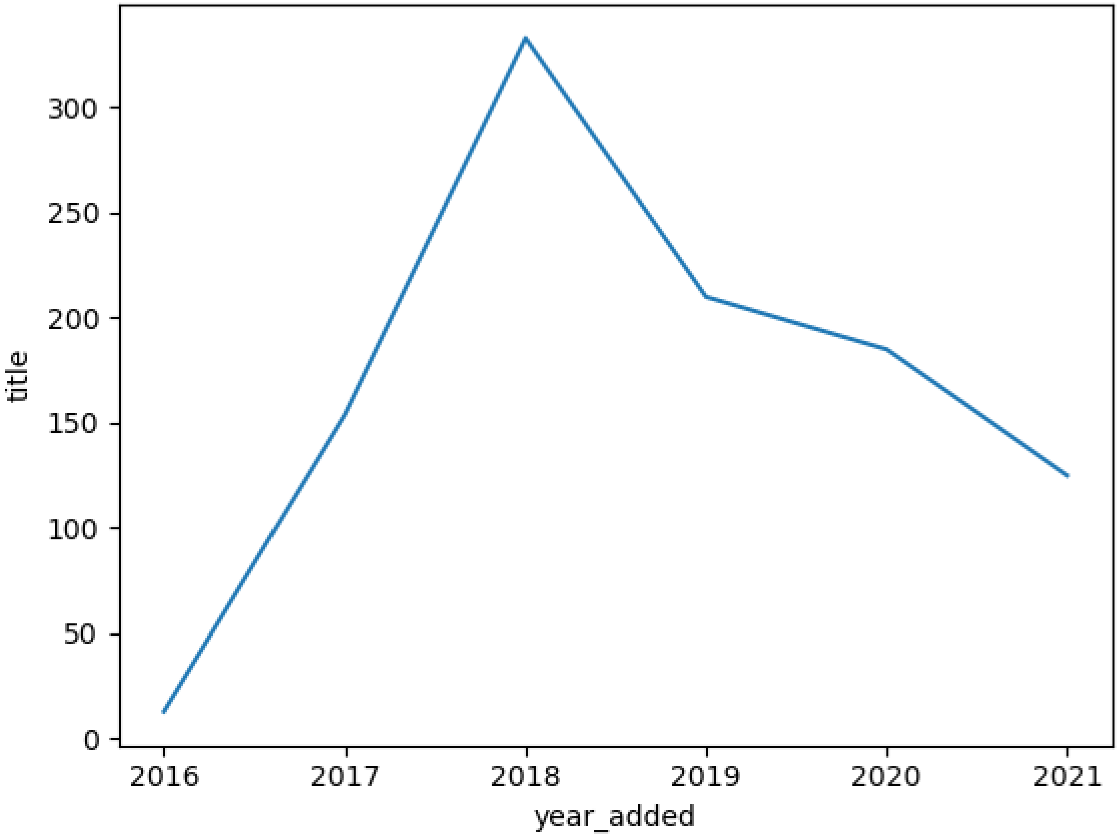
1. More movies added to platfrom in the month of April and towards the year end.

In [110…

```
# check for year in which more indian movies been added to platform
popIndYear =  indianMovies.groupby('year_added').agg({'title':'nunique'}).reset_ir
sns.lineplot(data=popIndYear,x='year_added',y='title')
```

Out[110]:

```
<Axes: xlabel='year_added', ylabel='title'>
```



1. Movies added to platform gradually increased till 2018 and could see a dip after 2018.

In [111…

```
# lets explore & analyse indian Tv shows
indianShows.head()
```

Out[111]:

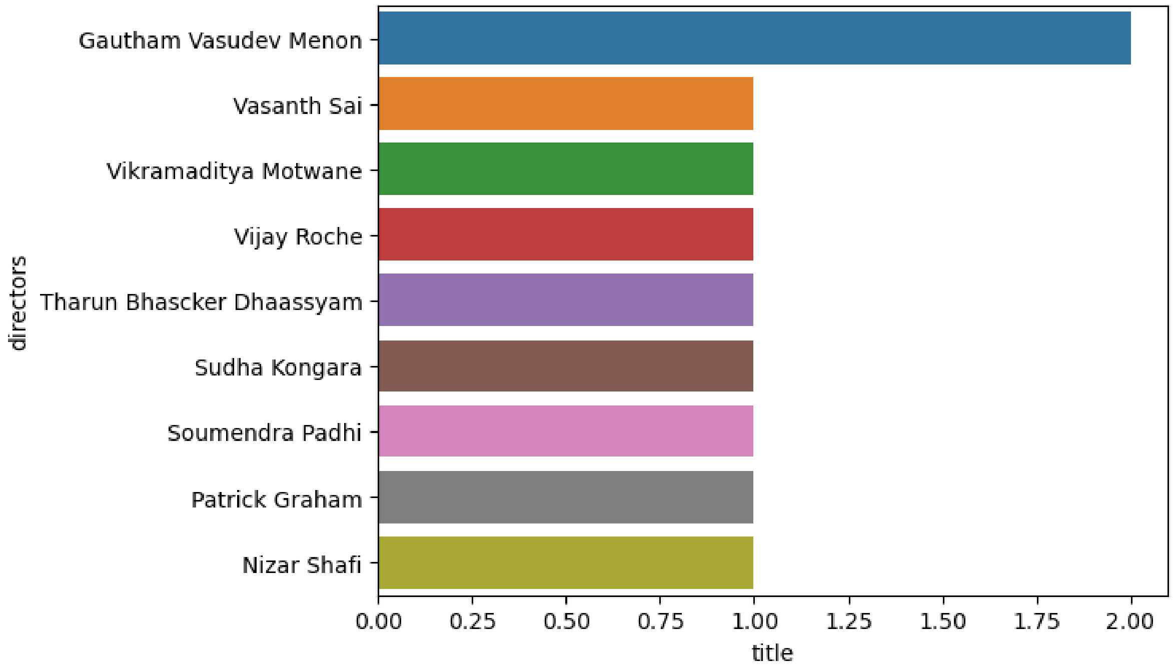
	title	directors	cast	country	listed_in	show_id	type	date_added	release_year	ra
87	Kota Factory	unknown directors	Mayur More	India	International TV Shows	s5	TV Show	24	2021	
88	Kota Factory	unknown directors	Mayur More	India	Romantic TV Shows	s5	TV Show	24	2021	
89	Kota Factory	unknown directors	Mayur More	India	TV Comedies	s5	TV Show	24	2021	
90	Kota Factory	unknown directors	Jitendra Kumar	India	International TV Shows	s5	TV Show	24	2021	
91	Kota Factory	unknown directors	Jitendra Kumar	India	Romantic TV Shows	s5	TV Show	24	2021	

In [112…

```
# Popular Tv show directors in India
popShowDir = indianShows.groupby('directors').agg({'title':'nunique'}).reset_index
sns.barplot(data=popShowDir[1:10],y='directors',x='title',orient='h')
```

Out[112]:

```
<Axes: xlabel='title', ylabel='directors'>
```



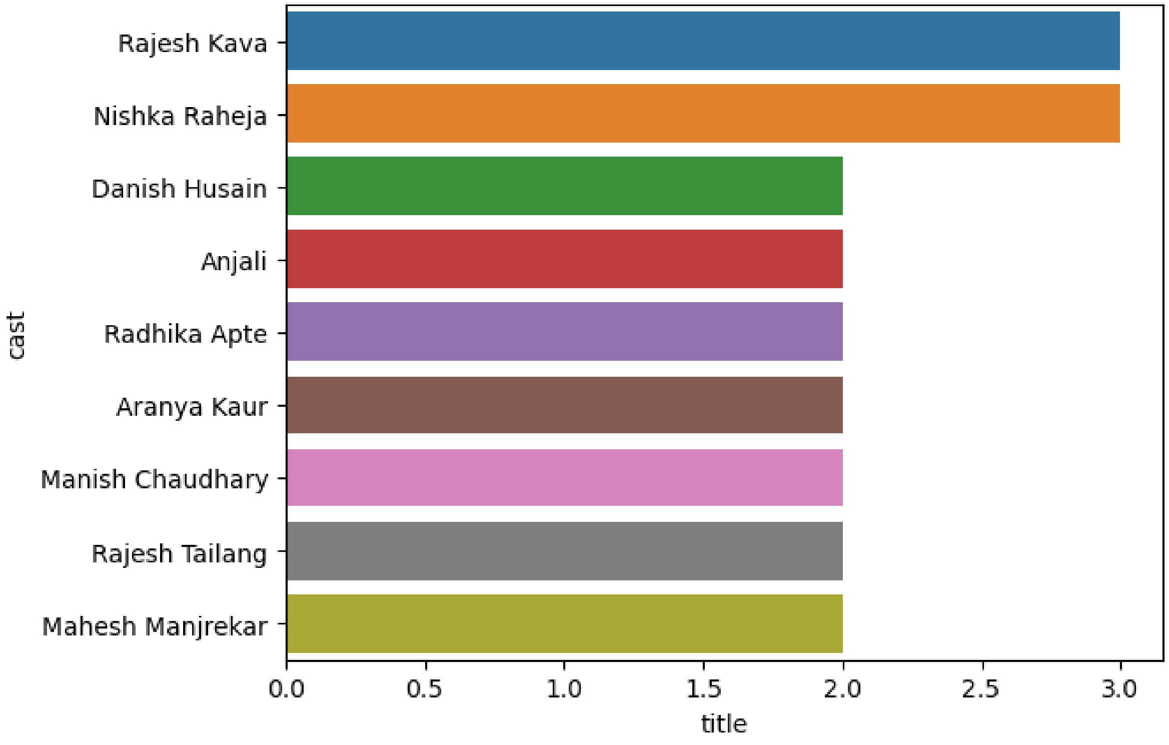
1. Popular Tv Shows director in India are Gautham Vasudev Menon, Vasanth Sai, Vikramaditya Motwane, Vijay Roche, Tharun Bhascker Dhaassyam

In [113…

```
# Popular Tv show actors in India
popShowActor = indianShows.groupby('cast').agg({'title':'nunique'}).reset_index().
sns.barplot(data=popShowActor[1:10],y='cast',x='title',orient='h')
```

Out[113]:

```
<Axes: xlabel='title', ylabel='cast'>
```



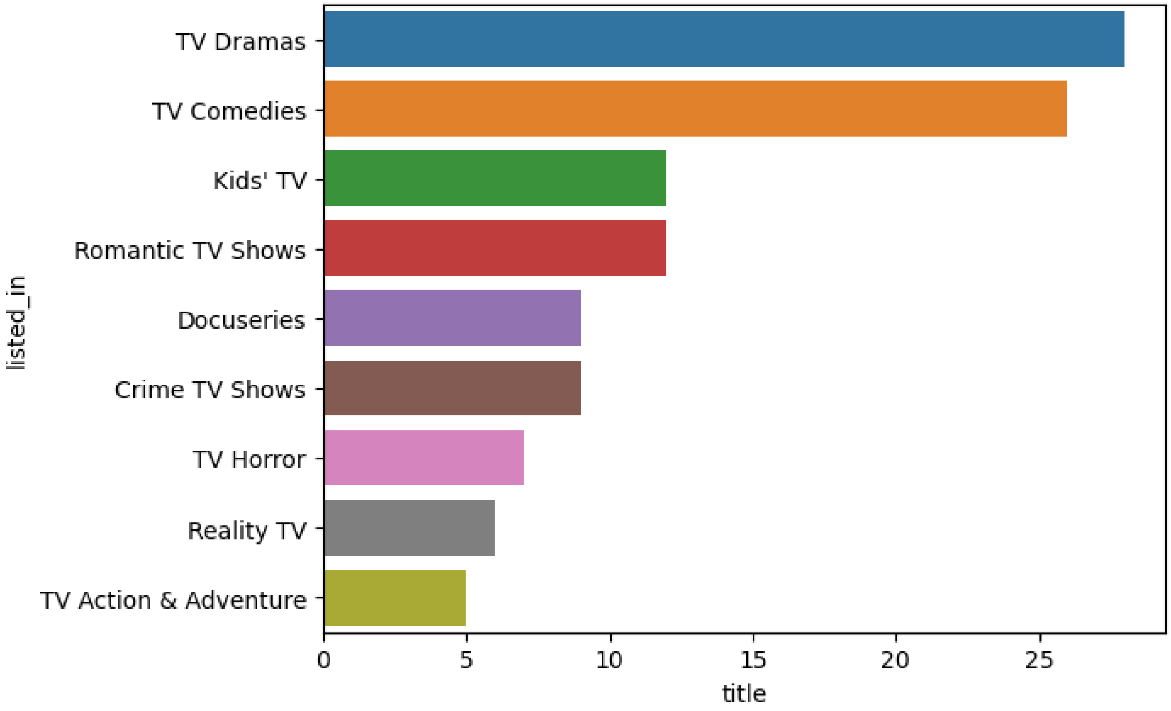
1.popular Tvshow actors are Rajesh Kava, nishka Raheja,danish Husain, Anjali

In [114…

```
# Popular Tv show genre India
popShowGenre = indianShows.groupby('listed_in').agg({'title':'nunique'}).reset_ind
sns.barplot(data=popShowGenre[1:10],y='listed_in',x='title',orient='h')
```

Out[114]:

```
<Axes: xlabel='title', ylabel='listed_in'>
```



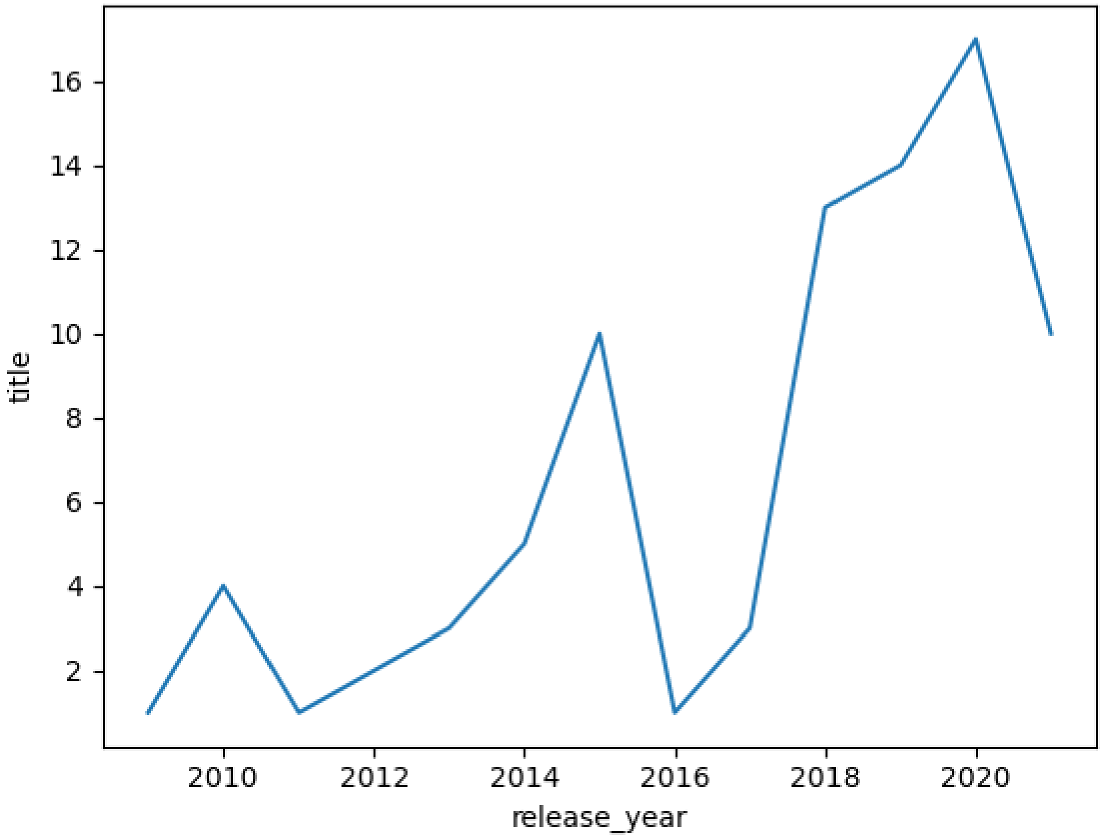
1. Popular tv show genre are Tv Dramas, Tv Comedies, Kids TV. Romantic TV shows etc

In [115…

```
# check for release years for tv shows in india.
popInd = indianShows.groupby('release_year').agg({'title':'nunique'}).reset_index(
sns.lineplot(data=popInd,x='release_year',y='title')
```

Out[115]:

```
<Axes: xlabel='release_year', ylabel='title'>
```



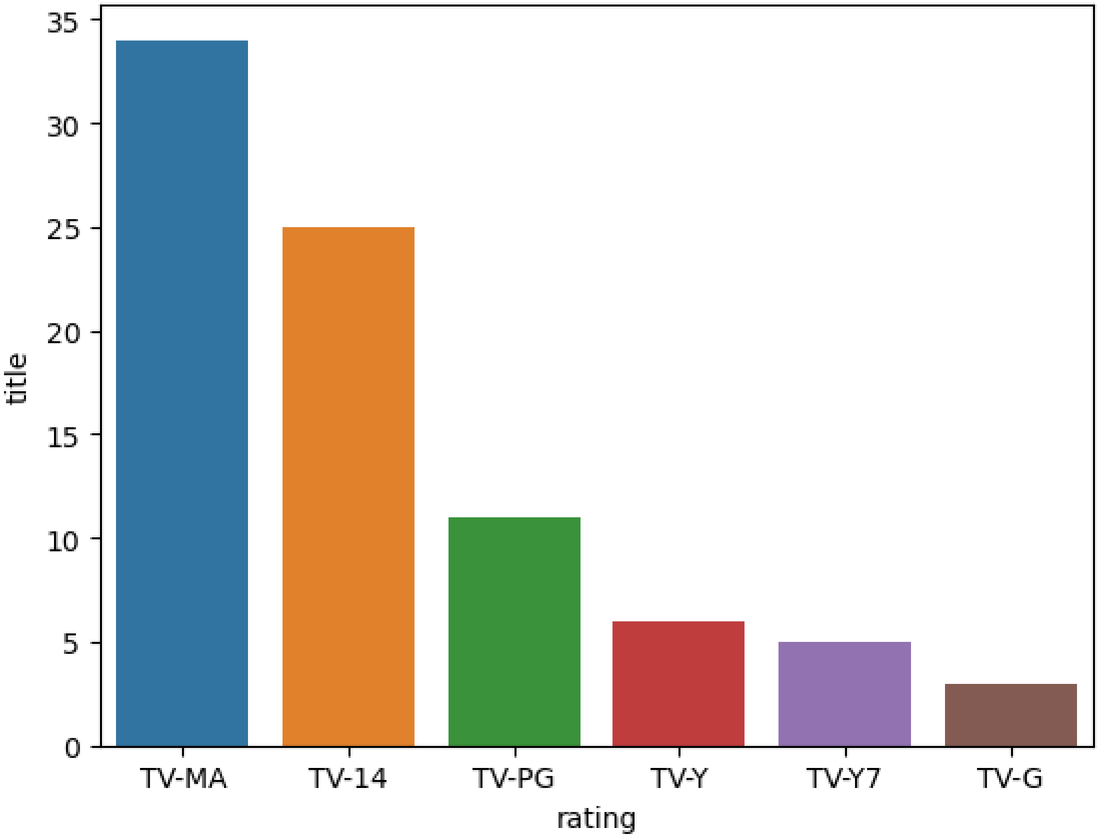
1. more Tv show released in year 2019 and decreased till 2021

In [116…

```
# Popular Ratigs in India
popIndRatings = indianShows.groupby('rating').agg({'title':'nunique'}).reset_inde
sns.barplot(data=popIndRatings,x='rating',y='title')
```

Out[116]:

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



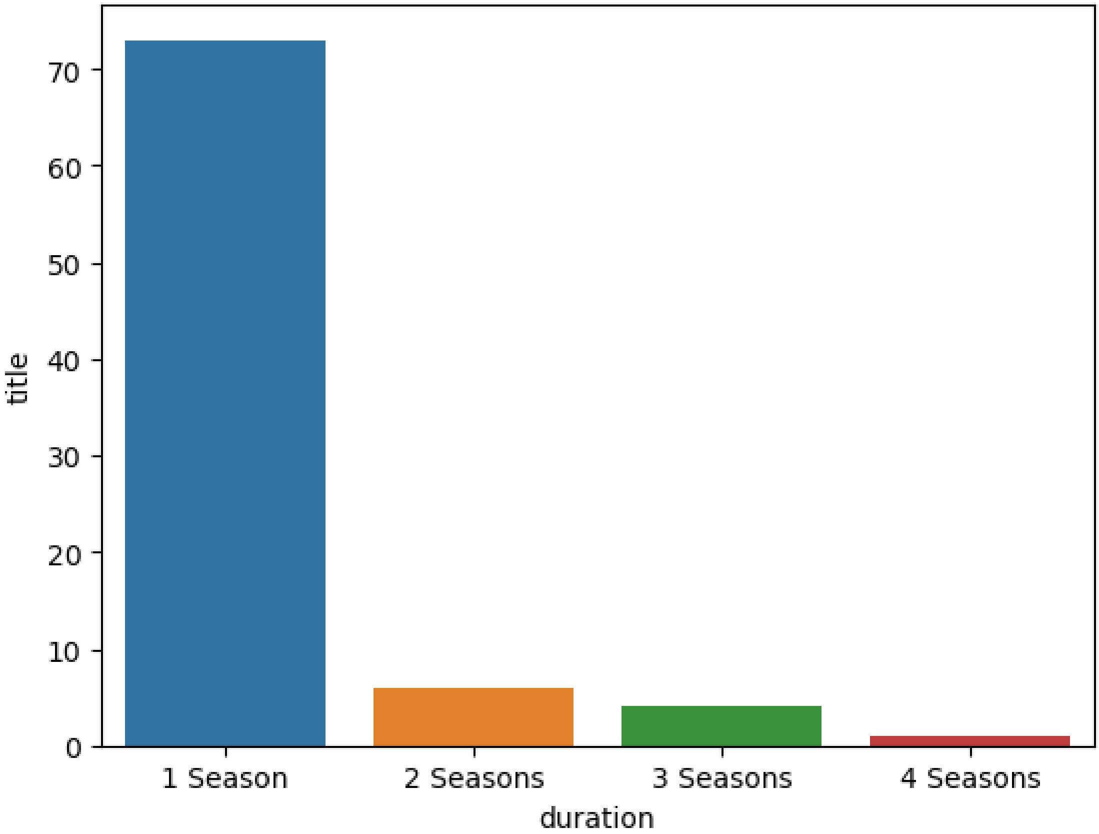
1. Popular Tv SHow ratings in india are TV-MA, Tv-14, TV-PG, TV-Y etc

In [117…

```
# Check for popular movie time generally people watch in INdia:
popIndDuation = indianShows.groupby('duration').agg({'title':'nunique'}).reset_ind
sns.barplot(data=popIndDuation[:10],x='duration',y='title')
```

Out[117]:

```
<Axes: xlabel='duration', ylabel='title'>
```



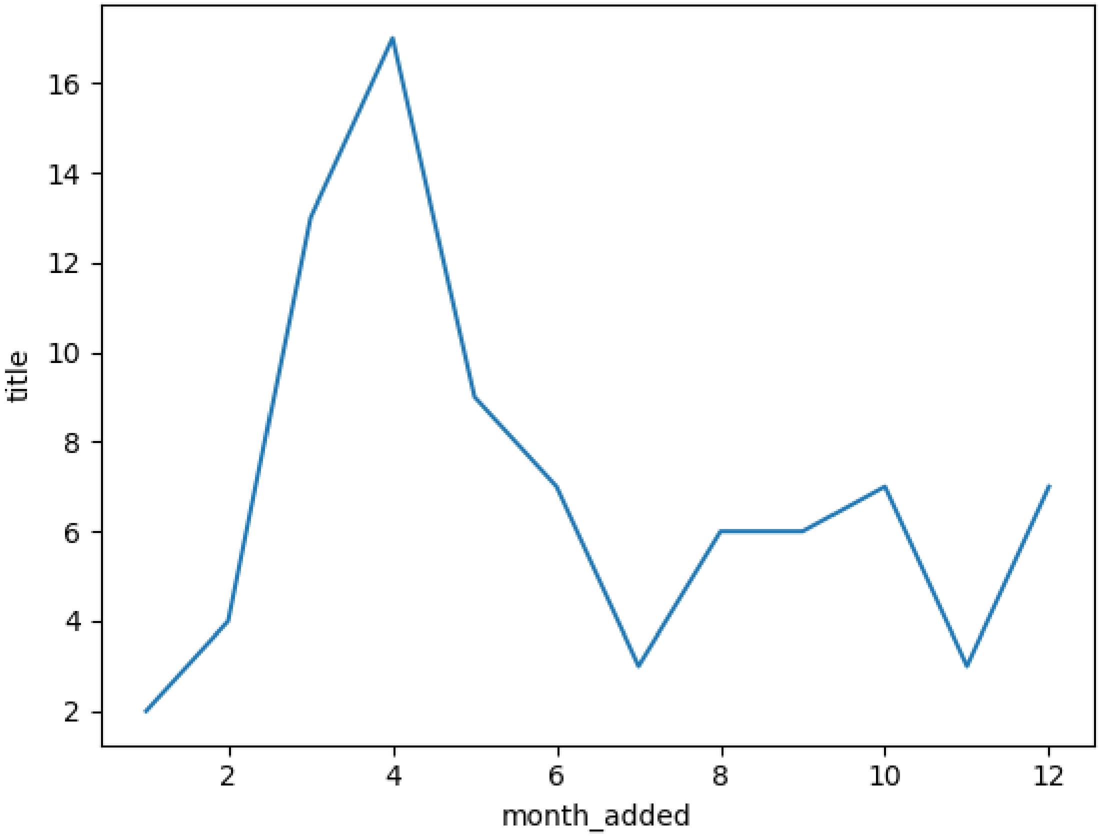
1. Generally people india whatch tv shows of 1season

In [118…

```
# check for month in which more indian movies been added to platform
popIndMonth =  indianShows.groupby('month_added').agg({'title':'nunique'}).reset_i
sns.lineplot(data=popIndMonth,x='month_added',y='title')
```

Out[118]:

```
<Axes: xlabel='month_added', ylabel='title'>
```



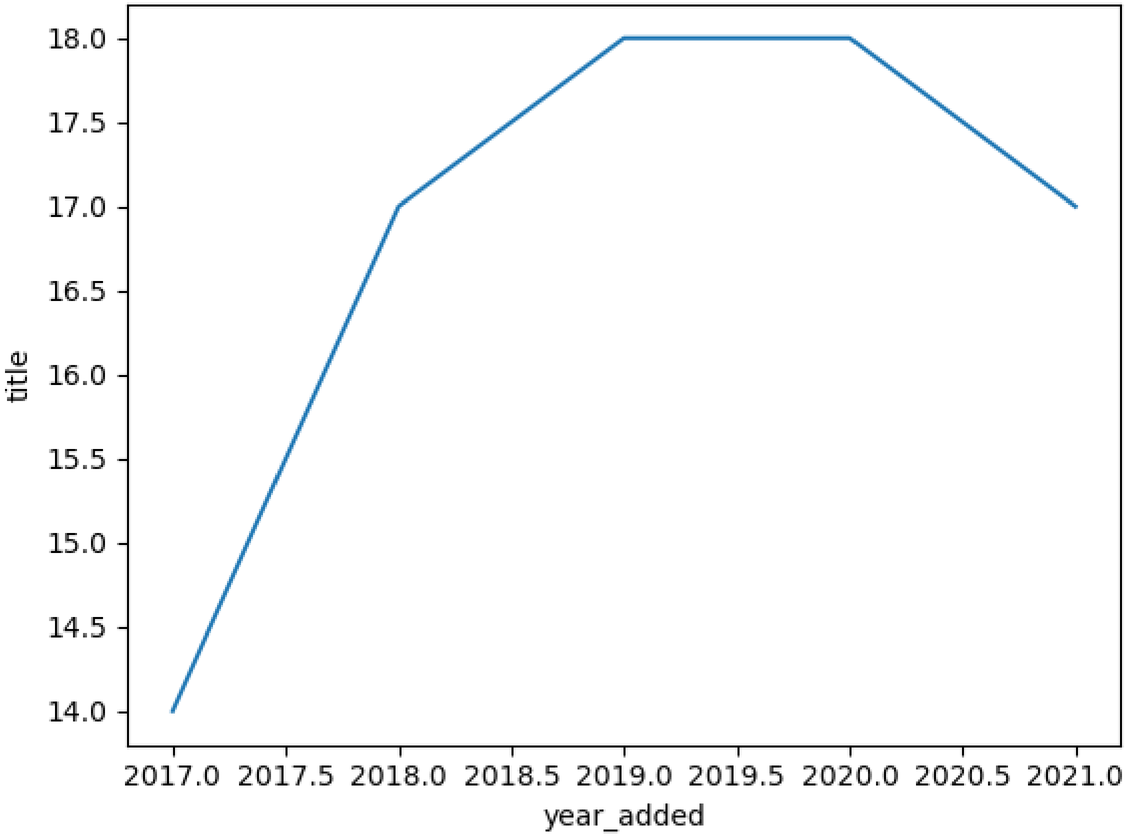
1. MOre tv shows been added to platform in the month of April.

In [119…

```
# check for year in which more indian movies been added to platform
popIndYear =  indianShows.groupby('year_added').agg({'title':'nunique'}).reset_inc
sns.lineplot(data=popIndYear,x='year_added',y='title')
```

Out[119]:

```
<Axes: xlabel='year_added', ylabel='title'>
```



1. could see a decreased trend in adding Tv shows after 2020.

Will explore MOvies/TVshows trends from United Kingdom:

In [120…

```
df_final_copy.head()
```

Out[120]:

	title	directors	cast	country	listed_in	show_id	type	date_added	release_yea
0	Dick Johnson Is Dead	Kirsten Johnson	unknown cast	United States	Documentaries	s1	Movie	25	202
1	Blood & Water	unknown directors	Ama Qamata	South Africa	International TV Shows	s2	TV Show	24	202
2	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Dramas	s2	TV Show	24	202
3	Blood & Water	unknown directors	Ama Qamata	South Africa	TV Mysteries	s2	TV Show	24	202
4	Blood & Water	unknown directors	Khosi Ngema	South Africa	International TV Shows	s2	TV Show	24	202

In [121…

```
ukmovies = df_final_copy.loc[(df_final_copy['country']=='United Kingdom') & (df_fi
ukshows = df_final_copy.loc[(df_final_copy['country']=='United Kingdom') & (df_fir
ukmovies
```

Out[121]:

	title	directors	cast	country	listed_in	show_id	type	date_added	relea
188	Sankofa	Haile Gerima	Kofi Ghanaba	United Kingdom	Dramas	s8	Movie	24	
189	Sankofa	Haile Gerima	Kofi Ghanaba	United Kingdom	Independent Movies	s8	Movie	24	
190	Sankofa	Haile Gerima	Kofi Ghanaba	United Kingdom	International Movies	s8	Movie	24	
206	Sankofa	Haile Gerima	Oyafunmike Ogunlano	United Kingdom	Dramas	s8	Movie	24	
207	Sankofa	Haile Gerima	Oyafunmike Ogunlano	United Kingdom	Independent Movies	s8	Movie	24	
...	...	...	...	...	...	...	...	...	
201429	You Can Tutu	James Brown	Zahra Hassan Malik	United Kingdom	Children & Family Movies	s8787	Movie	31	
201430	You Can Tutu	James Brown	Cleo Badcock	United Kingdom	Children & Family Movies	s8787	Movie	31	
201431	You Can Tutu	James Brown	Stuart Manning	United Kingdom	Children & Family Movies	s8787	Movie	31	
201432	You Can Tutu	James Brown	Ali Bastian	United Kingdom	Children & Family Movies	s8787	Movie	31	
201433	You Can Tutu	James Brown	Amanda Holt	United Kingdom	Children & Family Movies	s8787	Movie	31	

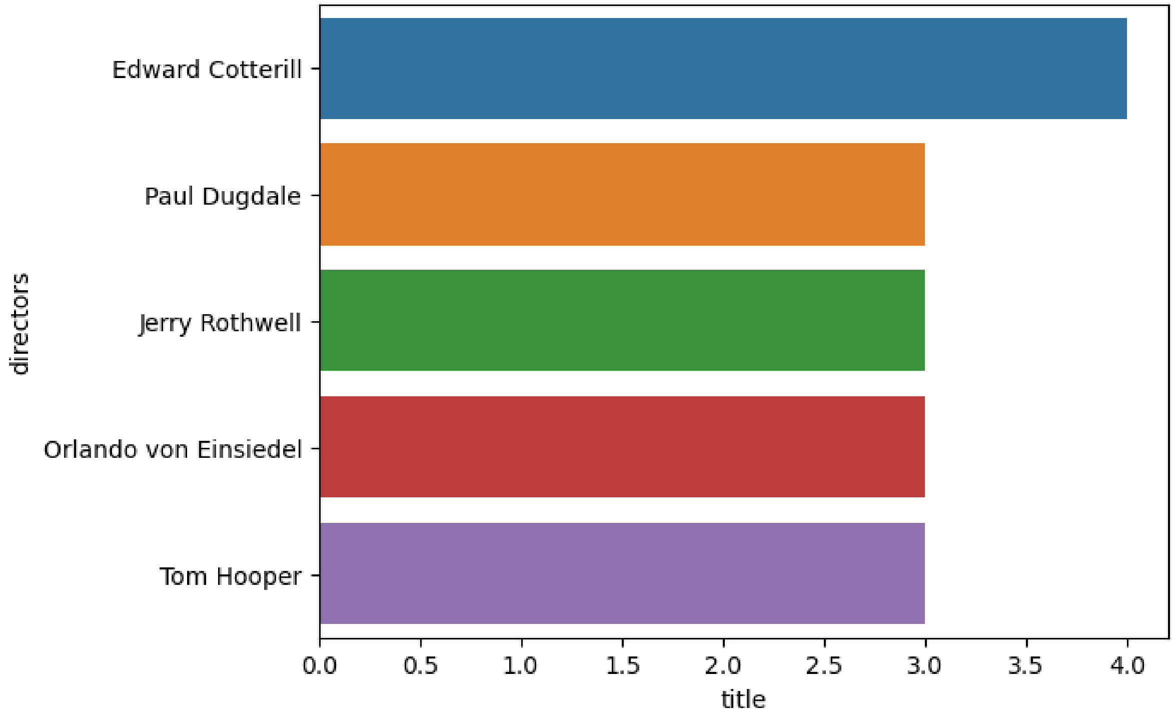
8589 rows × 15 columns

In [122…

```
# Check for popular movie directors in UK:
popukmovdir = ukmovies.groupby('directors').agg({'title':'nunique'}).reset_index(
sns.barplot(data=popukmovdir[1:6],x='title',y='directors',orient='h')
```

Out[122]:

```
<Axes: xlabel='title', ylabel='directors'>
```



In [123…

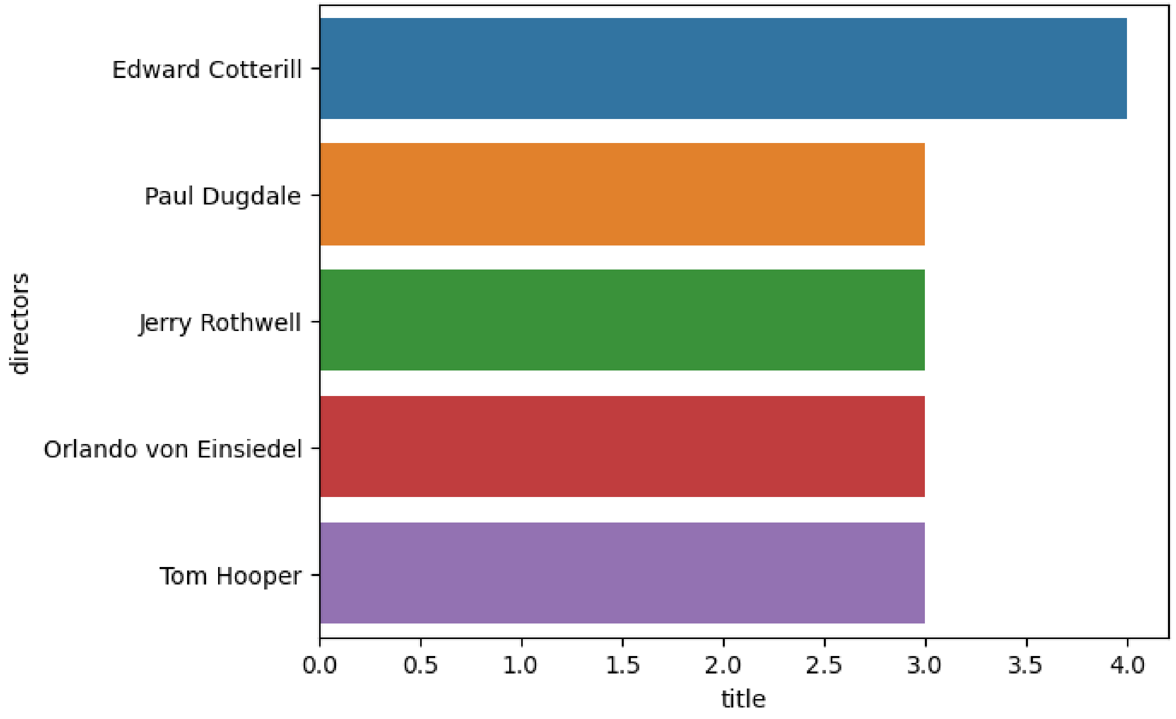
```
# Popular movies directors in Uk are Edward Cotterill, Paul Dugdale, Jerry Rothwel
```

In [124…

```
# Check for popular movie directors in UK:
popukmovdir = ukmovies.groupby('directors').agg({'title':'nunique'}).reset_index(
sns.barplot(data=popukmovdir[1:6],x='title',y='directors',orient='h')
```

Out[124]:

```
<Axes: xlabel='title', ylabel='directors'>
```

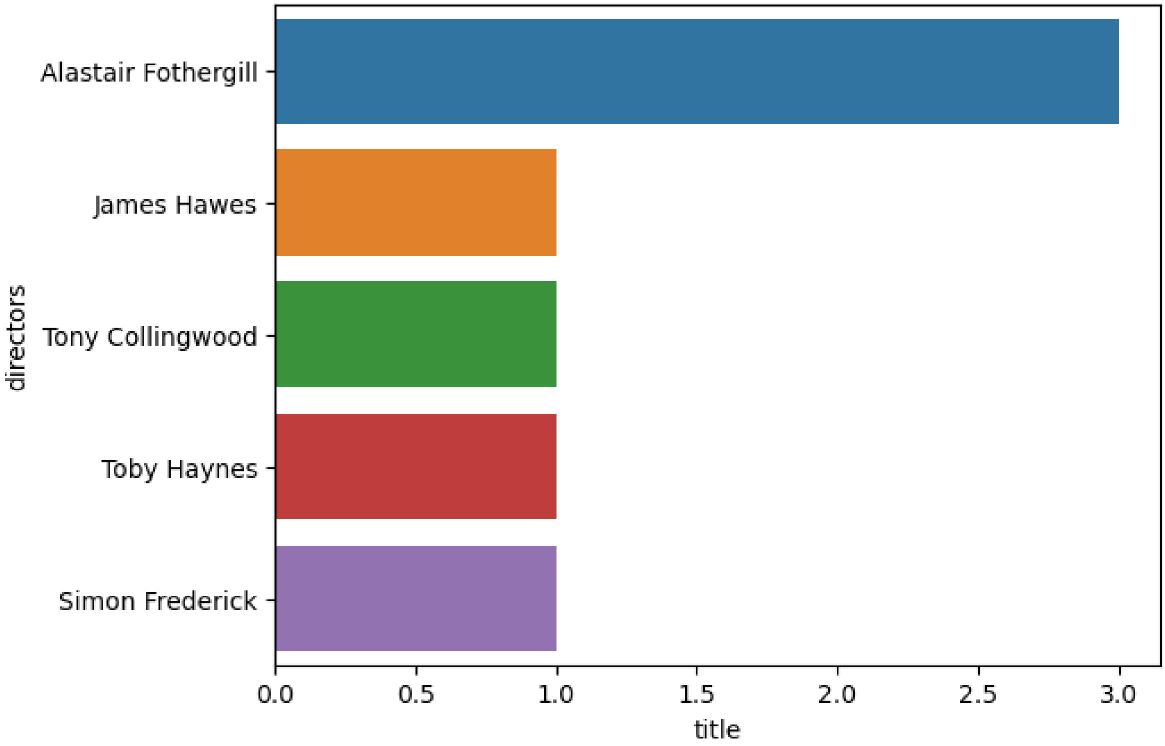


In [125…

```
# Check for popular TVSHOW directors in UK:
popshowdir = ukshows.groupby('directors').agg({'title':'nunique'}).reset_index().s
sns.barplot(data=popshowdir[1:6],x='title',y='directors',orient='h')
```

Out[125]:

```
<Axes: xlabel='title', ylabel='directors'>
```



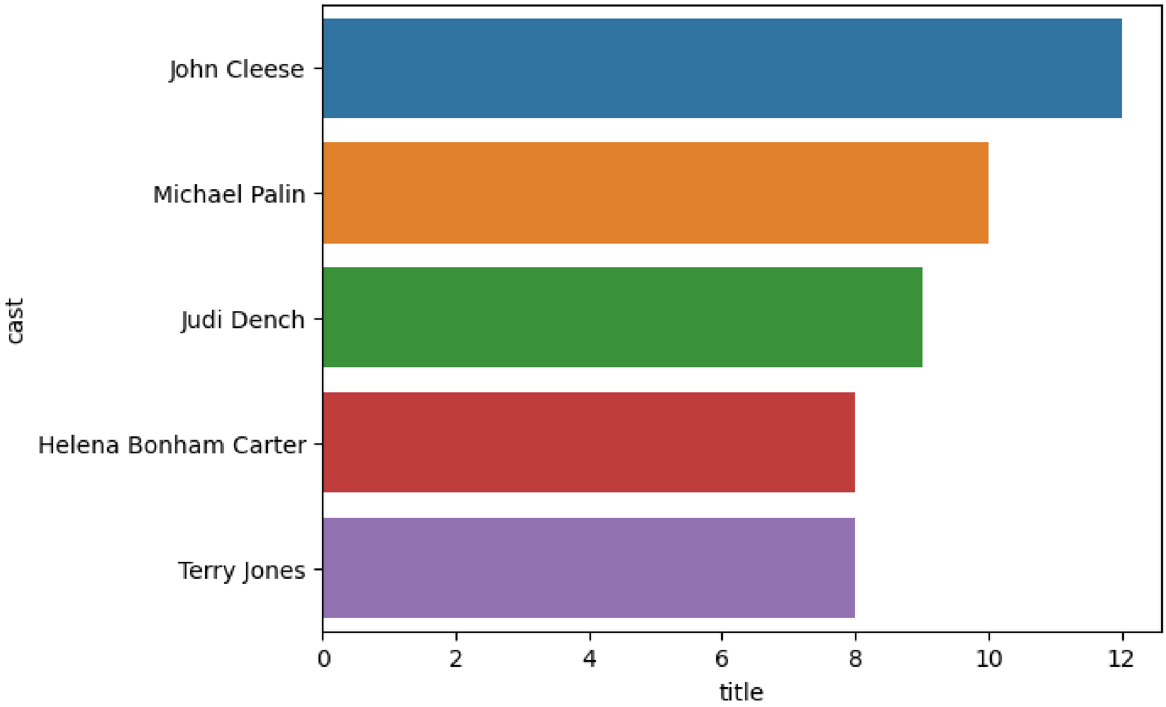
1. Popular tvshow directors are Alastair Fothergill, James Hawes, Tony Collingwood, Toby Haynes, Simon Frederick

In [126…

```
#uk cast
popukmovdir = ukmovies.groupby('cast').agg({'title':'nunique'}).reset_index().sort
sns.barplot(data=popukmovdir[1:6],x='title',y='cast',orient='h')
```

Out[126]:

```
<Axes: xlabel='title', ylabel='cast'>
```

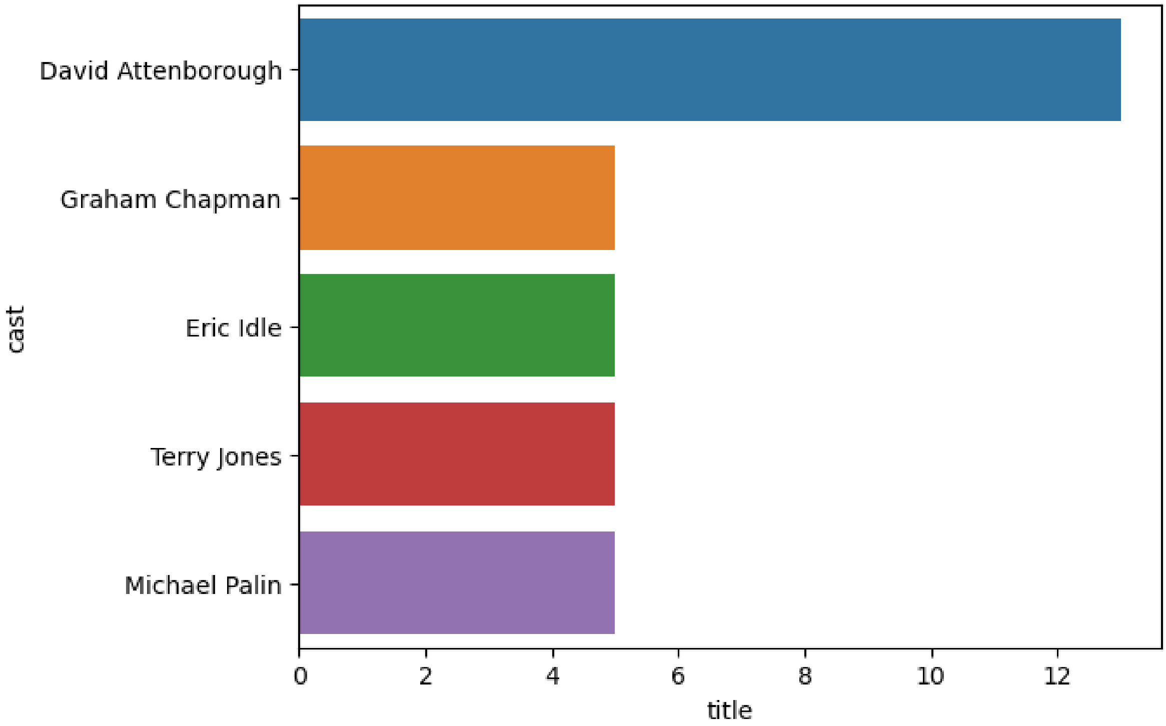


In [127…

```
# Check for popular TVSHOW actors in UK:
popshowdir = ukshows.groupby('cast').agg({'title':'nunique'}).reset_index().sort_v
sns.barplot(data=popshowdir[1:6],x='title',y='cast',orient='h')
```

Out[127]:

```
<Axes: xlabel='title', ylabel='cast'>
```

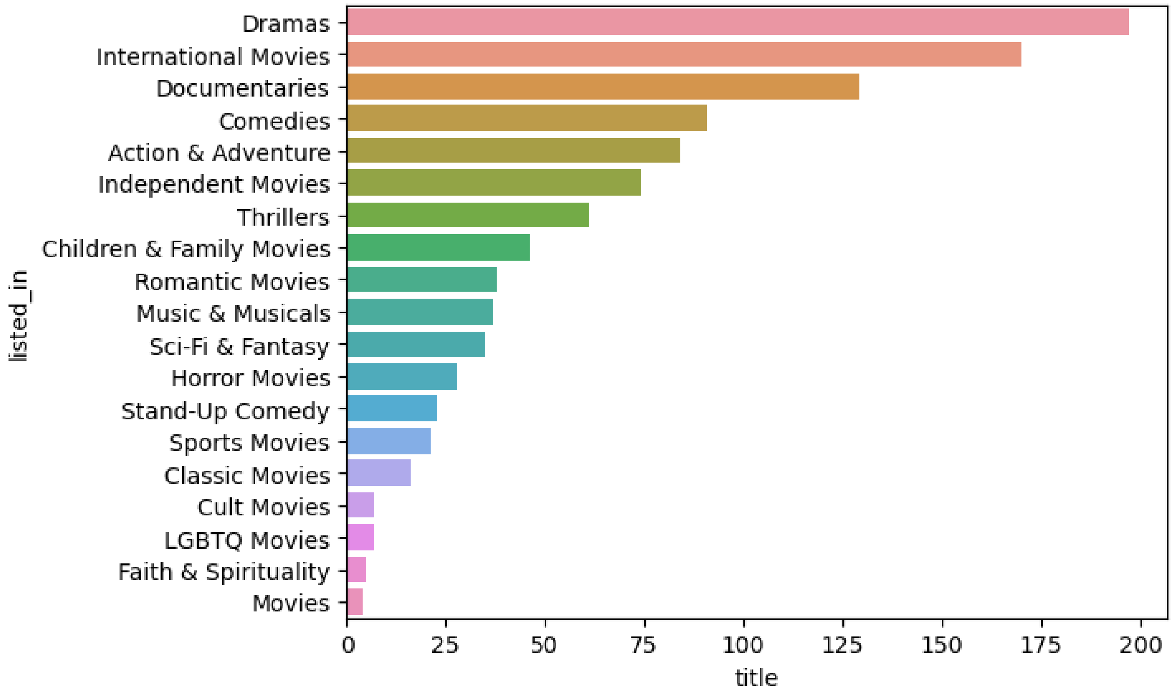


1. Popular MOvie Actors in Uk are John cleese,michael palin, Judi Dench, Helena Bonham carter. 2.Popular Tvshow Atcors in uk are David Attenborough, Graham Chapman, Eric idle, Terry Jones etc

In [128…

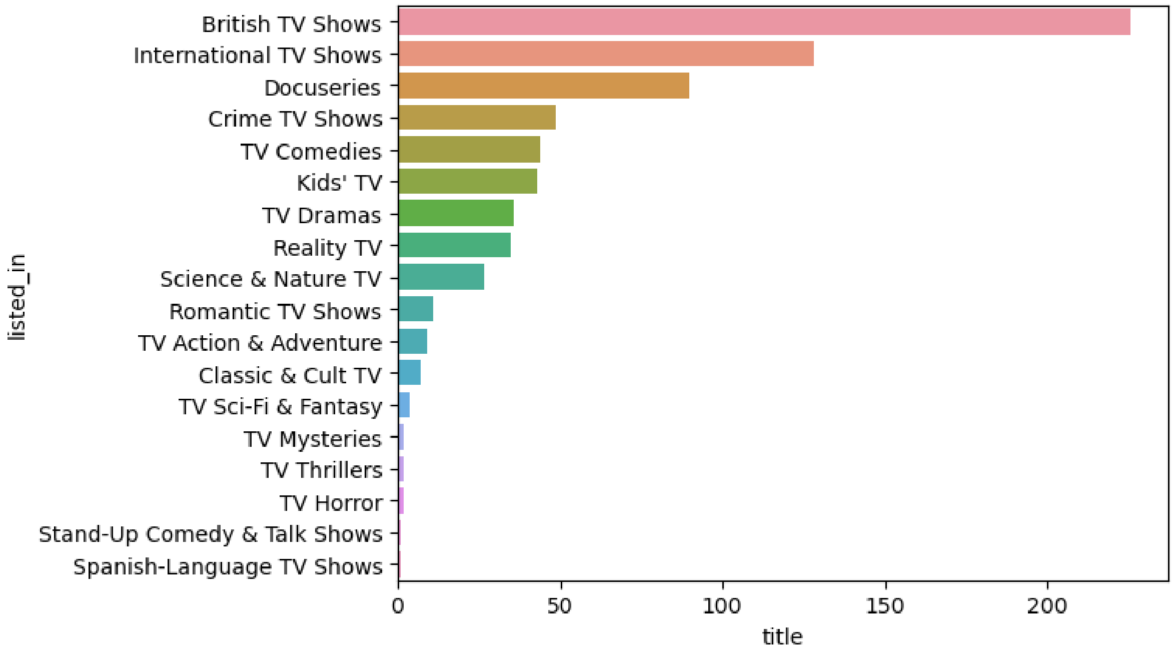
```
# Check for movie genre
popukmovdir = ukmovies.groupby('listed_in').agg({'title':'nunique'}).reset_index()
sns.barplot(data=popukmovdir,x='title',y='listed_in',orient='h')
```

```
Out[128]: <Axes: xlabel='title', ylabel='listed_in'>
```



```
In [129…
# Check for Tvshow Genre
popshowdir = ukshows.groupby('listed_in').agg({'title':'nunique'}).reset_index().s
sns.barplot(data=popshowdir,x='title',y='listed_in',orient='h')
```

```
Out[129]: <Axes: xlabel='title', ylabel='listed_in'>
```

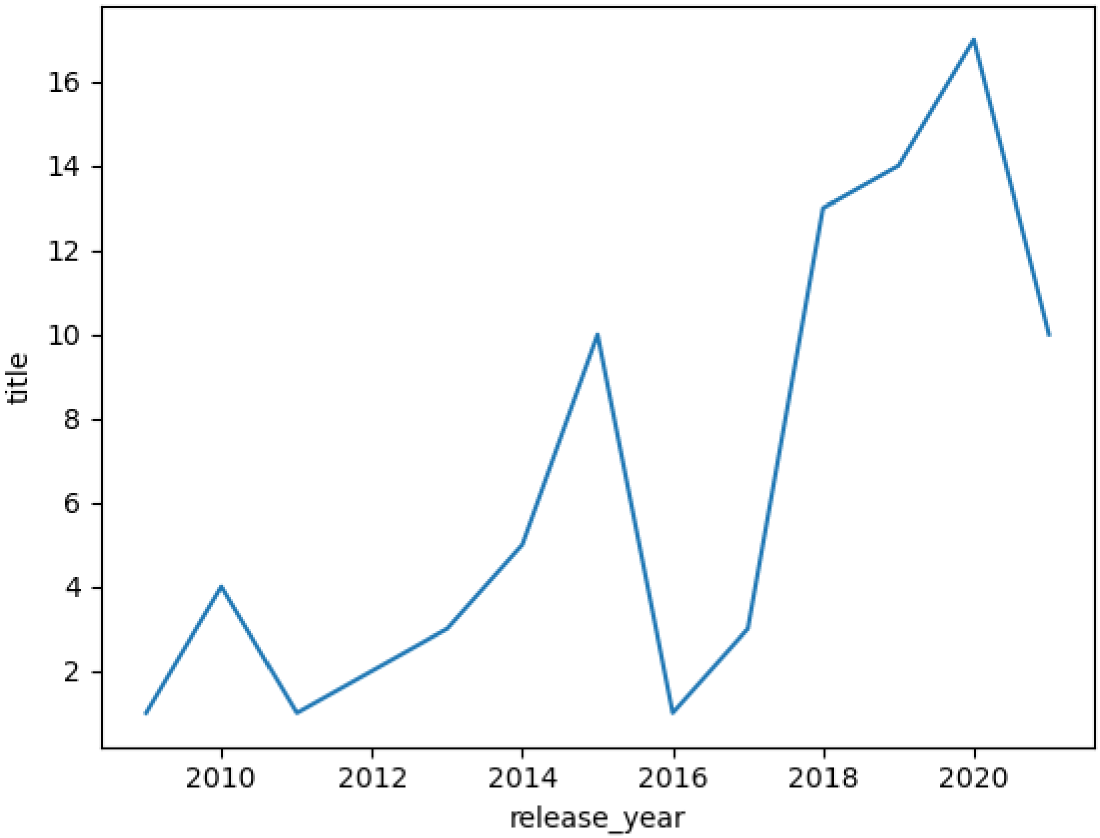


1.popular movie genre are Dramas, INternational MOvies,Documentaries, Comedies, Action&Adventure,Independant movies

1. Popular Tvshow genre are British TV Shiws, International Tv SHows, Docueries, Crime Tv shows

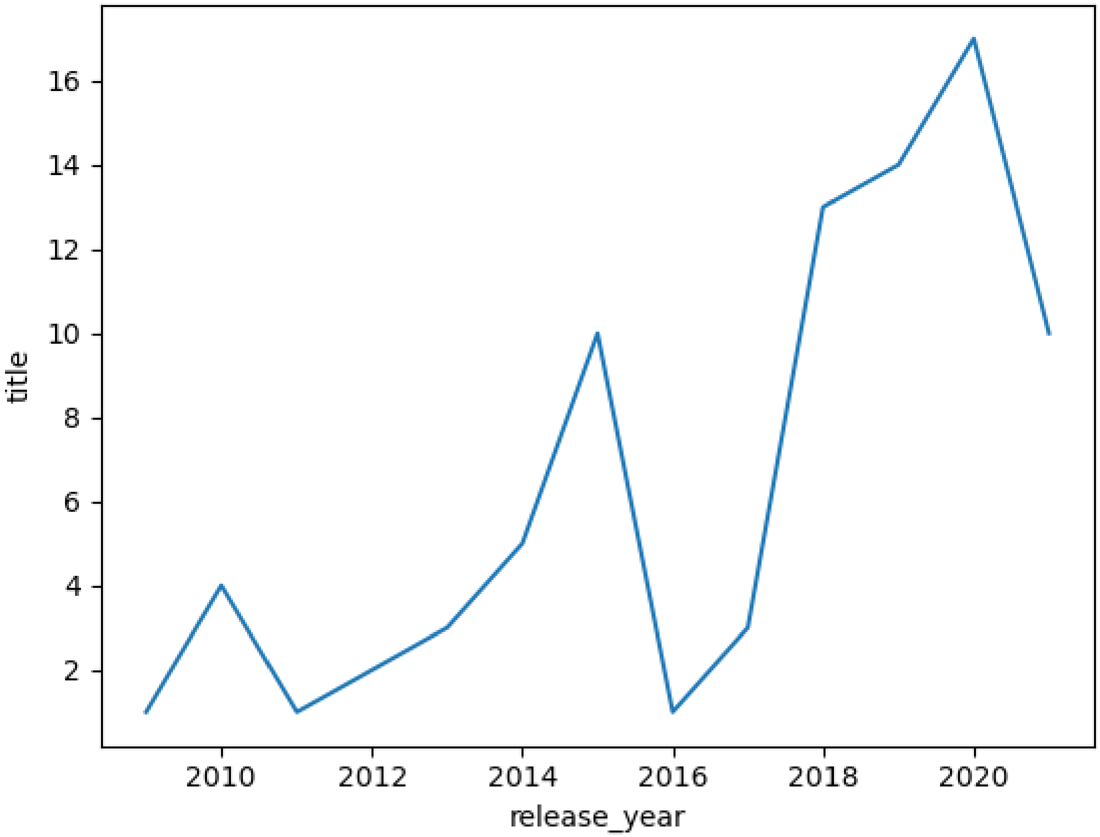
```
In [130…
# check for release years for movies in Uk.
popuk = ukmovies.groupby('release_year').agg({'title':'nunique'}).reset_index().sc
sns.lineplot(data=popInd,x='release_year',y='title')
```

```
Out[130]: <Axes: xlabel='release_year', ylabel='title'>
```



```
In [131…
# check for release years for tv shows in UK.
popuk = ukshows.groupby('release_year').agg({'title':'nunique'}).reset_index().sor
sns.lineplot(data=popInd,x='release_year',y='title')
```

```
Out[131]: <Axes: xlabel='release_year', ylabel='title'>
```



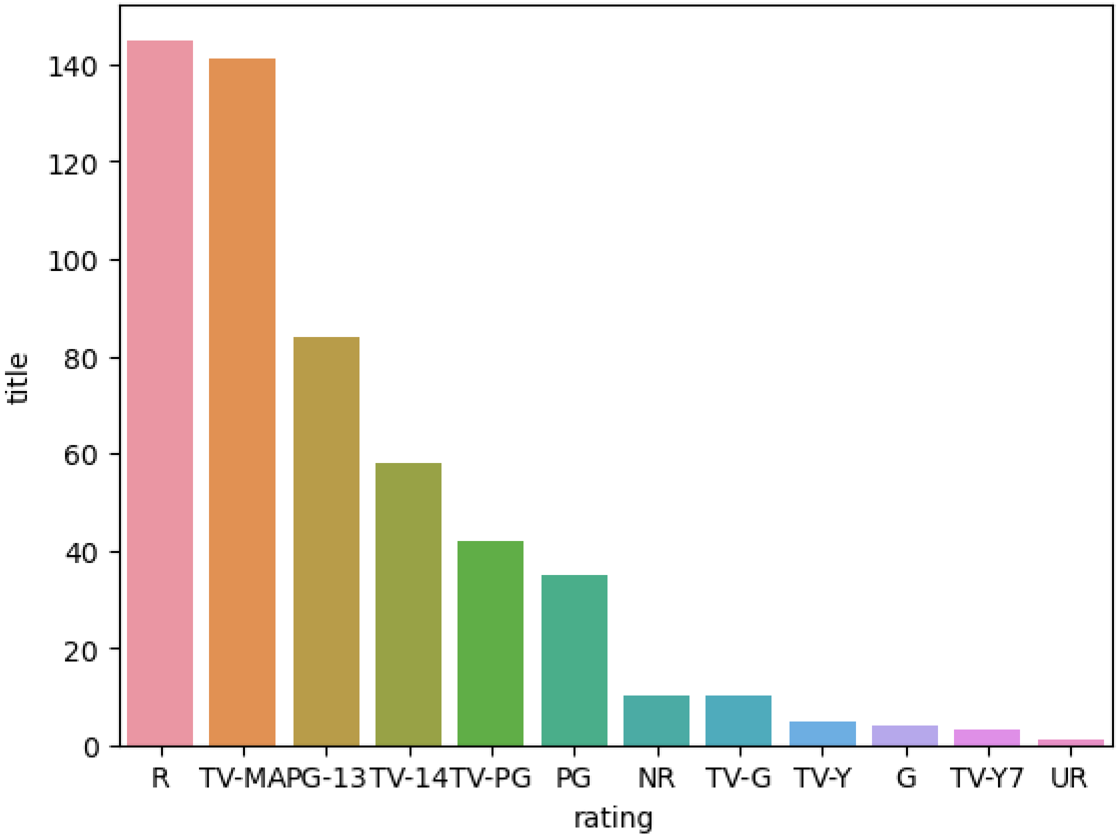
1. more Tv show released in year 2019 and decreased till 2021 and same with Movies

In [132…

```
# Popular Ratigs in uk
popIndRatings = ukmovies.groupby('rating').agg({'title':'nunique'}).reset_index().
sns.barplot(data=popIndRatings,x='rating',y='title')
```

Out[132]:

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

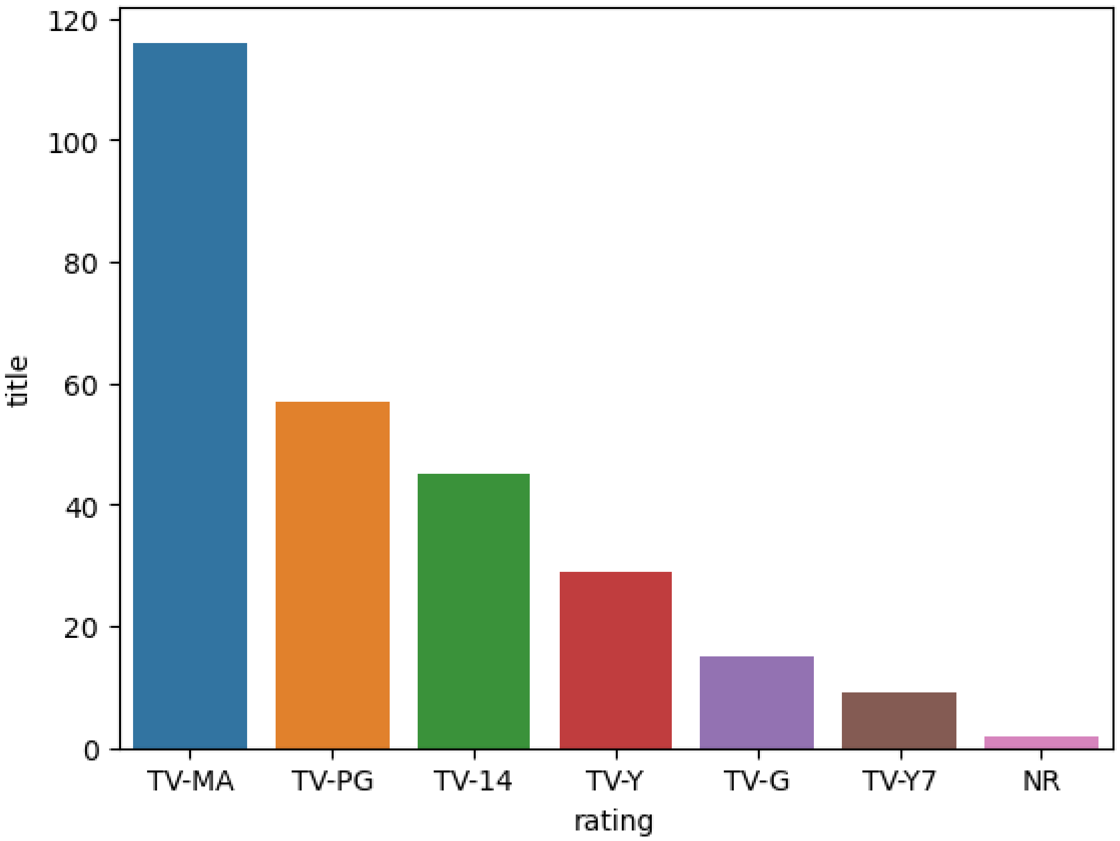


In [133…

```
# Popular Ratigs in uk
popIndRatings = ukshows.groupby('rating').agg({'title':'nunique'}).reset_index().s
sns.barplot(data=popIndRatings,x='rating',y='title')
```

Out[133]:

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



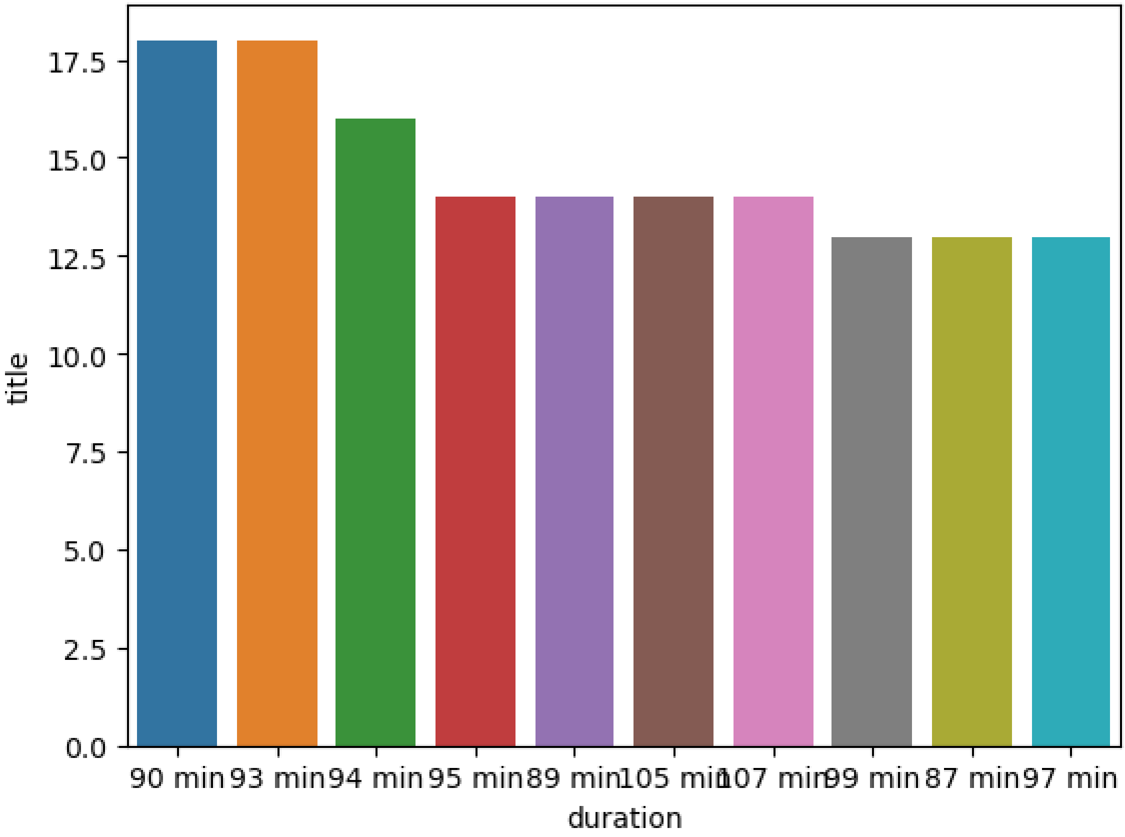
1. Popular movie rating in Uk are R, TV-MA, PG-13,TV-14
2. Popular tvshows rating in uk are TV_MA,tv-PG,TV-14,TV

In [135…

```
# Check for popular movie time generally people watch in uk:
popukmoviesDuation = ukmovies.groupby('duration').agg({'title':'nunique'}).reset_i
sns.barplot(data=popukmoviesDuation[:10],x='duration',y='title')
```

Out[135]:

```
<Axes: xlabel='duration', ylabel='title'>
```

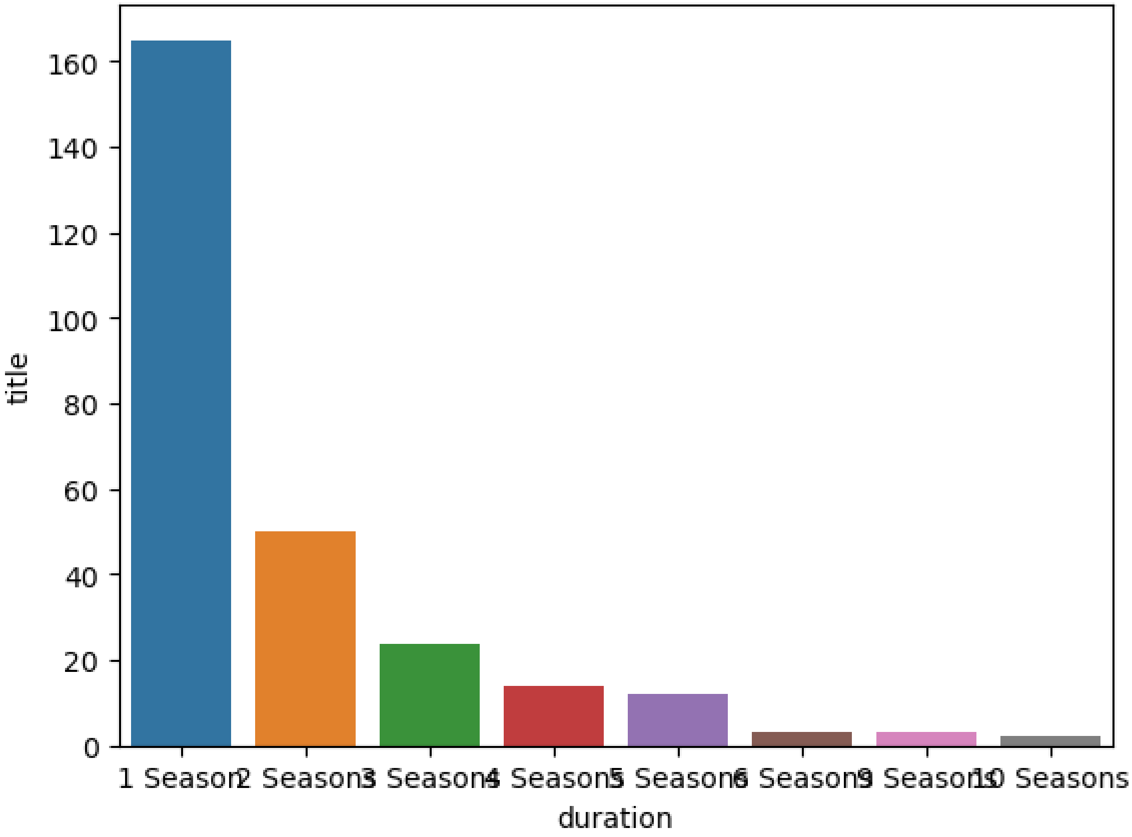


In [136…

```
# Check for popular show time generally people watch in uk:
popukshowsDuation = ukshows.groupby('duration').agg({'title':'nunique'}).reset_inc
sns.barplot(data=popukshowsDuation[:10],x='duration',y='title')
```

Out[136]:

```
<Axes: xlabel='duration', ylabel='title'>
```



1.Popular movie times in uk country are 90min,93 min,etc

1. Most popular watch time of TV shows in Uk are 1 season.

In [137…

```
ukshows.columns
```

Out[137]:

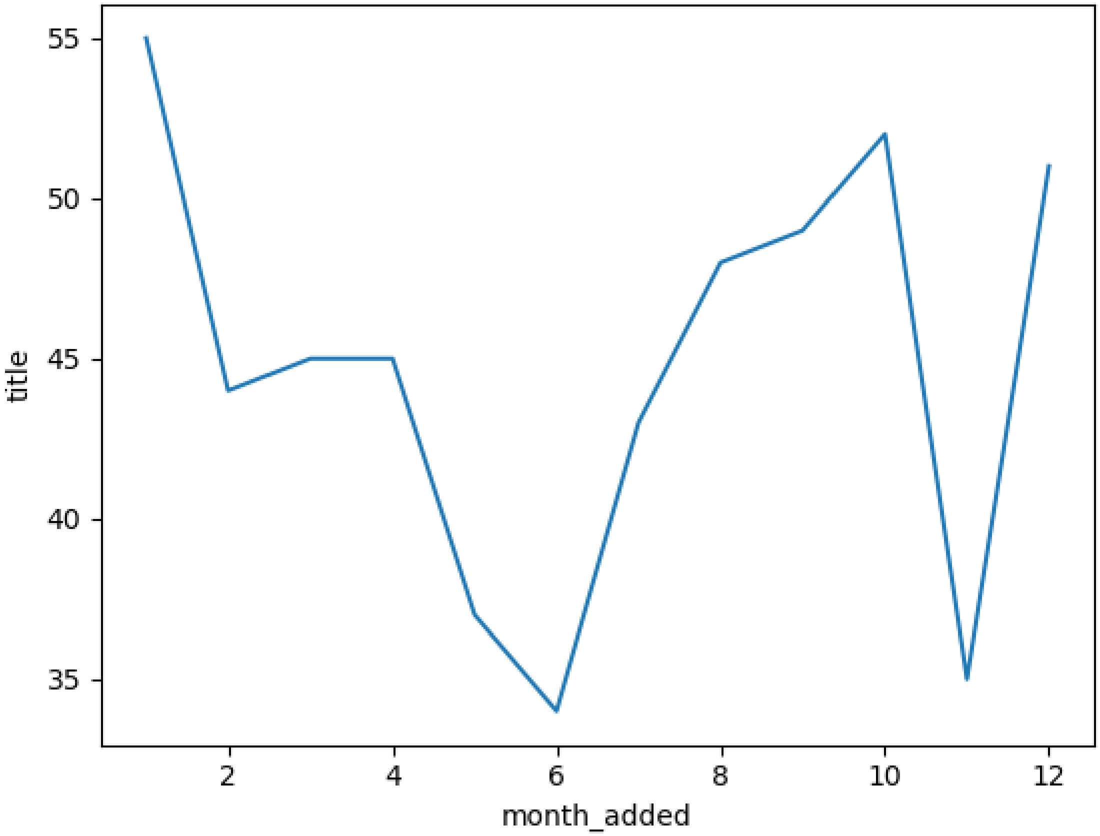
```
Index(['title', 'directors', 'cast', 'country', 'listed_in', 'show_id', 'type',
       'date_added', 'release_year', 'rating', 'duration', 'duration_copy',
       'modified_date_added', 'month_added', 'year_added'],
      dtype='object')
```

In [139…

```
# check for month in which more Uk movies been added to platform
popukMonth =  ukmovies.groupby('month_added').agg({'title':'nunique'}).reset_inde
sns.lineplot(data=popukMonth,x='month_added',y='title')
```

Out[139]:

```
<Axes: xlabel='month_added', ylabel='title'>
```

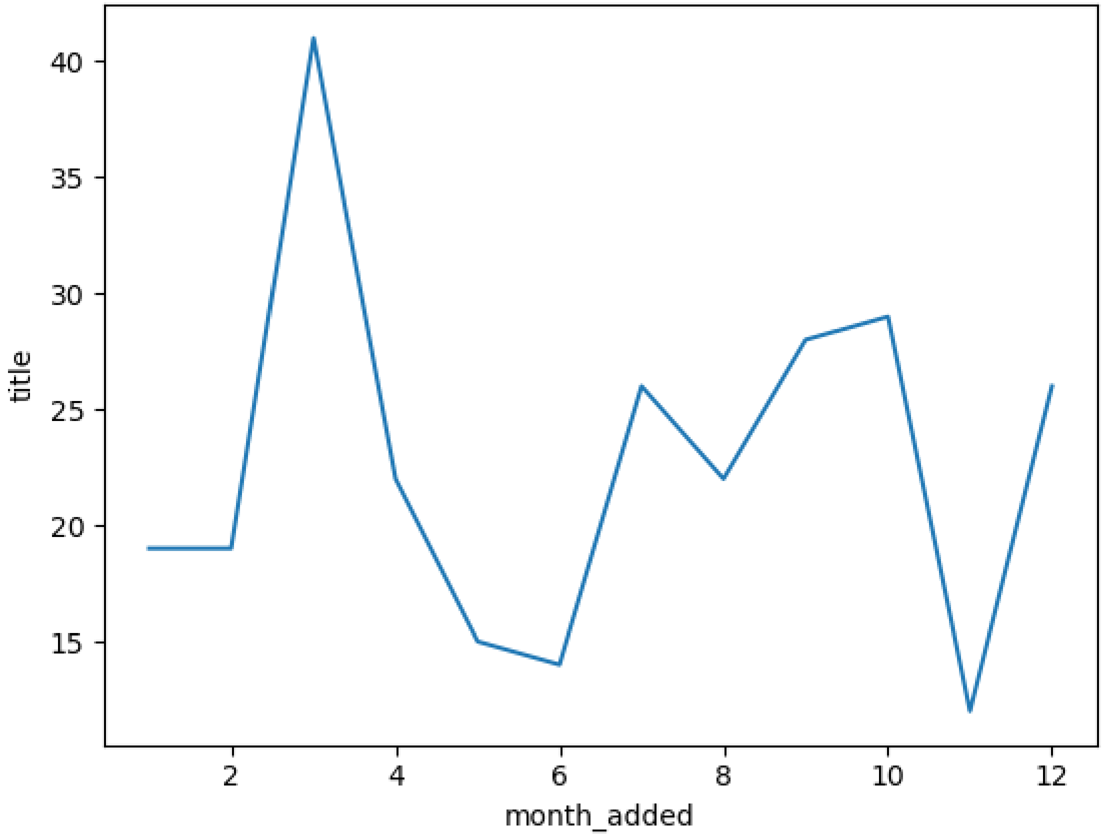


In [140…

```
# check for month in which more Uk movies been added to platform
popushows =  ukshows.groupby('month_added').agg({'title':'nunique'}).reset_index(
sns.lineplot(data=popushows,x='month_added',y='title')
```

Out[140]:

```
<Axes: xlabel='month_added', ylabel='title'>
```



1.more movies been added to platform in the month of october, jan

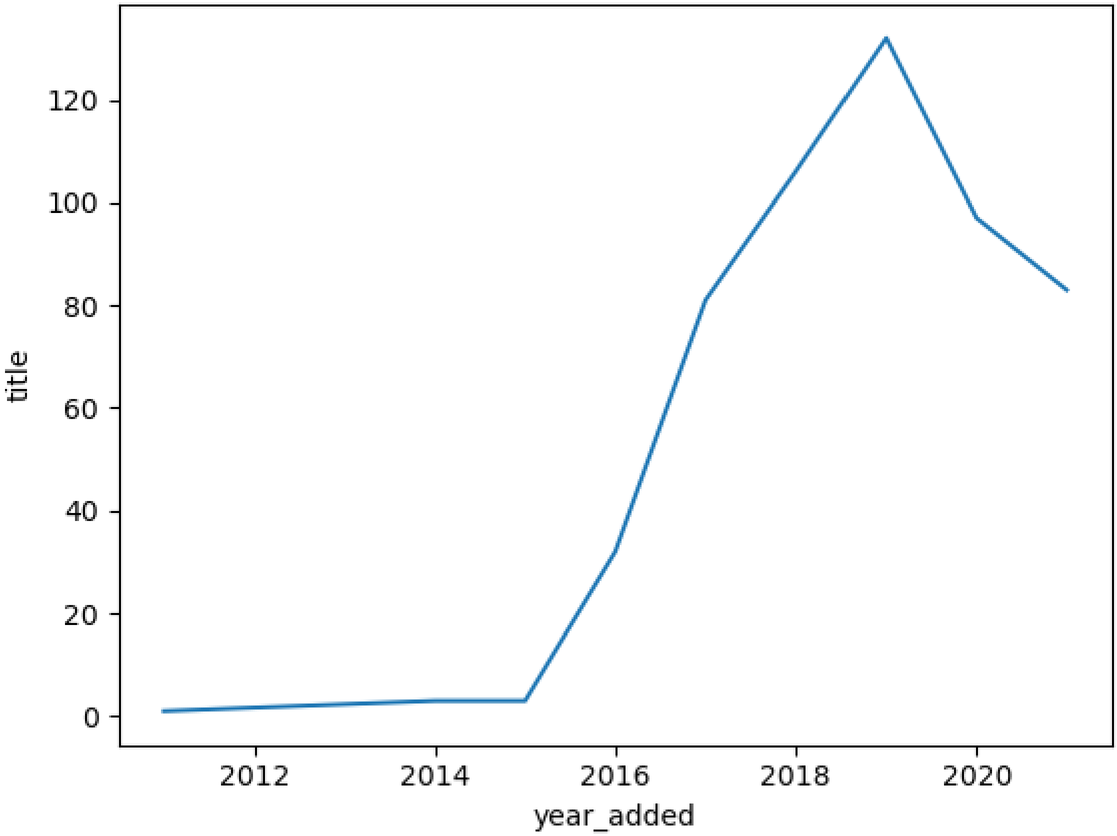
1. more tvshows been added to platform in the month ofmarch and october.

In [141…

```
# check for year in which more uk movies been added to platform
popukYear =  ukmovies.groupby('year_added').agg({'title':'nunique'}).reset_index()
sns.lineplot(data=popukYear,x='year_added',y='title')
```

Out[141]:

```
<Axes: xlabel='year_added', ylabel='title'>
```

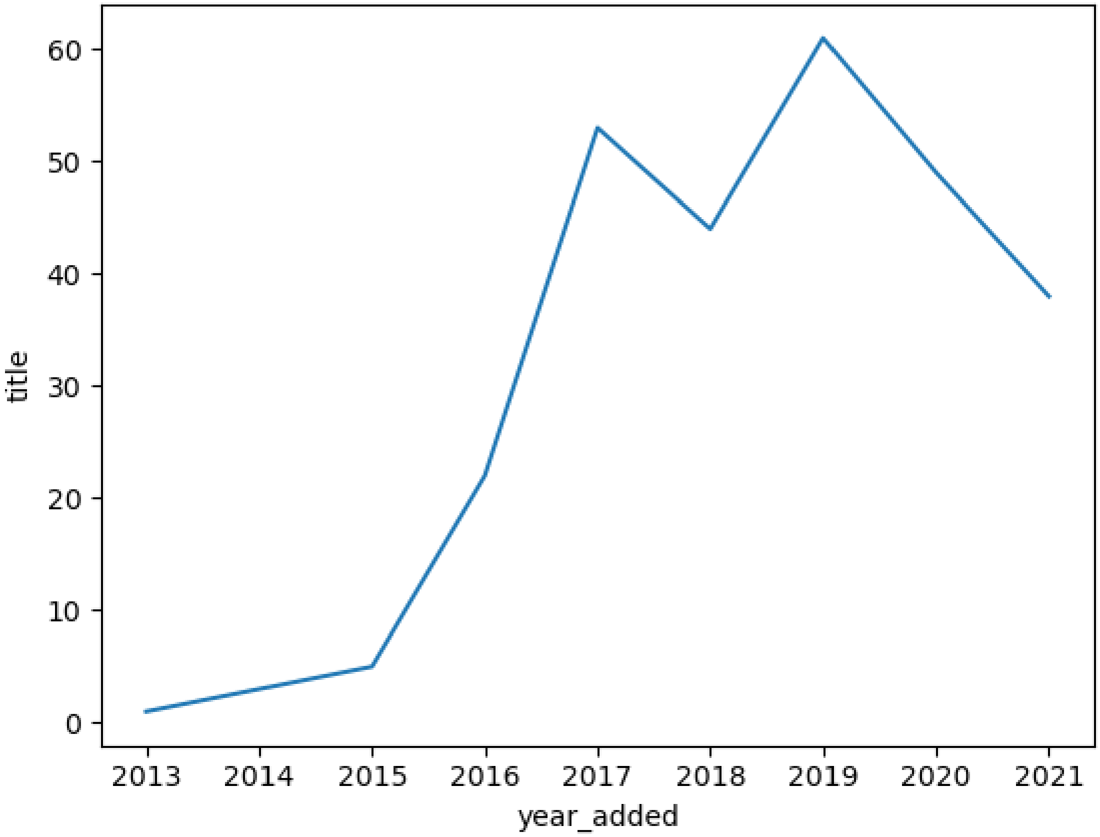


In [142…

```
# check for year in which more uk shows been added to platform
popukYear =  ukshows.groupby('year_added').agg({'title':'nunique'}).reset_index()
sns.lineplot(data=popukYear,x='year_added',y='title')
```

Out[142]:

```
<Axes: xlabel='year_added', ylabel='title'>
```



1. We could see a decreasing trends with # of movies added in a year from 2018 2.We could see a decreasing trends with # of shows added in a year from 2019

Recommendations, Analysis & Insights: 1) The most popular Genres across the countries and in both TV Shows and Movies are Drama, Comedy and International TV Shows/Movies.

2)Add TV Shows in July/August and Movies in last week of the year/first month of the next year.

3)For USA audience 80-120 mins is the recommended length for movies and Kids TV Shows are also popular along with the genres in first point.

4)For UK audience, recommended length for movies is same as that of USA (80-120 mins)

5)The target audience in USA and India is recommended to be 14+ and above ratings while for UK, its recommended to be completely Mature/R content .

6)Add movies for Indian Audience, it has been declining since 2018.

7)Anime Genre for Japan and Romantic Genre in TV Shows for South Korean audiences is recommended.

8) While creating content, take into consideration the popular actors/directors for that country. Also take into account the director-actor combination which is highly recommended.