EDA Netflix

In [1]:

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

Loading Data into DataFrame

In [2]:

```
df = pd.read_csv('netflix.csv')
df.head()
```

Out[2]:

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

Checking shape and data types of columns of dataframe

In [5]:

```
df.shape
```

Out[5]:

```
(8807, 12)
```

In [6]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8807 entries, 0 to 8806
Data columns (total 12 columns):
 #   Column        Non-Null Count  Dtype 
---  ------        --------------  ----- 
 0   show_id       8807 non-null   object
 1   type          8807 non-null   object
 2   title         8807 non-null   object
 3   director      6173 non-null   object
 4   cast          7982 non-null   object
 5   country       7976 non-null   object
 6   date_added    8797 non-null   object
 7   release_year  8807 non-null   int64 
 8   rating        8803 non-null   object
 9   duration      8804 non-null   object
 10  listed_in     8807 non-null   object
 11  description   8807 non-null   object
dtypes: int64(1), object(11)
memory usage: 825.8+ KB
```

Spliting and Stacking Cast column

In [3]:

```
dummy =df['cast'].apply(lambda x:str(x).split(',')).tolist()
df_new = pd.DataFrame(dummy,index = df['title'])
df_new = df_new.stack()
df_new = pd.DataFrame(df_new)
df_new.reset_index(inplace = True)
df_new = df_new[['title',0]]
df_new.columns = ['title','Cast']
```

In [7]:

```
df_new.head()
```

Out[7]:

	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

Spliting and Stacking director column

In [8]:

```
directors =df['director'].apply(lambda x:str(x).split(',')).tolist()
df_director = pd.DataFrame(directors,index = df['title'])
df_director = df_director.stack()
df_director = pd.DataFrame(df_director)
df_director.reset_index(inplace = True)
df_director = df_director[['title',0]]
df_director.columns = ['title','Director']
```

In [10]:

```
df_director.head(10)
```

Out[10]:

	title	Director
0	Dick Johnson Is Dead	Kirsten Johnson
1	Blood & Water	nan
2	Ganglands	Julien Leclercq
3	Jailbirds New Orleans	nan
4	Kota Factory	nan
5	Midnight Mass	Mike Flanagan
6	My Little Pony: A New Generation	Robert Cullen
7	My Little Pony: A New Generation	José Luis Ucha
8	Sankofa	Haile Gerima
9	The Great British Baking Show	Andy Devonshire

Spliting and Stacking listed_in column

In [11]:

```
lists =df['listed_in'].apply(lambda x:str(x).split(',')).tolist()
df_list = pd.DataFrame(lists,index = df['title'])
df_list = df_list.stack()
df_list = pd.DataFrame(df_list)
df_list.reset_index(inplace = True)
df_list = df_list[['title',0]]
df_list.columns = ['title','Listed_in']
```

In [12]:

```
df_list.head(10)
```

Out[12]:

	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
5	Ganglands	International TV Shows
6	Ganglands	TV Action & Adventure
7	Jailbirds New Orleans	Docuseries
8	Jailbirds New Orleans	Reality TV
9	Kota Factory	International TV Shows

Spliting and Stacking country column

In [13]:

```
lists =df['country'].apply(lambda x:str(x).split(',')).tolist()
df_country = pd.DataFrame(lists,index = df['title'])
df_country = df_country.stack()
df_country = pd.DataFrame(df_country)
df_country.reset_index(inplace = True)
df_country = df_country[['title',0]]
df_country.columns = ['title','country']
```

In [14]:

```
df_country.head(10)
```

Out[14]:

	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
5	Midnight Mass	nan
6	My Little Pony: A New Generation	nan
7	Sankofa	United States
8	Sankofa	Ghana
9	Sankofa	Burkina Faso

Merging df_new and df_director

In [15]:

```
df_final = pd.merge(df_new,df_director,on = 'title')
```

Merging df_list and df_final

Merging df_country and df_final

Merging df_final with origional dataset to get out final Dataframe

In [16]:

```
df_final = pd.merge(df_final,df_list,on = 'title')
df_final = pd.merge(df_final,df_country,on = 'title')
df_final = pd.merge(df,df_final,on='title')
```

Reading final dataframe and cheking columns

In [17]:

```
df_final.head(10)
```

Out[17]:

	show_id	type	title	director	cast	country_x	date_added	release_year	rating
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA
2	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA
3	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA
4	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA
5	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA
6	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA
7	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA
8	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA

	show_id	type	title	director	cast	country_x	date_added	release_year	rating
9	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA

In [18]:

```
df_final.columns
```

Out[18]:

```
Index(['show_id', 'type', 'title', 'director', 'cast', 'country_x',
       'date_added', 'release_year', 'rating', 'duration', 'listed_in',
       'description', 'Cast', 'Director', 'Listed_in', 'country_y'],
      dtype='object')
```

Dropping unwanted columns from DataFrame

In [19]:

```
df_final.drop(['show_id','director', 'cast', 'country_x','listed_in','description',],axi
df_final.rename(columns = {'Listed_in':'genre','country_y':'country'},inplace=True)
```

In [20]:

```
df_final.head()
```

Out[20]:

	type	title	date_added	release_year	rating	duration	Cast	Director	gen
0	Movie	Dick Johnson Is Dead	September 25, 2021	2020	PG-13	90 min	nan	Kirsten Johnson	Documentari
1	TV Show	Blood & Water	September 24, 2021	2021	TV-MA	2 Seasons	Ama Qamata	nan	Internatior TV Shov
2	TV Show	Blood & Water	September 24, 2021	2021	TV-MA	2 Seasons	Ama Qamata	nan	TV Dram
3	TV Show	Blood & Water	September 24, 2021	2021	TV-MA	2 Seasons	Ama Qamata	nan	TV Mysteri
4	TV Show	Blood & Water	September 24, 2021	2021	TV-MA	2 Seasons	Khosi Ngema	nan	Internatior TV Shov

In [21]:

```
df_final.shape
```

Out[21]:

```
(202065, 10)
```

Re-aranging order of columns

In [22]:

```
df_final = df_final.iloc[:,[0,1,6,7,8,9,2,3,4,5]]
```

In [24]:

```
df_final.head()
```

Out[24]:

	type	title	Cast	Director	genre	country	date_added	release_year	ratin
0	Movie	Dick Johnson Is Dead	nan	Kirsten Johnson	Documentaries	United States	September 25, 2021	2020	PG 1
1	TV Show	Blood & Water	Ama Qamata	nan	International TV Shows	South Africa	September 24, 2021	2021	TV M
2	TV Show	Blood & Water	Ama Qamata	nan	TV Dramas	South Africa	September 24, 2021	2021	TV M
3	TV Show	Blood & Water	Ama Qamata	nan	TV Mysteries	South Africa	September 24, 2021	2021	TV M
4	TV Show	Blood & Water	Khosi Ngema	nan	International TV Shows	South Africa	September 24, 2021	2021	TV M

Percentage of missing values for each columns

In [25]:

```
(df_final.isna().sum()*100/df_final.shape[0]).sort_values(ascending = False)
```

Out[25]:

```
date_added      0.078193
rating          0.033158
duration        0.001485
type            0.000000
title           0.000000
Cast            0.000000
Director        0.000000
genre           0.000000
country         0.000000
release_year    0.000000
dtype: float64
```

From above code we can see that many columns has zero missing value in column but they have values nan in columns which means those are in string format

Finding 'nan' in columns and replacing them with np.nan

Replacing 'nan' with np.nan in 'Cast'

In [26]:

```
def func(value):
    if value == 'nan':
        return np.nan
    else:
        return value
df_final['Cast'] = df_final['Cast'].apply(func)
```

Replacing 'nan' with np.nan in 'Director'

In [27]:

```
def fun(value):
    if value == 'nan':
        return np.nan
    else:
        return value
df_final['Director'] = df_final['Director'].apply(fun)
```

Replacing 'nan' with np.nan in 'genre'

In [28]:

```
def fun(value):
    if value == 'nan':
        return np.nan
    else:
        return value
df_final['genre'] = df_final['genre'].apply(fun)
```

Replacing 'nan' with np.nan in 'country'

In [29]:

```
def func(value):
    if value == 'nan':
        return np.nan
    else:
        return value
df_final['country'] = df_final['country'].apply(func)
```

Checking for missing value percentage again

In [30]:

```
(df_final.isna().sum()*100/df_final.shape[0]).sort_values(ascending = False)
```

Out[30]:

```
Director        25.062727
country          5.887709
Cast             1.063519
date_added       0.078193
rating           0.033158
duration         0.001485
type             0.000000
title            0.000000
genre            0.000000
release_year     0.000000
dtype: float64
```

Dealing with Missing Values and Replacing NaN with mode value of respective Column

In [31]:

```
df_final['Cast'] = df_final['Cast'].fillna(df_final['Cast'].mode()[0])
df_final['Director'] = df_final['Director'].fillna(df_final['Director'].mode()[0])
df_final['date_added'] = df_final['date_added'].fillna(df_final['date_added'].mode()[0])
df_final['rating'] = df_final['rating'].fillna(df_final['rating'].mode()[0])
df_final['duration'] = df_final['duration'].fillna(df_final['duration'].mode()[0])
df_final['country'] = df_final['country'].fillna(df_final['country'].mode()[0])
```

Re-checking missing values after fixing them

In [32]:

```
(df_final.isna().sum()*100/df_final.shape[0]).sort_values(ascending = False)
```

Out[32]:

```
type            0.0
title           0.0
Cast            0.0
Director        0.0
genre           0.0
country         0.0
date_added      0.0
release_year    0.0
rating          0.0
duration        0.0
dtype: float64
```

Fixing rating columns with useable values and converting datatype to integers

In [33]:

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

Out[33]:

```
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',
       'TV-Y7-FV', 'UR'], dtype=object)
```

In [34]:

```
def fun(x):
    if x == '74 min' or x == '84 min' or x == '66 min':
        return 'normal'
    else:
        return x
df_final['rating'] = df_final['rating'].apply(fun)
```

In [35]:

```
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', 'normal', 'NR', 'TV-Y7-FV', 'UR'],
      dtype=object)
```

Fixing duration columns with useable values and converting datatype to integers ease in calculation

In [38]:

```
def fun(x):
    return str(x).split()[0]
df_final['duration'] = df_final['duration'].apply(fun)
convert_dict = {'duration': int}
df_final = df_final.astype(convert_dict)
```

In [39]:

```
df_final['duration']
```

Out[39]:

```
0          90
1           2
2           2
3           2
4           2
          ...
202060    111
202061    111
202062    111
202063    111
202064    111
Name: duration, Length: 202065, dtype: int32
```

Changing datatype of date_added columns

In [40]:

```
df_final['date_added'] = pd.to_datetime(df_final['date_added'])
```

Checking Distribution of content month wise for India

In [52]:

```
content_per_month = df_final.loc[df_final['country'] == 'India',['country','title','date
content_per_month
```

Out[52]:

	index	country	title	date_added
0	87	India	Kota Factory	2021-09-24
1	88	India	Kota Factory	2021-09-24
2	89	India	Kota Factory	2021-09-24
3	90	India	Kota Factory	2021-09-24
4	91	India	Kota Factory	2021-09-24
...	...	...	...	...
22134	202060	India	Zubaan	2019-03-02
22135	202061	India	Zubaan	2019-03-02
22136	202062	India	Zubaan	2019-03-02
22137	202063	India	Zubaan	2019-03-02
22138	202064	India	Zubaan	2019-03-02

22139 rows × 4 columns

Reccommendation.

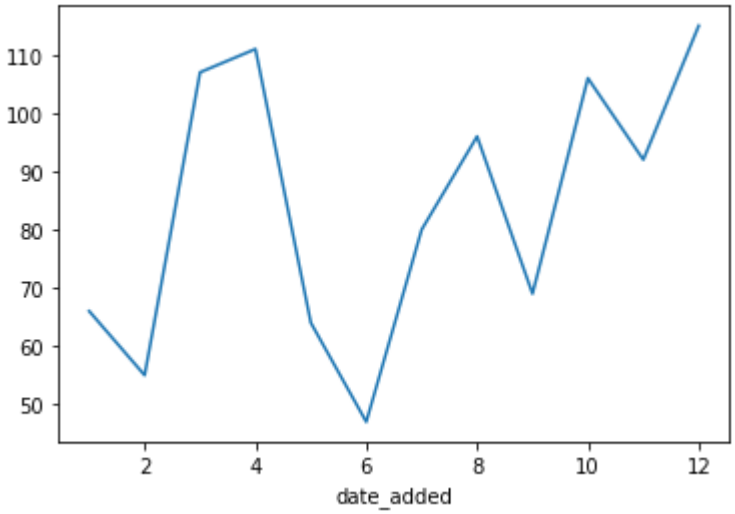
Count of Content is higher in month of December while is relativly less around may-june so this can be interchanged as around december academic sessions are usually moving towards exams while may-june are supposed to be holidays

In [56]:

```
content_distribution_by_month = content_per_month.groupby(content_per_month['date_added'
content_distribution_by_month.plot()
```

Out[56]:

```
<AxesSubplot:xlabel='date_added'>
```



Insight

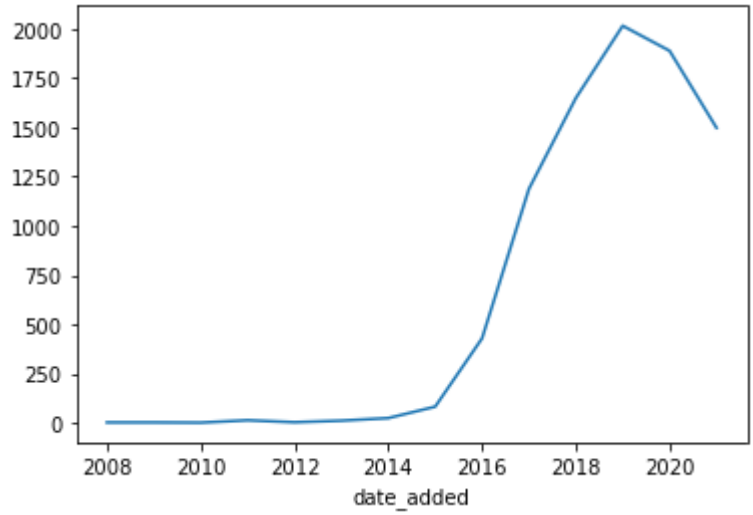
count of content per year has shown an increasing trend from 2008 to 2020 then a slight fall but overall it was increasing

In [57]:

```
content_per_year = df_final.groupby(df_final['date_added'].dt.year)['title'].nunique()
content_per_year.plot()
```

Out[57]:

```
<AxesSubplot:xlabel='date_added'>
```



Insight

average watch time for movies is 106.83 min while average watch time for TV show is 1.92 season

In [58]:

```
df_final.groupby(df_final['type'])['duration'].mean()
```

Out[58]:

```
type
Movie      106.838209
TV Show      1.928101
Name: duration, dtype: float64
```

Insights.

Netflix has more content in form of movies for which average duration is 106 min while TV show has average duration is 1.92 seasons

Reccommendations.

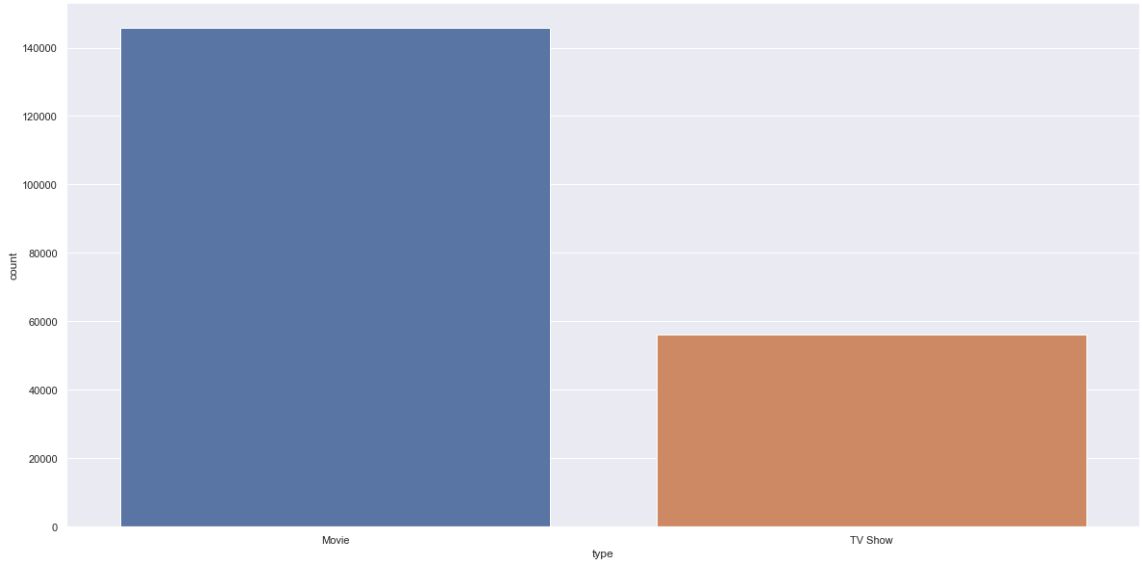
Netflix should give emphasis on increasing TV shows as they have season so if someone watches a season they will give more time Netflix as compare to movies hence increses Watch hours

In [115]:

```
sns.countplot(x ='type', data = df_final)
```

Out[115]:

```
<AxesSubplot:xlabel='type', ylabel='count'>
```



Insight

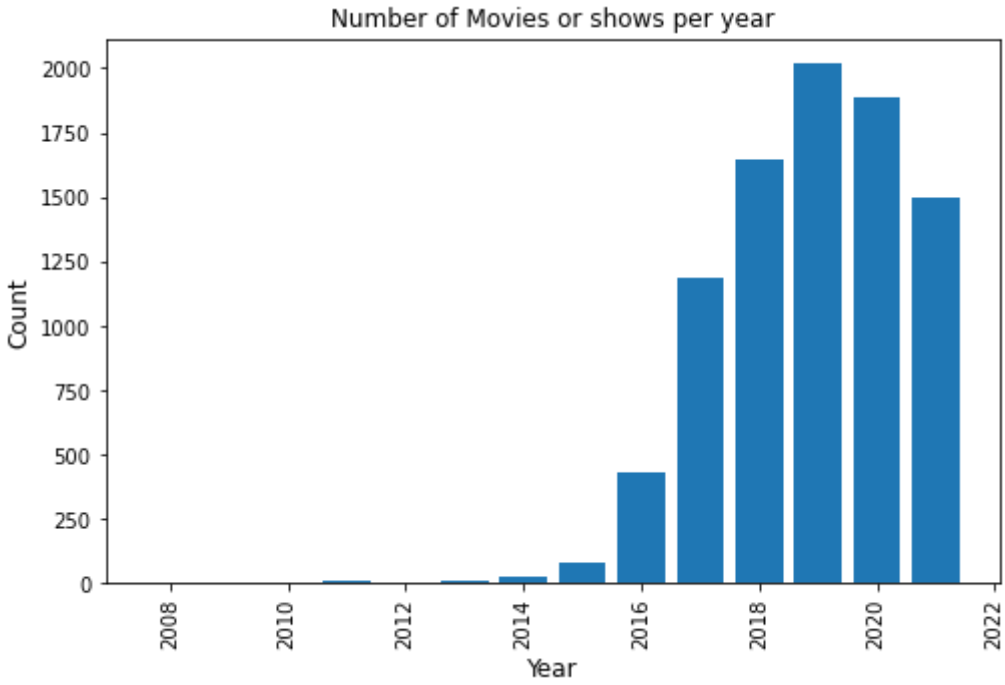
count of content per year has shown an increasing trend from 2008 to 2020 then a slight fall but overall it was increasing

In [73]:

```
content_per_year = df_final.groupby(df_final['date_added'].dt.year)['title'].nunique()
a = content_per_year.reset_index()
plt.figure(figsize=(8,5))
plt.bar(a['date_added'],a['title'])
plt.xticks(rotation=90, fontsize=10)
plt.xlabel("Year", fontsize=12)
plt.ylabel("Count", fontsize=12)
plt.title("Number of Movies or shows per year")
```

Out[73]:

```
Text(0.5, 1.0, 'Number of Movies or shows per year')
```



INSIGHT.

Maximum Content present on netflix is from International movie genre followed by Dramas and the Comedy

RECCOMMENDATION.

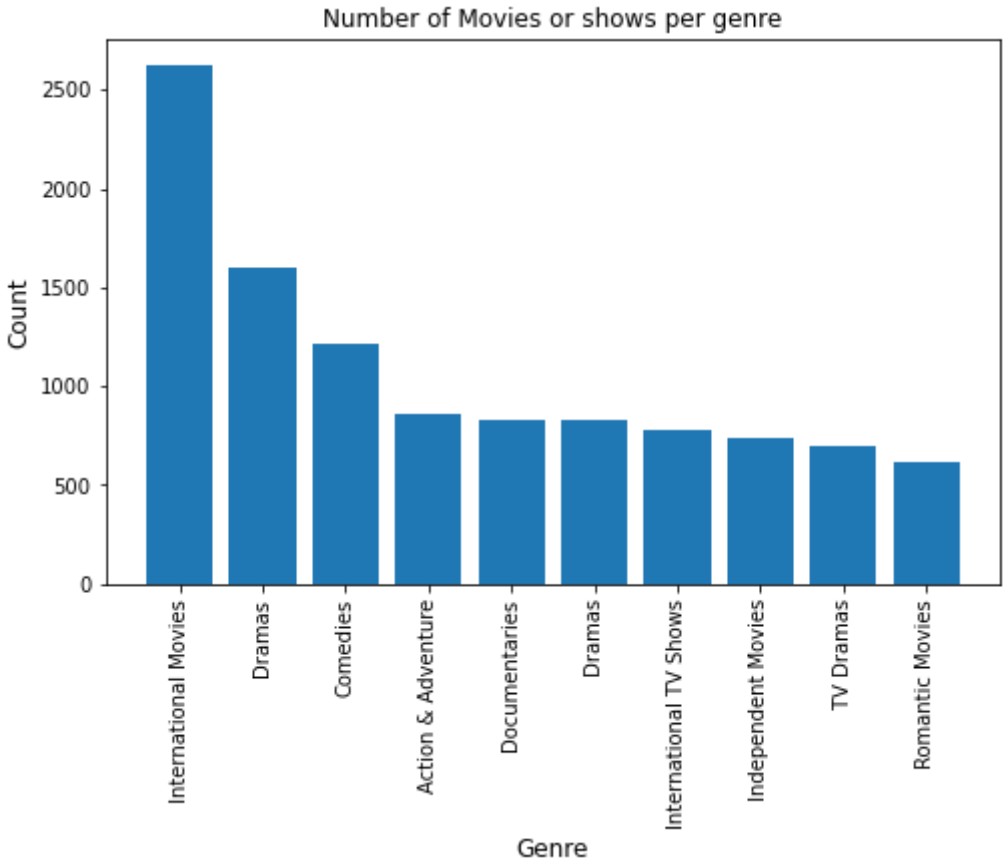
There are very less Content from Sci-Fi and Romantic movies which are very popular genre and has a huge fan base so netflix should add these genre into its list

In [78]:

```
content_by_genre = df_final.groupby(df_final['genre'])['title'].nunique().sort_values(as
content_by_genre.head(10)
plt.figure(figsize=(8,5))
plt.bar(content_by_genre['genre'][:10],content_by_genre['title'][:10])
plt.xticks(rotation=90, fontsize=10)
plt.xlabel("Genre", fontsize=12)
plt.ylabel("Count", fontsize=12)
plt.title("Number of Movies or shows per genre")
```

Out[78]:

```
Text(0.5, 1.0, 'Number of Movies or shows per genre')
```



In [ ]:

Insight

Netflix has maximum content of rating TV-MA(For Mature Audiences) and followed by TV-14(Parents strongly cautioned. May not be suitable for ages under 14.)

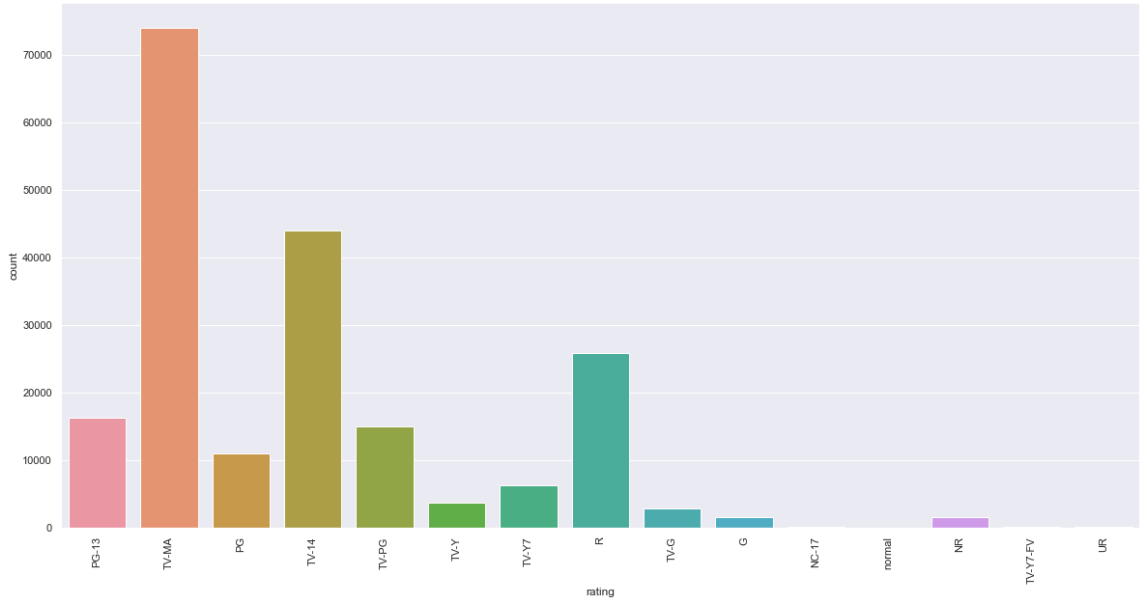
Reccomendation

Netflix should bring some kids friendly content in order to gain more traffic,kids do watch and other stuff so if kids frirndly content is available on Netflix then they will definitly use it.

Refrence- https://help.netflix.com/en/node/2064/us (https://help.netflix.com/en/node/2064/us)(for understanding rating legends)

In [88]:

```
sns.set(rc={'figure.figsize':(20,10)})
sns.countplot(x ='rating', data = df_final)
plt.xticks(rotation=90)
plt.show()
```



Distribution of Content country wise

Insights

India has Comedy movies but comedy TV shows count is neglegible same is visible with USA and if we Consider Japan sp japan has content from very few catagories

Reccommendation

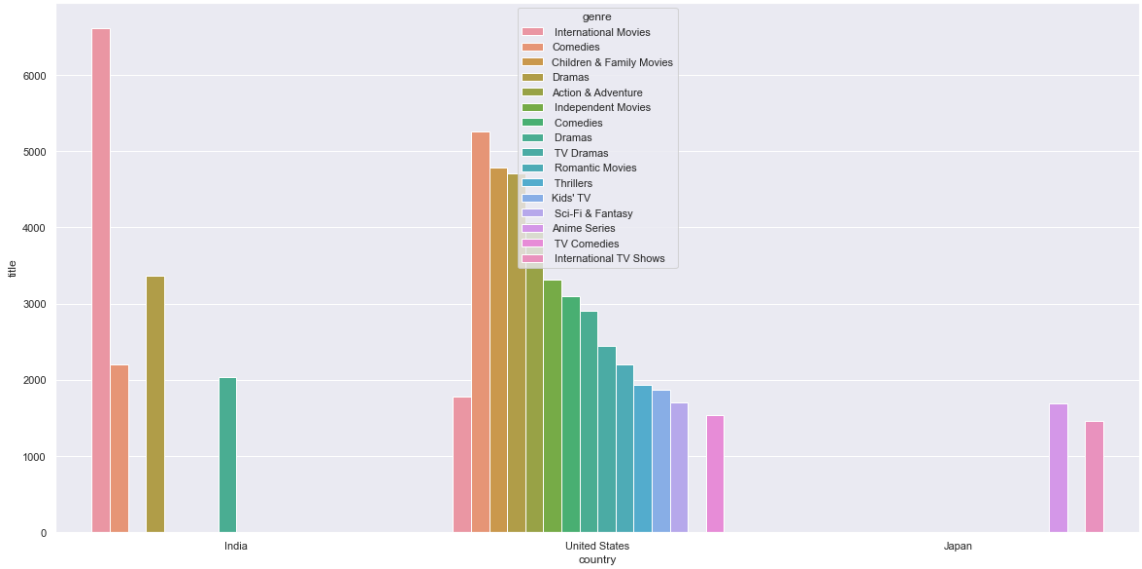
Neflix must increase content genre wise in order to engage more and more traffic

In [108]:

```
a = df_final.groupby(['country','genre'])['title'].count().sort_values(ascending = False
sns.set(rc={'figure.figsize':(20,10)})
sns.barplot(x='country',y='title',hue='genre',data=a)
```

Out[108]:

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



In [ ]:

In [ ]: