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Netflix is one of the most popular media and video streaming platforms. They have over 10000 movies or # tv shows available on their platform, as of mid-2021, they have over 222M Subscribers globally. This tabular dataset consists of listings of all the movies and tv shows available on Netflix, along with details such as - cast, directors, ratings, release year, duration, etc.

Dataset - Netflix Dataset Link

Understanding the Dataset

The dataset has a list of all the TV shows/movies available on Netflix:

Show_id: Unique ID for every Movie / Tv Show

Type: Identifier - A Movie or TV Show

Title: Title of the Movie / Tv Show

Director: Director of the Movie

Cast: Actors involved in the movie/show

Country: Country where the movie/show was produced

Date_added: Date it was added on Netflix

Release_year: Actual Release year of the movie/show

Rating: Maturity Rating of the movie/show

Duration: Total Duration - in minutes or number of seasons

Listed_in: Genre

Description: The summary description

Importing all the necessary libraries

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

Reading and checking the dataset

```
df = pd.read_csv("/kaggle/input/netflix/netflix.csv")
df.head()
```

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

```
df.shape
```

```
(8807, 12)
```

```
df.columns
```

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

Renaming the listed in column to genres

```
df.rename(columns={'listed_in':'genre'},inplace=True)
df.columns
```

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

Dropping the show_id column as it may be of no use in the analysis

```
df.drop(columns='show_id',inplace=True)
```

Checking for duplicates

```
df.duplicated().sum()
```

```
0
```

```
df.nunique().sort_values(ascending=False)
```

```
title           8807
description     8775
cast            7692
director        4528
date_added      1767
country          748
genre            514
duration         220
release_year      74
rating            17
type               2
dtype: int64
```

Checking the missing values

```
null = df.isna().sum().sort_values(ascending=False)
percent = round(df.isna().mean()*100,2).sort_values(ascending = False)

missing_data = pd.concat([null,percent],axis=1,keys=['Missing Value Count','Percentage'])

print('Total Records Present: ',df.shape[0])
print(missing_data[missing_data['Missing Value Count']!=0])
print('Total','                     ',missing_data['Missing Value Count'].sum(),'      ',round
```

```
Total Records Present:  8807
            Missing Value Count  Percentage
director                   2634       29.91
country                     831        9.44
cast                        825        9.37
date_added                   10        0.11
rating                        4        0.05
duration                      3        0.03
Total                      4307        48.9
```

Dropping the rows which have null values in date_added column as there are only 10 values which sums up to only 0.11% of the total values

```
df.dropna(subset = ['date_added'],inplace=True)
df['date_added'].isna().sum()
```

```
0
```

Dropping the rows which have null values in rating column as there are only 4 values which sums up to only 0.05% of the total values

```
df.dropna(subset = ['rating'],inplace=True)
df['rating'].isna().sum()
```

```
0
```

Dropping the rows which have null values in duration column as there are only 3 values which sums up to only 0.03% of the total values

```
df.dropna(subset = ['duration'],inplace=True)
df['rating'].isna().sum()
```

```
0
```

```
null = df.isna().sum().sort_values(ascending=False)
percent = round(df.isna().mean()*100,2).sort_values(ascending = False)

missing_data = pd.concat([null,percent],axis=1,keys=['Missing Value Count','Percentage'])

print('Total Records Present: ',df.shape[0])
print(missing_data[missing_data['Missing Value Count']!=0])
print('Total','                  ',missing_data['Missing Value Count'].sum(),'     ',round(10
```

```
Total Records Present:  8790
          Missing Value Count  Percentage
director                 2621       29.82
country                   829        9.43
cast                      825        9.39
Total                    4275       48.63
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 8790 entries, 0 to 8806
Data columns (total 11 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   type          8790 non-null   object
 1   title         8790 non-null   object
 2   director      6169 non-null   object
 3   cast          7965 non-null   object
 4   country       7961 non-null   object
 5   date_added    8790 non-null   object
 6   release_year  8790 non-null   int64
 7   rating        8790 non-null   object
 8   duration      8790 non-null   object
 9   genre         8790 non-null   object
 10  description   8790 non-null   object
dtypes: int64(1), object(10)
memory usage: 824.1+ KB
```

Converting the date added column from object to datetime format

```
df['date_added'] = pd.to_datetime(df['date_added'])
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 8790 entries, 0 to 8806
Data columns (total 11 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   type          8790 non-null   object
 1   title         8790 non-null   object
 2   director      6169 non-null   object
 3   cast          7965 non-null   object
 4   country       7961 non-null   object
 5   date_added    8790 non-null   datetime64[ns]
 6   release_year  8790 non-null   int64
 7   rating        8790 non-null   object
 8   duration      8790 non-null   object
 9   genre         8790 non-null   object
 10  description   8790 non-null   object
dtypes: datetime64[ns](1), int64(1), object(9)
memory usage: 824.1+ KB
```

Adding day, month, year, month_name, day_name as seperate columns to the dataframe as these will help us in analysis

```
df['day'] = df['date_added'].dt.day
df['month'] = df['date_added'].dt.month
df['year'] = df['date_added'].dt.year
df['month_name'] = df['date_added'].dt.month_name()
df['weekday'] = df['date_added'].dt.day_name()
df.head()
```

	type	title	director	cast	country	date_added	release_year	rating	dura
0	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	2021-09-25	2020	PG-13	9(
1	TV	Blood &	NaN	Ama Qamata, Khosi Ngema Thaban...	South	2021-09-24	2021	TV-MA	

Checking for unique values of rating and categorising them for better understanding

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

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

Samuel

Netflix has officially categorised theese into 3 main categories (https://help.netflix.com/en/node/2064/us), so using that for our EDA

Replacing 'TV-Y','TV-Y7','G','TV-G','PG','TV-PG','TV-Y7-FV' to Kids,

'PG-13','TV-14' to Teens,

'R','TV-MA','NC-17' to Adults,

and 'NR','UR' to null values

```
df['rating'] = df['rating'].replace(['TV-Y','TV-Y7','G','TV-G','PG','TV-PG','TV-Y7-FV'],'Kids
df['rating'] = df['rating'].replace(['PG-13','TV-14'],'Teens')
df['rating'] = df['rating'].replace(['R','TV-MA','NC-17'],'Adults')
df['rating'] = df['rating'].replace(['NR','UR'],np.NaN)
df.head()
```

	type	title	director	cast	country	date_added	release_year	rating	dura
0	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	2021-09-25	2020	Teens	9(

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

```
array(['Teens', 'Adults', 'Kids', nan], dtype=object)
```

1 Show Water NaN Ngema, Africa 2021-09-24 2021 Adults Sea

From here it is confirmed that values have been replaced successfully and now we will delete rows that have null values.

Sami

```
df['rating'].isna().sum()
```

```
82
```

Jouy,

```
df.dropna(subset = ['rating'],inplace=True)
df['rating'].isna().sum()
```

```
0
```

82 values were null, whhich was only about 1% of the data, so we deleted those rows.

```
null = df.isna().sum().sort_values(ascending=False)
percent = round(df.isna().mean()*100,2).sort_values(ascending = False)

missing_data = pd.concat([null,percent],axis=1,keys=['Missing Value Count','Percentage'])

print('Total Records Present: ',df.shape[0])
print(missing_data[missing_data['Missing Value Count']!=0])
print('Total','                  ',missing_data['Missing Value Count'].sum(),'     ',round(10
```

```
Total Records Present:  8708
          Missing Value Count  Percentage
director                 2617       30.05
country                   829        9.52
cast                      808        9.28
Total                    4254       48.85
```

Now, we still have about 48% missing data. So, we will check in which rows the director, country and cast all three are null, if all these 3 are null then there is no use of that row.

```
df[(df['director'].isna()) & (df['country'].isna()) & (df['cast'].isna())].shape[0]
```

```
96
```

We found out that total 96 such rows are there which dont have director, country and cast as null, so deleting those rows.

```
df.shape
```

```
(8708, 16)
```

```
df.dropna(subset = ['director','country','cast'], how = 'all',inplace=True)
df.shape
```

```
(8612, 16)
```

```
null = df.isna().sum().sort_values(ascending=False)
percent = round(df.isna().mean()*100,2).sort_values(ascending = False)

missing_data = pd.concat([null,percent],axis=1,keys=['Missing Value Count','Percentage'])

print('Total Records Present: ',df.shape[0])
print(missing_data[missing_data['Missing Value Count']!=0])
print('Total','                  ',missing_data['Missing Value Count'].sum(),'     ',round(10
```

```
Total Records Present:  8612
          Missing Value Count  Percentage
director                 2521       29.27
country                   733        8.51
cast                      712        8.27
Total                    3966       46.05
```

As the missing value percentage of these rows are significant, we cant delete them so we will deal with those later and now lets focus

on one more major problem in the dataset which is NESTED DATA in director, cast, country, and genre.

```
df.head()
```

	type	title	director	cast	country	date_added	release_year	rating	dura
0	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	2021-09-25	2020	Teens	9
1	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane	South Africa	2021-09-24	2021	Adults	Sea

Now we will split all the nested data individually and save them in a new dataframe, and then we will merge all of them so get the final dataframe.

Tracy

In the process we will lose the format of null values from np.NaN to string NaN, so that requires one additional step which is done in the last 2 lines of each block We can confirm the count of null values from the above block

```
df_cast = pd.DataFrame(df['cast'].apply(lambda x: str(x).split(', ')).tolist(),index=df['titl
df_cast = df_cast.stack()
df_cast = pd.DataFrame(df_cast)
df_cast.reset_index(inplace=True)
df_cast = df_cast[['title',0]]
df_cast.columns =['title','cast']
df_cast.replace('nan',np.NaN,inplace=True)
df_cast.isna().sum()
```

```
title      0
cast     712
dtype: int64
```

```
df_genre = pd.DataFrame(df['genre'].apply(lambda x: str(x).split(', ')).tolist(),index=df['ti
df_genre = df_genre.stack()
df_genre = pd.DataFrame(df_genre)
df_genre.reset_index(inplace=True)
df_genre = df_genre[['title',0]]
df_genre.columns =['title','genre']
df_genre.replace('nan',np.NaN,inplace=True)
df_genre.isna().sum()
```

```
title    0
genre    0
dtype: int64
```

```
df_director = pd.DataFrame(df['director'].apply(lambda x: str(x).split(', ')).tolist(),index=
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']
df_director.replace('nan',np.NaN,inplace=True)
df_director.isna().sum()
```

```
title          0
director    2521
dtype: int64
```

```
df_country = pd.DataFrame(df['country'].apply(lambda x: str(x).split(', ')).tolist(),index=df
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']
df_country.replace('nan',np.NaN,inplace=True)
df_country.isna().sum()
```

```
title        0
country    733
dtype: int64
```

```
df12 = df_cast.merge(df_genre, on = 'title')
df12
```

	title	cast	genre
0	Dick Johnson Is Dead	NaN	Documentaries
1	Blood & Water	Ama Qamata	International TV Shows
2	Blood & Water	Ama Qamata	TV Dramas
3	Blood & Water	Ama Qamata	TV Mysteries
4	Blood & Water	Khosi Ngema	International TV Shows
...	...	...	...
147927	Zubaan	Anita Shabdish	International Movies
147928	Zubaan	Anita Shabdish	Music & Musicals
147929	Zubaan	Chittaranjan Tripathy	Dramas
147930	Zubaan	Chittaranjan Tripathy	International Movies
147931	Zubaan	Chittaranjan Tripathy	Music & Musicals

147932 rows × 3 columns

```
df123 = df_director.merge(df12, on = 'title')
df123
```

	title	director	cast	genre
0	Dick Johnson Is Dead	Kirsten Johnson	NaN	Documentaries
1	Blood & Water	NaN	Ama Qamata	International TV Shows
2	Blood & Water	NaN	Ama Qamata	TV Dramas
3	Blood & Water	NaN	Ama Qamata	TV Mysteries
4	Blood & Water	NaN	Khosi Ngema	International TV Shows
...	...	...	...	...
159583	Zubaan	Mozez Singh	Anita Shabdish	International Movies
159584	Zubaan	Mozez Singh	Anita Shabdish	Music & Musicals
159585	Zubaan	Mozez Singh	Chittaranjan Tripathy	Dramas
159586	Zubaan	Mozez Singh	Chittaranjan Tripathy	International Movies
159587	Zubaan	Mozez Singh	Chittaranjan Tripathy	Music & Musicals

159588 rows × 4 columns

```
df1234 = df_country.merge(df123, on = 'title')
df1234
```

	title	country	director	cast	
0	Dick Johnson Is Dead	United States	Kirsten Johnson	NaN	Docume
1	Blood & Water	South Africa	NaN	Ama Qamata	International TV
2	Blood & Water	South Africa	NaN	Ama Qamata	TV D
3	Blood & Water	South Africa	NaN	Ama Qamata	TV My
4	Blood & Water	South Africa	NaN	Khosi Ngema	International TV
...	...	...	...	...	
199945	Zubaan	India	Mozez Singh	Anita Shabdish	International
199946	Zubaan	India	Mozez Singh	Anita Shabdish	Music & M
199947	Zubaan	India	Mozez Singh	Chittaranjan Tripathy	D
199948	Zubaan	India	Mozez Singh	Chittaranjan Tripathy	International
199949	Zubaan	India	Mozez Singh	Chittaranjan Tripathy	Music & M

199950 rows × 5 columns

```
df_new = df.merge(df1234, on = 'title')
df_new
```

	type	title	director_x	cast_x	country_x	date_added	release_year	ratir
0	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	2021-09-25	2020	Teer
1	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	2021-09-24	2021	Adul
2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	2021-09-24	2021	Adul
3	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	2021-09-24	2021	Adul

```
df_new.drop(columns = ['cast_x','country_x','director_x','genre_x'],inplace=True)
df_new.rename(columns={'country_y':'country','director_y':'director','cast_y':'cast','genre_y
df_new.head()
```

	type	title	date_added	release_year	rating	duration	description	day	month	y
0	Movie	Dick Johnson Is Dead	2021-09-25	2020	Teens	90 min	As her father nears the end of his life, filmm...	25	9	2
1	TV Show	Blood & Water	2021-09-24	2021	Adults	2 Seasons	After crossing paths at a party, a Cape Town t...	24	9	2
2	TV Show	Blood & Water	2021-09-24	2021	Adults	2 Seasons	After crossing paths at a party, a Cape	24	9	2

199946	Movie	Zubaan	Mozez Singh	Jane	India	2019-03-02	2015	Teer

```
df_new.shape
```

```
(199950, 16)
```

Vicky

This is the new dataframe which has 199950 rows and 16 columns after unnesting the data

199947 Movie Zubaan Singh Jane India 2019-03-02 2015 Teen

```
null = df_new.isna().sum().sort_values(ascending=False)
percent = round(df_new.isna().mean()*100,2).sort_values(ascending = False)

missing_data = pd.concat([null,percent],axis=1,keys=['Missing Value Count','Percentage'])

print('Total Records Present: ',df_new.shape[0])
print(missing_data[missing_data['Missing Value Count']!=0])
print('Total','                 ',missing_data['Missing Value Count'].sum(),'     ',round(100
```

```
Total Records Present:  199950
          Missing Value Count  Percentage
director                50116       25.06
country                 11710        5.86
cast                     1894        0.95
Total                   63720       31.87
```

Raaghav

Here we will not delete the missing values as it will affect the data and other columns will get manipulated, hence we will replace them with a global value 'unknown'

```
df_new['cast'] = df_new['cast'].replace(np.NaN,'Unknown')
df_new['country'] = df_new['country'].replace(np.NaN,'Unknown')
df_new['director'] = df_new['director'].replace(np.NaN,'Unknown')
```

```
df_new.head()
```

	type	title	date_added	release_year	rating	duration	description	day	month	y
0	Movie	Dick Johnson Is Dead	2021-09-25	2020	Teens	90 min	As her father nears the end of his life, filmm...	25	9	2
1	TV Show	Blood & Water	2021-09-24	2021	Adults	2 Seasons	After crossing paths at a party, a Cape Town t...	24	9	2
2	TV Show	Blood & Water	2021-09-24	2021	Adults	2 Seasons	After crossing paths at a party, a Cape	24	9	2

```
null = df_new.isna().sum().sort_values(ascending=False)
percent = round(df_new.isna().mean()*100,2).sort_values(ascending = False)

missing_data = pd.concat([null,percent],axis=1,keys=['Missing Value Count','Percentage'])
```

```
print('Total Records Present: ',df_new.shape[0])
print(missing_data[missing_data['Missing Value Count']!=0])
print('Total','                 ',missing_data['Missing Value Count'].sum(),'     ',round(100
```

```
Total Records Present:  199950
Empty DataFrame
Columns: [Missing Value Count, Percentage]
Index: []
Total                   0       0.0
```

After replacing we can confirm no more null values

```
df_new.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 199950 entries, 0 to 199949
Data columns (total 16 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   type          199950 non-null  object
 1   title         199950 non-null  object
 2   date_added    199950 non-null  datetime64[ns]
 3   release_year  199950 non-null  int64
 4   rating        199950 non-null  object
 5   duration      199950 non-null  object
 6   description   199950 non-null  object
 7   day           199950 non-null  int64
 8   month         199950 non-null  int64
 9   year          199950 non-null  int64
 10  month_name    199950 non-null  object
 11  weekday       199950 non-null  object
 12  country       199950 non-null  object
 13  director      199950 non-null  object
 14  cast          199950 non-null  object
 15  genre         199950 non-null  object
dtypes: datetime64[ns](1), int64(4), object(11)
memory usage: 25.9+ MB
```

```
df_new.duplicated().sum()
```

```
55
```

In the new dataframe, we can see 55 rows which are duplicated, so deleting them.

```
df_new.drop_duplicates(keep='first',inplace=True)
```

```
df_new.shape
```

```
(199895, 16)
```

Creating 2 more dataframes for better analysis by dividing the present dataframe on the basis of type i.e Movie and TV Show and naming them df_movies and df_tvs.

```
df_movies = df_new.loc[df_new['type']=='Movie']
df_tvs = df_new.loc[df_new['type']=='TV Show']
```

```
df_movies.shape
```

```
(144240, 16)
```

```
df_tvs.shape
```

```
(55655, 16)
```

The duration column has values such as 90 minutes for movies and 2 seasons for tv shows, so we will remove the word 'minutes' and 'seasons' in their respective dataframes.

```
df_movies['duration'] = df_movies['duration'].str.replace('min',"")
df_movies.head()
```

```
/tmp/ipykernel_20/772087966.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_
  df_movies['duration'] = df_movies['duration'].str.replace('min',"")
```

	type	title	date_added	release_year	rating	duration	description	day	mon
0	Movie	Dick Johnson Is Dead	2021-09-25	2020	Teens	90	As her father nears the end of his life, filmm...	25	
157	Movie	My Little Pony: A New Generation	2021-09-24	2021	Kids	91	Equestria's divided. But a bright-eyed hero be...	24	
158	Movie	My Little Pony: A New Generation	2021-09-24	2021	Kids	91	Equestria's divided. But a bright-eyed hero be...	24	

```
df_tvs['duration'] = df_tvs['duration'].str.replace('Seasons',"")
df_tvs['duration'] = df_tvs['duration'].str.replace('Season',"")
```

```
df_tvs.head()
```

```
/tmp/ipykernel_20/4164884425.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_
  df_tvs['duration'] = df_tvs['duration'].str.replace('Seasons',"")
/tmp/ipykernel_20/4164884425.py:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_
  df_tvs['duration'] = df_tvs['duration'].str.replace('Season',"")
```

	type	title	date_added	release_year	rating	duration	description	day	month	yea
1	TV Show	Blood & Water	2021-09-24	2021	Adults	2	After crossing paths at a party, a Cape Town t...	24	9	202
2	TV Show	Blood & Water	2021-09-24	2021	Adults	2	After crossing paths at a party, a Cape Town t...	24	9	202
3	TV	Blood &	2021-09-24	2021	Adults	2	After crossing paths at a	24	9	202

Here, we are replacing the column duration with a better name season for tv shows only in df_tvs.

```
df_tvs.rename(columns={'duration':'seasons'},inplace=True)
```

```
/tmp/ipykernel_20/3221938497.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_
  df_tvs.rename(columns={'duration':'seasons'},inplace=True)
```

Finally, we have 4 dataframes, we will use all of these according to the analysis required ahead

df = Cleaned data before unnesting.

df_new = Cleaned data after unnesting.

df_movies = Cleaned data of type - movie after unnesting.

df_tvs = Cleaned data of type - TV Show after unnesting

We are ready with out dataframes, and also ready to begin our EDA!

Lets start with checking the time period of our data.

```
print(df['year'].min())
print(df['year'].max())
```

```
2008
2021
```

- The data lies between the year 2008 and 2021.

Now lets see the count of content available on Netflix.

```
df.shape[0]
```

```
8612
```

- The Netflix library has 8612 movies or shows to watch.

Now, lets see the count of movies and TV Shows individually.

```
print('Movie: ', df[df['type']=='Movie'].shape[0])
print('TV Show: ', df[df['type']=='TV Show'].shape[0])
```

```
Movie:  6031
TV Show:  2581
```

- There are a total of 6031 movies and 2581 TV shows to available.

Now, lets see how many directors are present in the data.

```
df_director['director'].nunique()
```

```
4925
```

- There are a total of 4925 directors present in the data

Now, lets see the count of actors present.

```
df_cast['cast'].nunique()
```

```
36148
```

- There are a total of 36148 actors present in the data.

Lets check in how many countries in the data distributed in.

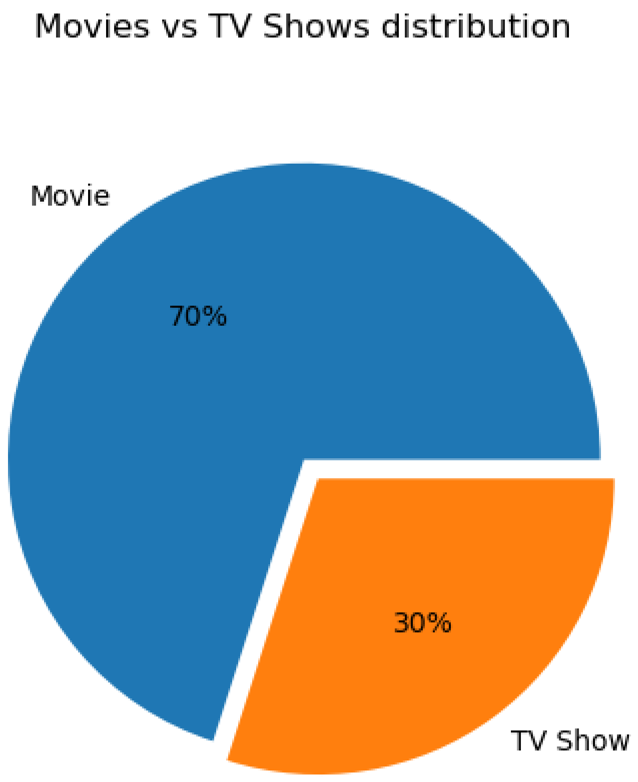
```
df_country['country'].nunique()
```

```
127
```

- The content is distributed across 127 countries.

Lets start our visualisation with seeing the distribution of content on Netflix. Here we will use df as we only need to count the row once.

```
labels = ['Movie', 'TV Show']
plt.pie(df.groupby('type')['type'].count(), labels = labels, explode = (0.08,0), autopct = '%
plt.suptitle('Movies vs TV Shows distribution')
plt.show()
```



Inference

- Netflix has 70% of its content as movies.
- TV Shows are clearly lesser than Movies.

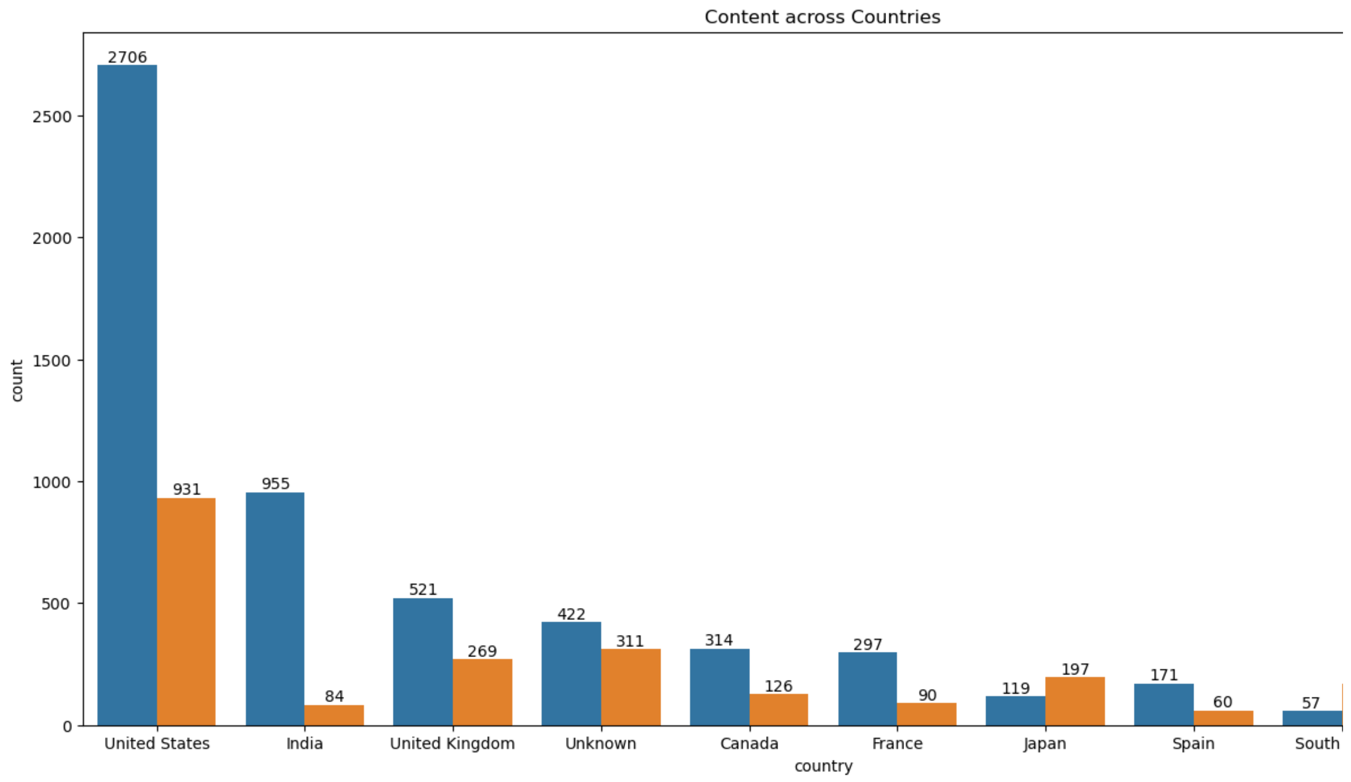
Recommendations

- More TV Shows should be added as they create more suspense and have more story than a 100 minute movie.
- Users like to binge watch a particular story for a longer time.

Lets see the content distribution across countries.

Here we need the unnested data for countries which is in df_new and we need to count the titles. After unnesting there is only one dataframe which has multiple rows because we also unnested the director, cast and genre, so hence we will do a drop_duplicate function on the df_new so that we will only get one row of the title and country group.

```
df_temp = df_new.drop_duplicates(subset = ['country', 'title'])

x = df_temp['country'].value_counts().head(10)

plt.figure(figsize = (17,8))
plt.title('Content across Countries')
label = sns.countplot(data = df_temp, x = 'country', hue = 'type', order=x.index)
for i in label.containers:
    label.bar_label(i)
plt.show()
```



Inference

- US has the most content for movies followed by India and UK.
- TV Shows are mostly created in the US and UK.
- We can also observe that all the countries have more movies than TV Shows, whereas Japan and South Korea have more TV shows than movies.

Recommendation

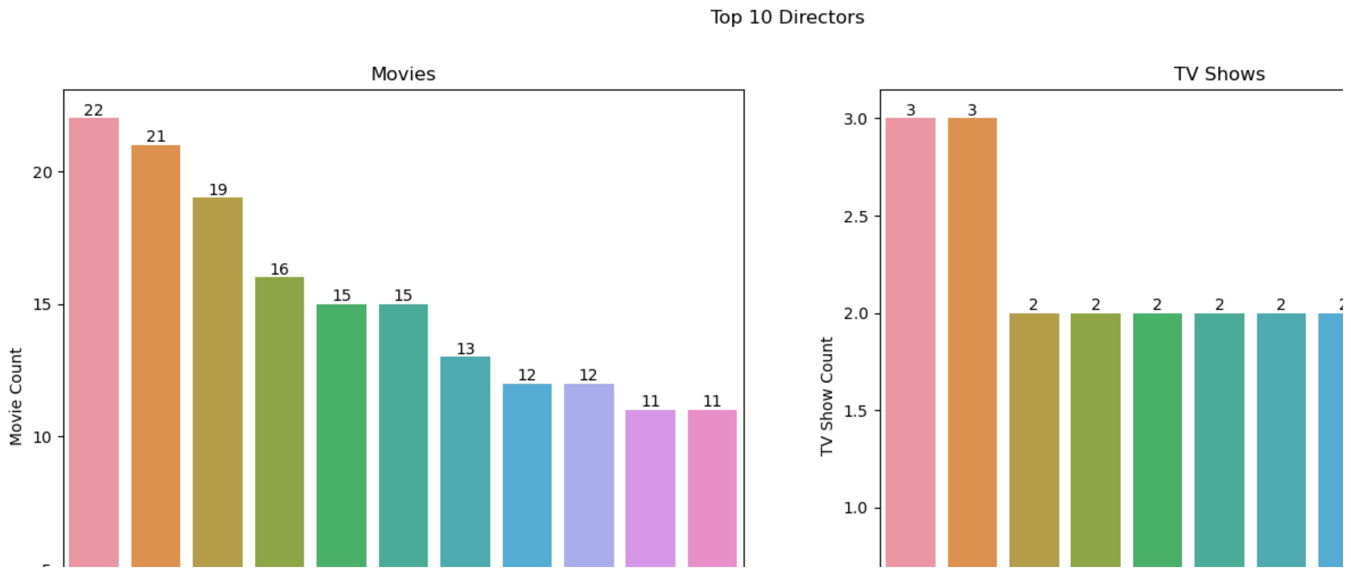
- The difference between the number of movies and Tv shows for all the countries is very high especially for India.
- This should be minimised by adding more TV Shows as TV Shows can keep a user engaged for 2-3 seasons rated than a 100 minute movie.
- TV Shows have also been very popular in recent times and are the new and demanded versions of a movie.

Lets see the top 10 Directors.

Here we need unnested data of directors only so we will drop duplicates on director, title group in df_movies and df_tvs.

```
df_movies_temp = df_movies.drop_duplicates(subset = ['director','title'])
df_tvs_temp = df_tvs.drop_duplicates(subset = ['director','title'])
```

```
plt.figure(figsize = (17,7))
plt.suptitle('Top 10 Directors')

plt.subplot(1,2,1)
label = sns.countplot(data=df_movies_temp, x='director', order = df_movies_temp['director'].v
for i in label.containers:
    label.bar_label(i)
plt.title("Movies")
plt.xticks(rotation=45)
plt.xlabel('Directors')
plt.ylabel('Movie Count')

plt.subplot(1,2,2)
label = sns.countplot(data=df_tvs_temp, x='director', order = df_tvs_temp['director'].value_c
for i in label.containers:
    label.bar_label(i)
plt.title("TV Shows")
plt.xticks(rotation=45)
plt.xlabel('Directors')
plt.ylabel('TV Show Count')

plt.show()
```



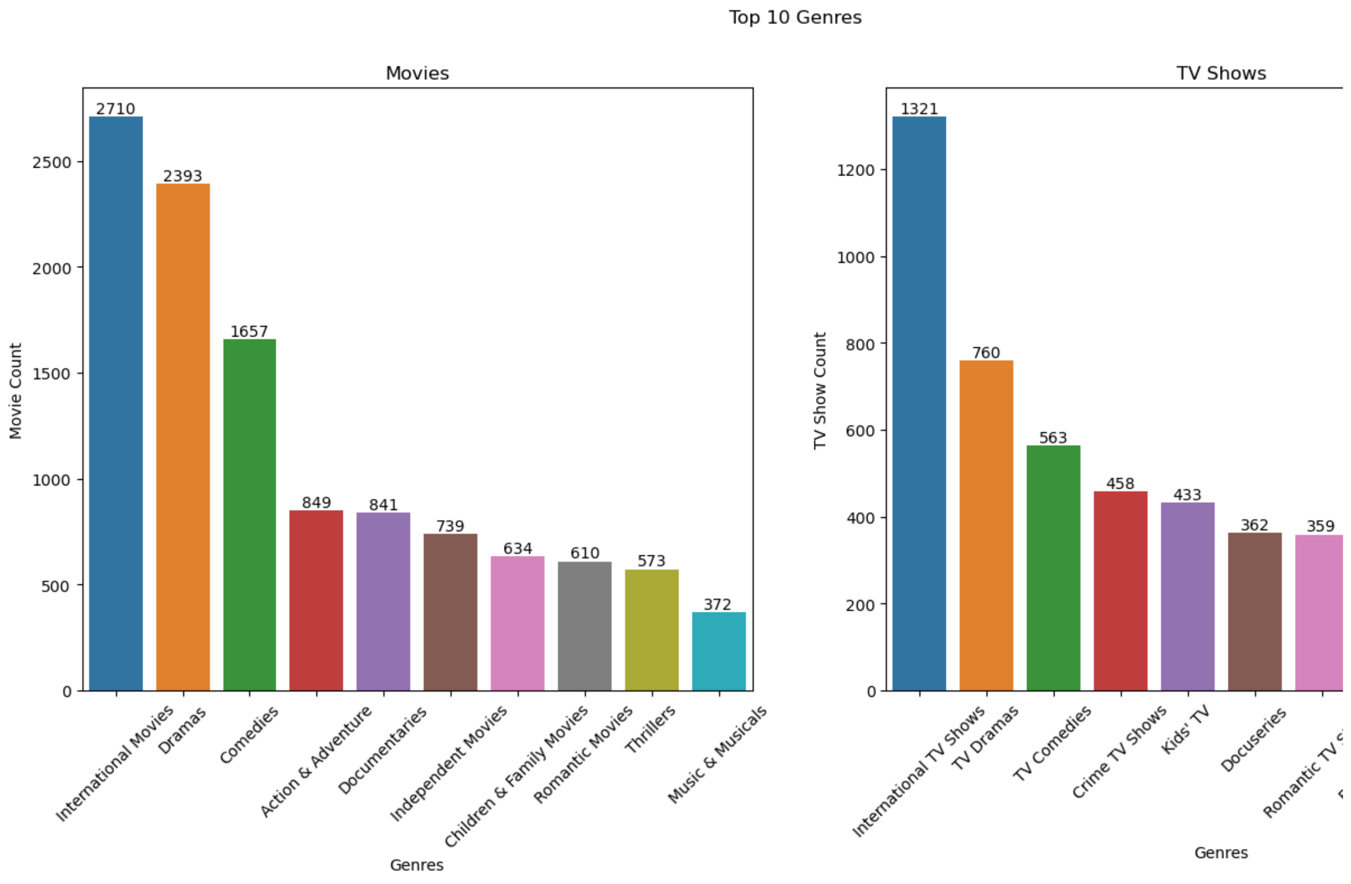
Inference

- Rajiv Chilaka, Jan Suter, Raul Campos are the most active directors with 22, 21 and 19 movies,
- Whereas for TV Shows all the directos have directed around 2-3 shows only.

Lets see the top 10 Genres

Here we need unnested data of genres only so we will drop duplicates on genre, title group in df_movies and df_tvs.

```
df_movies_temp = df_movies.drop_duplicates(subset = ['genre','title'])
df_tvs_temp = df_tvs.drop_duplicates(subset = ['genre','title'])

plt.figure(figsize = (17,7))
plt.suptitle('Top 10 Genres')

plt.subplot(1,2,1)
label = sns.countplot(data= df_movies_temp, x='genre', order = df_movies_temp['genre'].value_
for i in label.containers:
    label.bar_label(i)
plt.title("Movies")
plt.xticks(rotation=45)
plt.xlabel('Genres')
plt.ylabel('Movie Count')

plt.subplot(1,2,2)
label = sns.countplot(data=df_tvs_temp, x='genre', order = df_tvs_temp['genre'].value_counts(
for i in label.containers:
    label.bar_label(i)
plt.title("TV Shows")
plt.xticks(rotation=45)
plt.xlabel('Genres')
plt.ylabel('TV Show Count')

plt.show()
```



Inference

- From the above graph, it is inferred that most of the content fall under International followed by Drama and Comedy genre

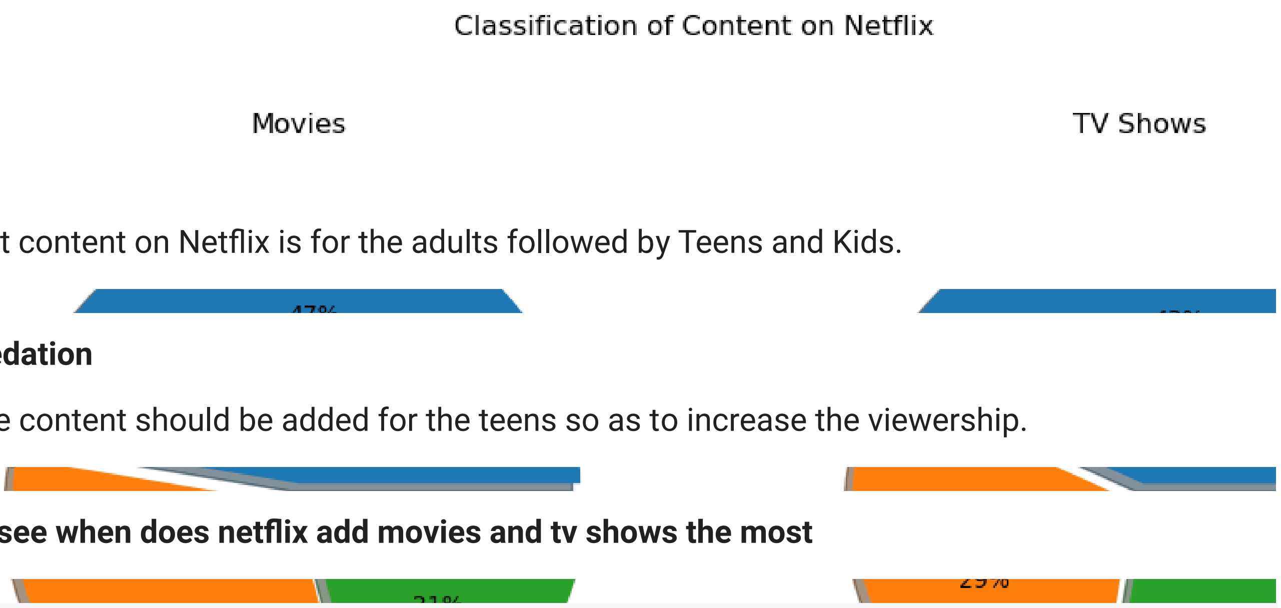
Recommendations

- The count of International genre is very high as compared to other genres for TV Shows,
- Netflix should try adding more content of different genres as well.

```
df_temp = df_new.drop_duplicates(subset = ['genre','title'])

plt.figure(figsize = (17,8))
plt.xticks(rotation=90)
sns.countplot(data = df_temp, x='country', hue = 'type', dodge = False, order = df_temp['coun
plt.show()
```

Lets see the content available age group wise

```
df_movies_temp = df_movies.drop_duplicates(subset = ['rating','title'])
df_tvs_temp = df_tvs.drop_duplicates(subset = ['rating','title'])

plt.figure(figsize = (12,6))
plt.suptitle('Classification of Content on Netflix')

plt.subplot(1,2,1)
plt.pie(df_movies_temp['rating'].value_counts(), labels = df_movies_temp['rating'].value_coun
plt.title('Movies')

plt.subplot(1,2,2)
plt.pie(df_tvs_temp['rating'].value_counts(), labels = df_tvs_temp['rating'].value_counts().i
plt.title('TV Shows')

plt.show()
```



Inference

- Most content on Netflix is for the adults followed by Teens and Kids.

Recommedation

- More content should be added for the teens so as to increase the viewership.

Now, lets see when does netflix add movies and tv shows the most

```
df_movies_temp = df_movies.drop_duplicates(subset = ['year','title'])


mv_year = df_movies_temp['year'].value_counts()
mv_year.sort_index(inplace=True)

month_order = ['January', 'February', 'March', 'April', 'May', 'June', 'July','August', 'Sept
mv_month = df_movies_temp['month_name'].value_counts().loc[month_order]

day_order = ['Monday','Tuesday','Wednesday','Thursday','Friday','Saturday','Sunday']
mv_day = df_movies_temp['weekday'].value_counts().loc[day_order]


plt.figure(figsize=(17,8))
plt.suptitle('Movies added on Netflix')

plt.subplot(1,3,1)
label = sns.countplot(data=df_movies_temp, x='year', order = mv_year.index)
for i in label.containers:
    label.bar_label(i)
plt.xticks(rotation=45)
plt.xlabel('Year')
plt.title('Year wise')

plt.subplot(1,3,2)
label = sns.countplot(data=df_movies_temp, x='month_name', order = mv_month.index)
for i in label.containers:
    label.bar_label(i)
plt.xticks(rotation=45)
plt.xlabel('Month')
plt.title('Month wise')

plt.subplot(1,3,3)
label = sns.countplot(data=df_movies_temp, x='weekday', order = mv_day.index)
```

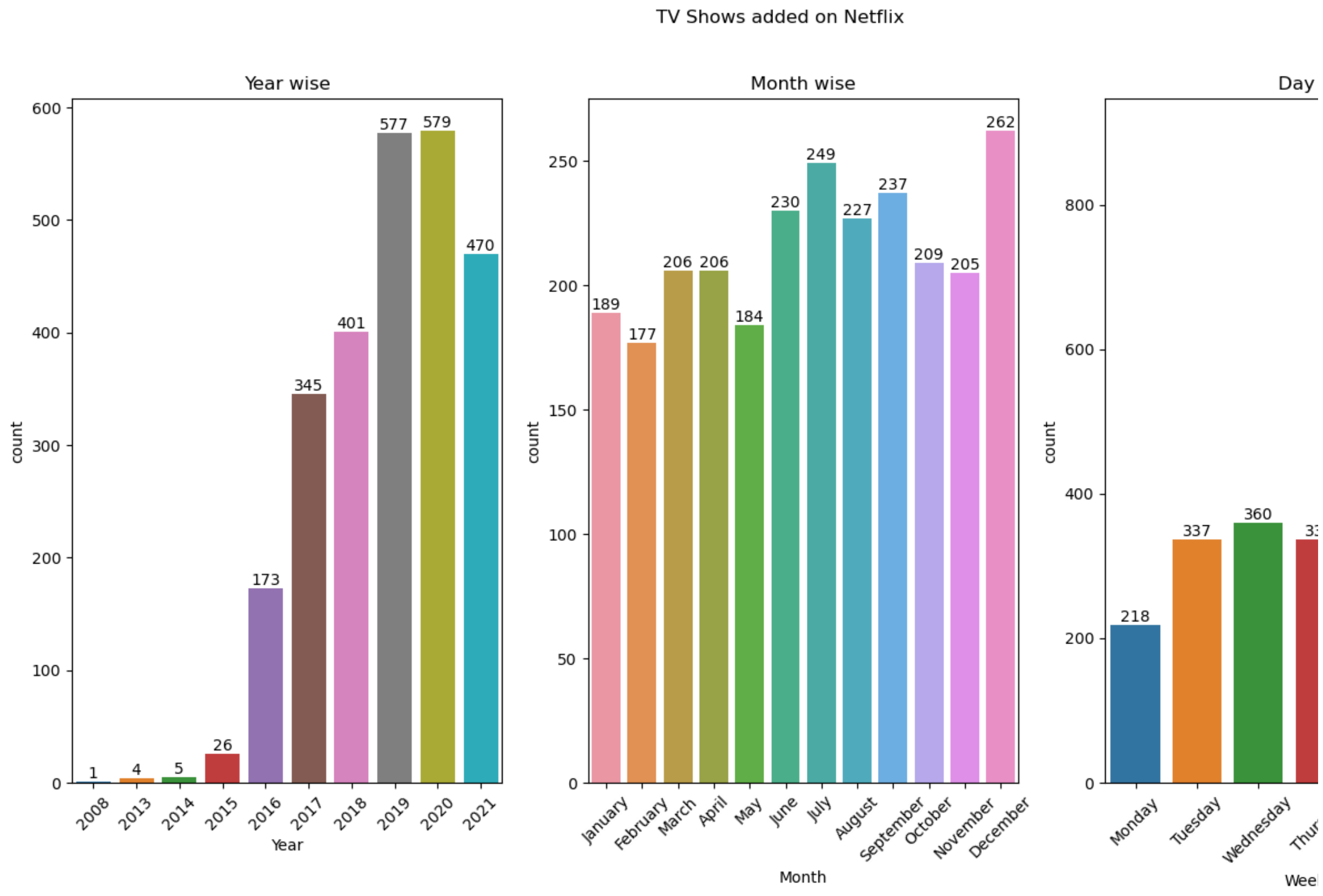
```
for i in label.containers:
    label.bar_label(i)
plt.xticks(rotation=45)
plt.xlabel('Weekday')
plt.title('Day wise')


plt.show()
```

Movies added on Netflix

Inference

- As per the data, most movies were released in the year 2019 and 2020.
- They were released the most in July.
- We can also see that most movies were released on Friday.

```
df_tvs_temp = df_tvs.drop_duplicates(subset = ['year','title'])

tv_year = df_tvs_temp['year'].value_counts()
tv_year.sort_index(inplace=True)

month_order = ['January', 'February', 'March', 'April', 'May', 'June', 'July','August', 'Sept
tv_month = df_tvs_temp['month_name'].value_counts().loc[month_order]

day_order = ['Monday','Tuesday','Wednesday','Thursday','Friday','Saturday','Sunday']
tv_day = df_tvs_temp['weekday'].value_counts().loc[day_order]


plt.figure(figsize=(17,8))
plt.suptitle('TV Shows added on Netflix')

plt.subplot(1,3,1)
label = sns.countplot(data=df_tvs_temp, x='year', order = tv_year.index)
for i in label.containers:
    label.bar_label(i)
plt.xticks(rotation=45)
plt.xlabel('Year')
plt.title('Year wise')

plt.subplot(1,3,2)
label = sns.countplot(data=df_tvs_temp, x='month_name', order = tv_month.index)
for i in label.containers:
    label.bar_label(i)
plt.xticks(rotation=45)
plt.xlabel('Month')
plt.title('Month wise')

plt.subplot(1,3,3)
label = sns.countplot(data=df_tvs_temp, x='weekday', order = tv_day.index)
for i in label.containers:
    label.bar_label(i)
plt.xticks(rotation=45)
plt.xlabel('Weekday')
plt.title('Day wise')


plt.show()
```



Inference

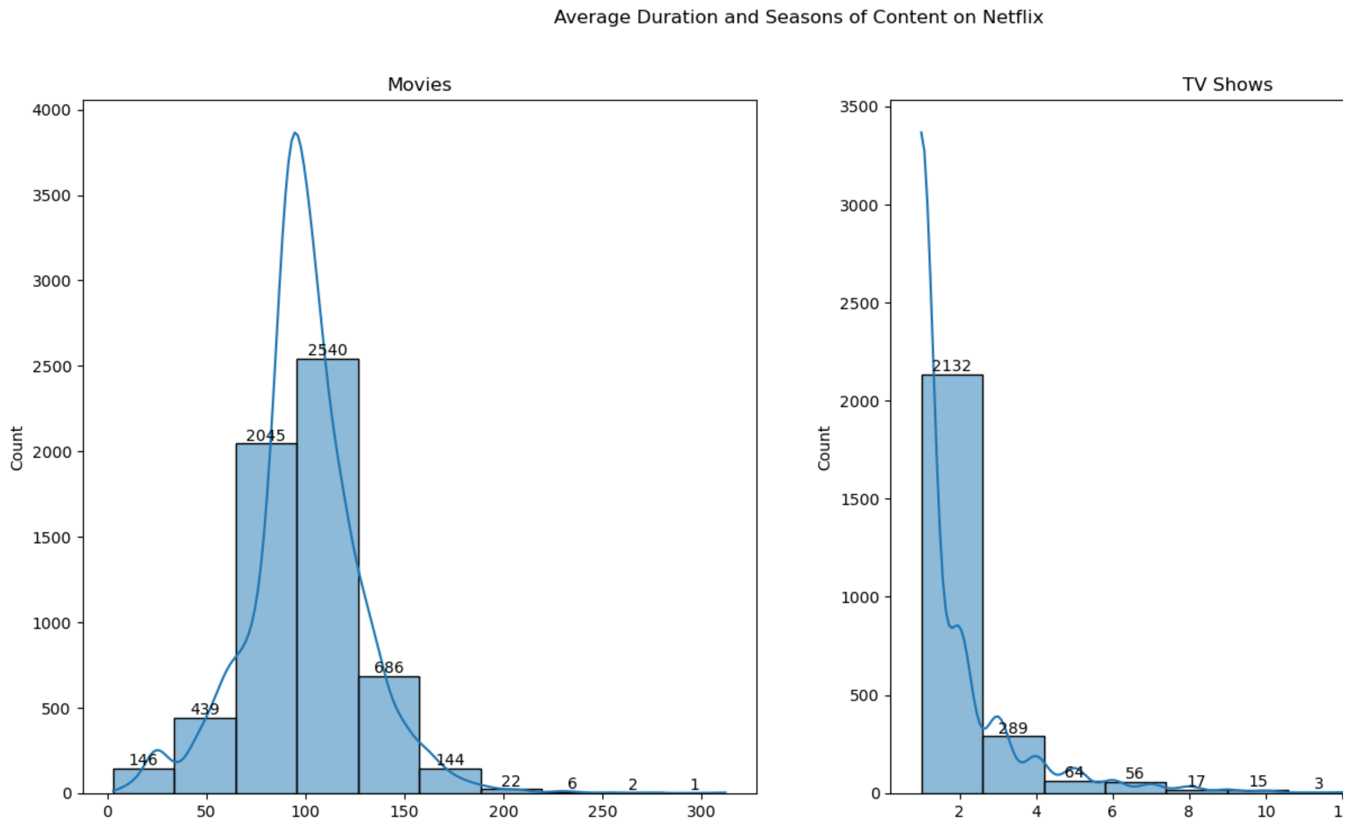
- As per the data, most TV Shows were released in the year 2019 and 2020.
- They were released the most in December followed by July and September.
- We can also see that most shows were released on Friday.

Recommendation

- To increase viewership in India, more shows should be released during the vacation or festival seasons which are around April-May and between October and December.

Lets see the average duration of a movie and a average season of TV Show

```
df_movies_temp = df_movies.drop_duplicates(subset = ['duration','title'])
df_tvs_temp = df_tvs.drop_duplicates(subset = ['seasons','title'])



plt.figure(figsize=(17,8))
plt.suptitle('Average Duration and Seasons of Content on Netflix')

plt.subplot(1,2,1)
label = sns.histplot(df_movies_temp['duration'].astype(int), bins=10, kde = True)
for i in label.containers:
    label.bar_label(i)
plt.xlabel('Duration')
plt.title('Movies')

plt.subplot(1,2,2)
label = sns.histplot(df_tvs_temp['seasons'].astype(int), bins=10, kde = True)
for i in label.containers:
    label.bar_label(i)
plt.xlabel('Seasons')
plt.title('TV Shows')

plt.show()
```



Inference

- Most (Around 4500) movies have duration between 65 and 125 minutes.
- Most(Around 2200) TV Shows have been produced for around 2 seasons.

Recommendations

- Duration must be kep between 65 and 125 minutes for a movie.
- TV Show should have around 2-3 seasons

Lets see the range of most movie's duration and tv show's seasons lie.

```
df_movies_temp['duration'] = df_movies_temp['duration'].astype(int)
df_tvs_temp['seasons'] = df_tvs_temp['seasons'].astype(int)

plt.figure(figsize=(17,8))
plt.suptitle('Average Duration and Seasons of Content on Netflix')

plt.subplot(1,2,1)
sns.boxplot(df_movies_temp, x='type', y='duration')
plt.title('Movies')

plt.subplot(1,2,2)
sns.boxplot(df_tvs_temp, x='type', y='seasons')
plt.title('TV Shows')
plt.show()
```

```
/tmp/ipykernel_20/785406378.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead
```

Inference

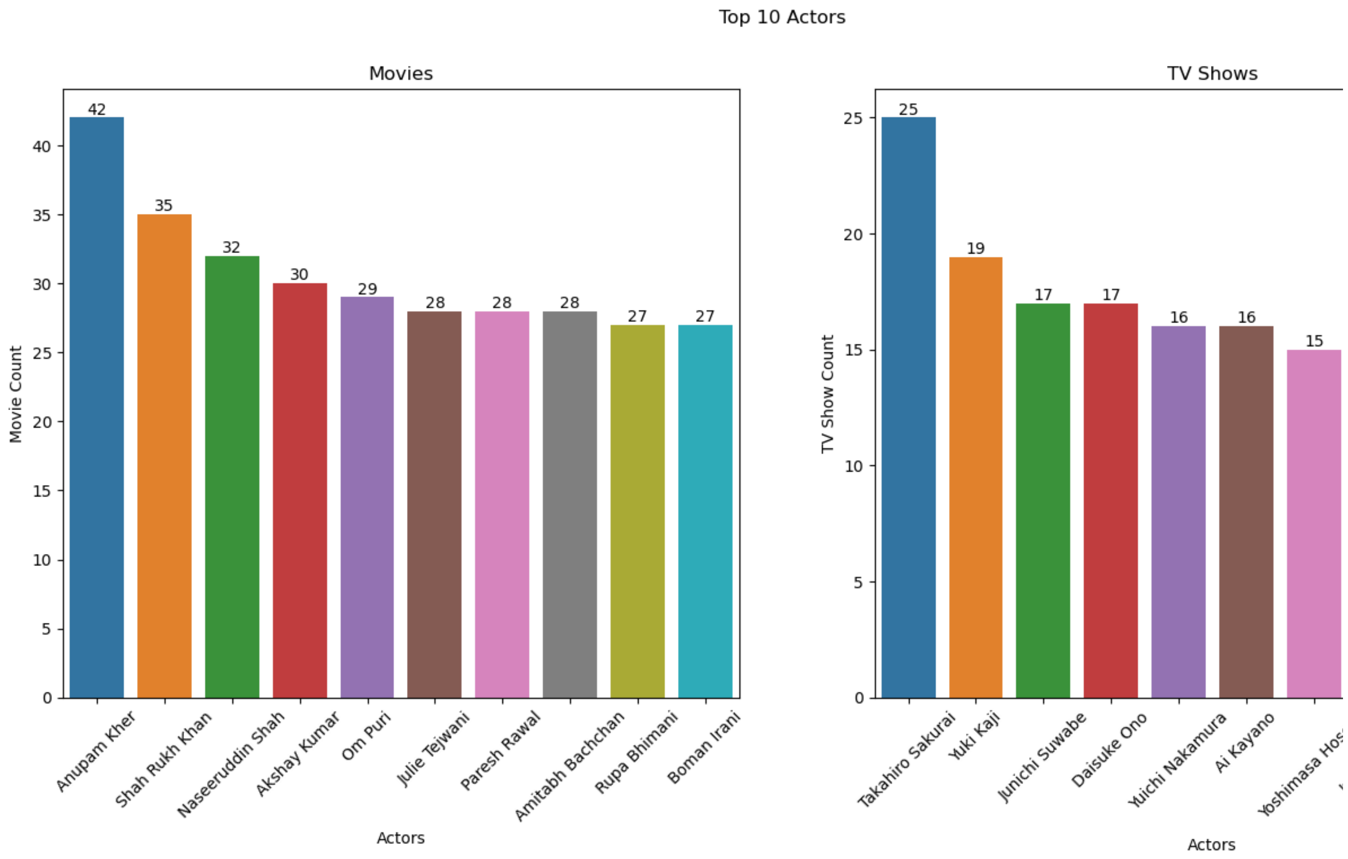
- The median duration of a movie on Netflix is around 100 minutes, whereas the median season of a TV Show is 1 season.
- Most movies have duration length between 50 and 160 minutes.
- Most TV shows have either 1,2 or 3 seasons.

Recommendation

- In order to keep the audience engaged, it is recommended to keep the movie length upto 160 minutes and upto 3 seasons for a TV Show.

Lets see most active actors for movies and tv shows seperately.

```
df_movies_temp = df_movies.drop_duplicates(subset = ['cast','title'])
df_tvs_temp = df_tvs.drop_duplicates(subset = ['cast','title'])

plt.figure(figsize = (17,7))
plt.suptitle('Top 10 Actors')

plt.subplot(1,2,1)
label = sns.countplot(data=df_movies_temp, x='cast', order = df_movies_temp['cast'].value_cou
for i in label.containers:
    label.bar_label(i)
plt.title("Movies")
plt.xticks(rotation=45)
plt.xlabel('Actors')
plt.ylabel('Movie Count')

plt.subplot(1,2,2)
label = sns.countplot(data=df_tvs_temp, x='cast', order = df_tvs_temp['cast'].value_counts()[
for i in label.containers:
    label.bar_label(i)
plt.title("TV Shows")
plt.xticks(rotation=45)
plt.xlabel('Actors')
plt.ylabel('TV Show Count')

plt.show()
```



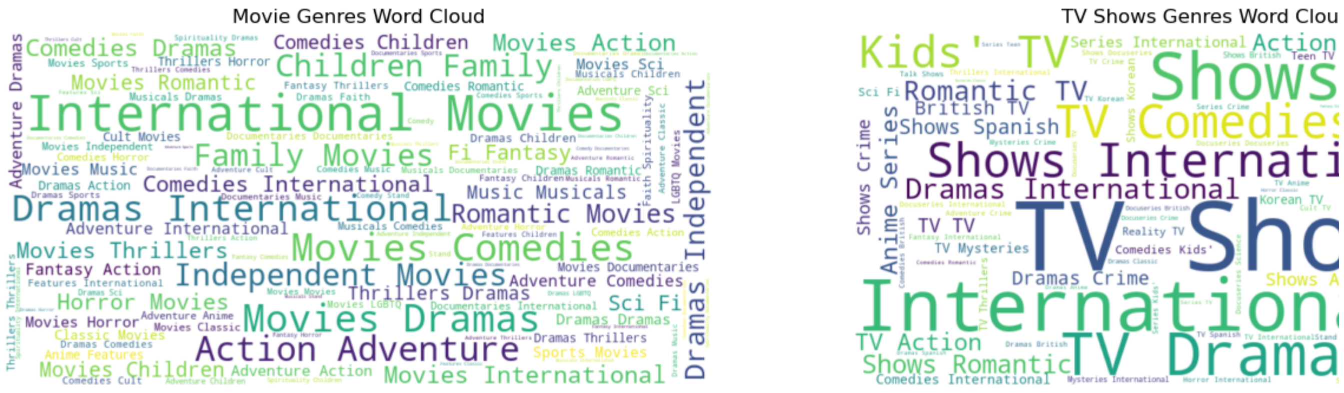
Inference

- We can clearly see that Anupam Kher has done the most amount of movies followed by Shah Rukh Khan and Naseeruddin Shah.
- The top 10 actors for movies are all Indians, whereas the top 10 actors for TV Shows are from different countries.
- 8 out of the top 10 actors for movies are males and 2 are females.

Recommendations

- TV Shows have very few Indian actors as compared to other actors.
- To increase viewership of TV Shows in India, Netflix should add more TV Shows with Indian actors in it.

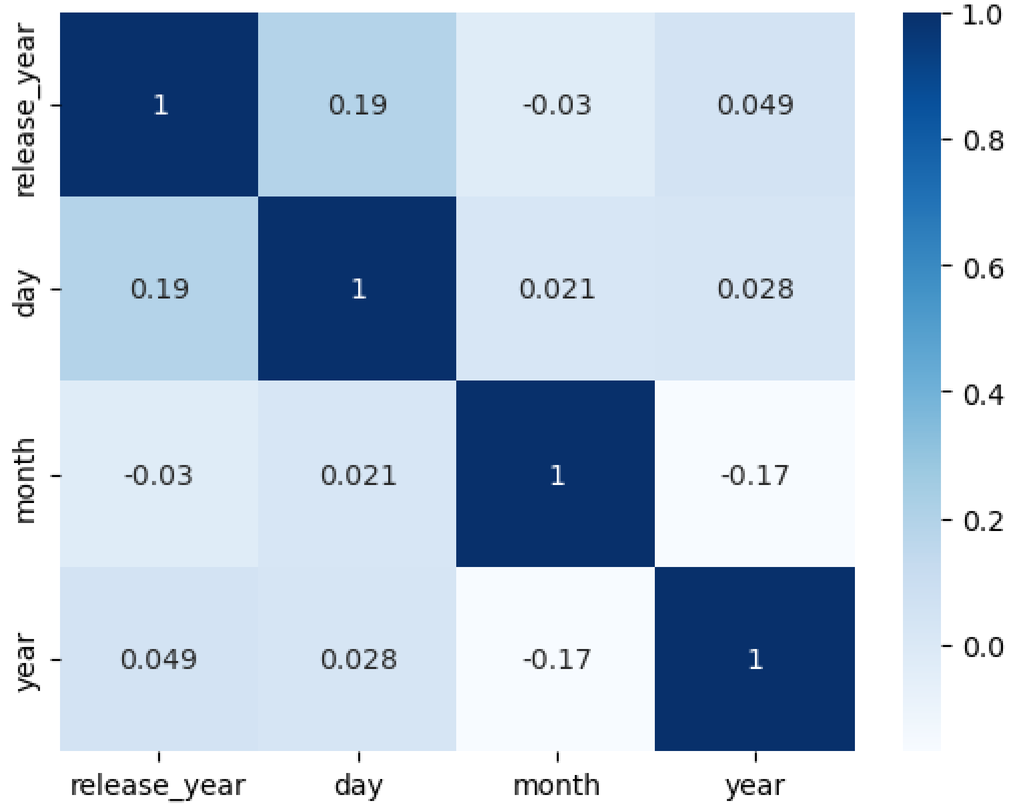
```
genre_text = " ".join(df_movies["genre"])
wordcloud = WordCloud(width=800, height=400, background_color="white").generate(genre_text)

plt.figure(figsize=(17, 10))

plt.subplot(1,2,1)
plt.imshow(wordcloud, interpolation="bilinear")
plt.axis("off")
plt.title("Movie Genres Word Cloud")

genre_text = " ".join(df_tvs["genre"])
wordcloud = WordCloud(width=800, height=400, background_color="white").generate(genre_text)

plt.subplot(1,2,2)
plt.imshow(wordcloud, interpolation="bilinear")
plt.axis("off")
plt.title("TV Shows Genres Word Cloud")

plt.show()
```



Lets see the correlation in our data.

```
sns.heatmap(df_new.corr(), cmap = 'Blues', annot=True)
plt.show()
```

```
/tmp/ipykernel_20/2437158043.py:1: FutureWarning: The default value of numeric_only in [
  sns.heatmap(df_new.corr(), cmap = 'Blues', annot=True)
```

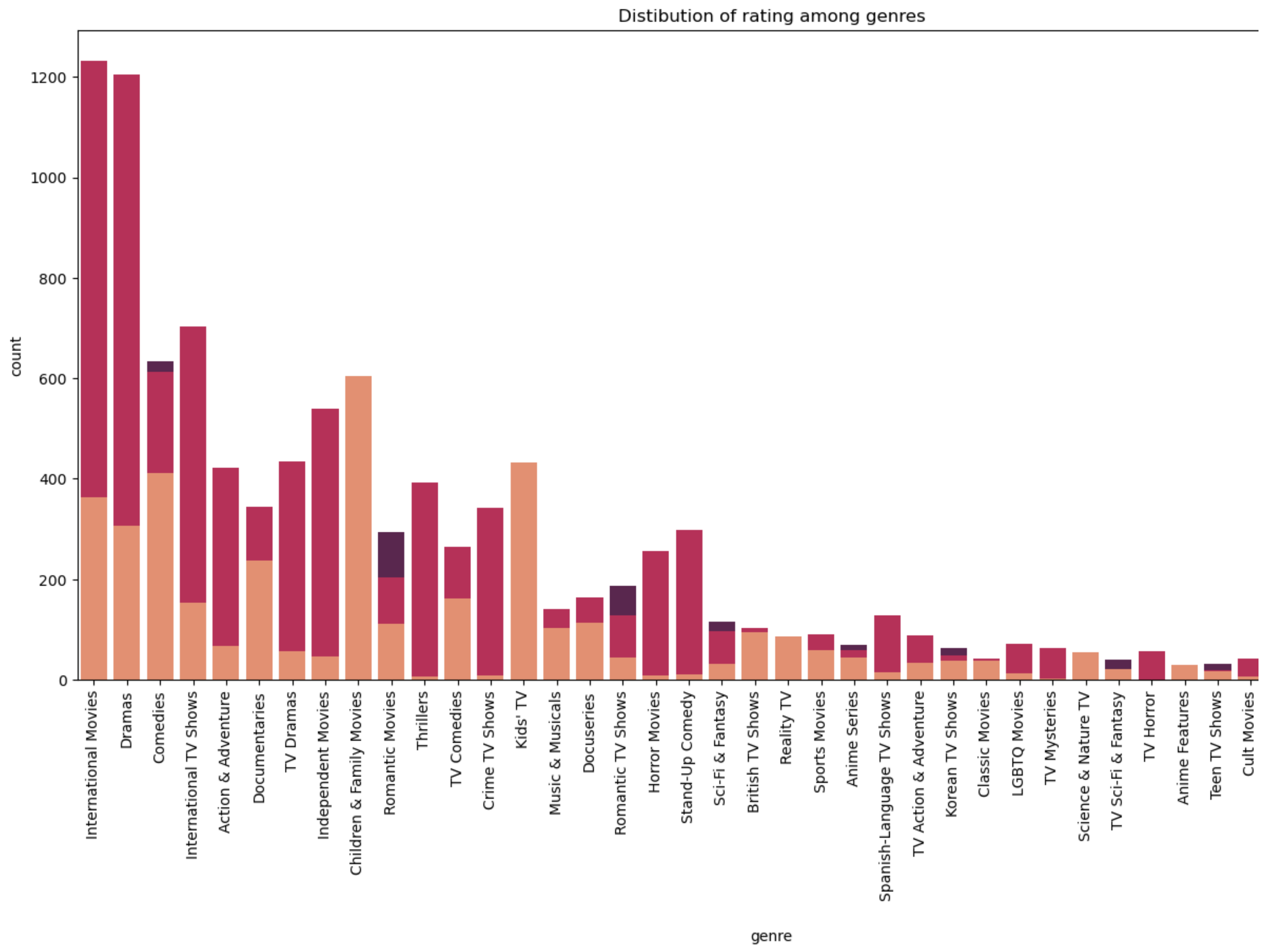


Inference

- The heatmap shows the relation between numerical values of the data.
- Heatmap in our case gives us no interpretation as the only numerical values which we have in our data are the day, month and year of the movie or tv show.

Lets see distribution of genre and rating among themselves.

```
df_temp = df_new.drop_duplicates(subset = ['genre','title'])

plt.figure(figsize=(17,8))
plt.title('Distibution of rating among genres')
sns.countplot(data=df_temp, x='genre', hue = 'rating', dodge=False, order = df_temp['genre'].
plt.xticks(rotation=90)
plt.show()
```



Inference

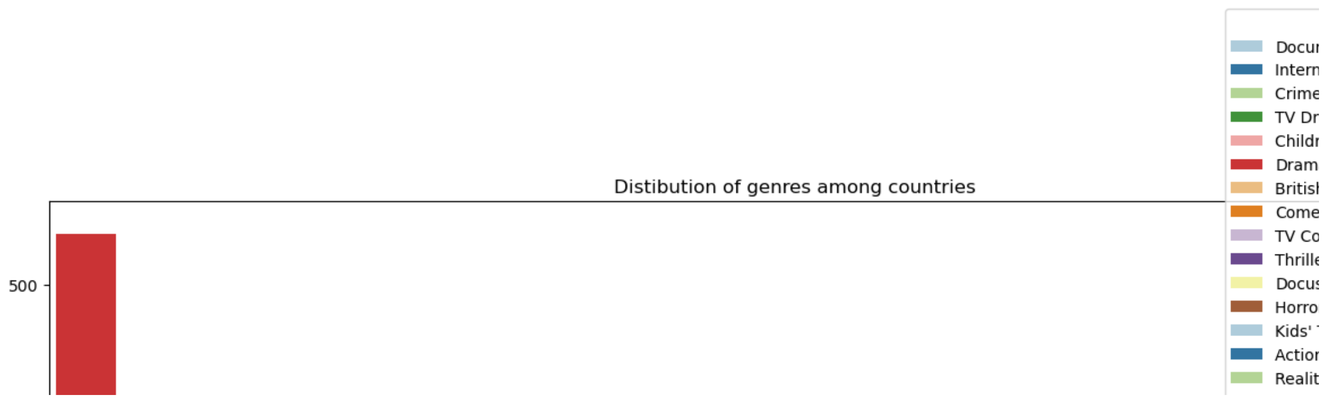
- We can clearly see that most content(both movies and tv shows) are made for adults.

Recommendations

- To increase more users, netflix should diversify the content for teens and kids as well.

Lets see distribution of genres across countries.

```
df_temp = df_new.drop_duplicates(subset = ['country','title'])

plt.figure(figsize=(17,8))
plt.title('Distibution of genres among countries')
sns.countplot(data=df_temp, x='country', hue = 'genre', dodge=False, order = df_temp['country
plt.xticks(rotation=90)
plt.show()
```



Inference

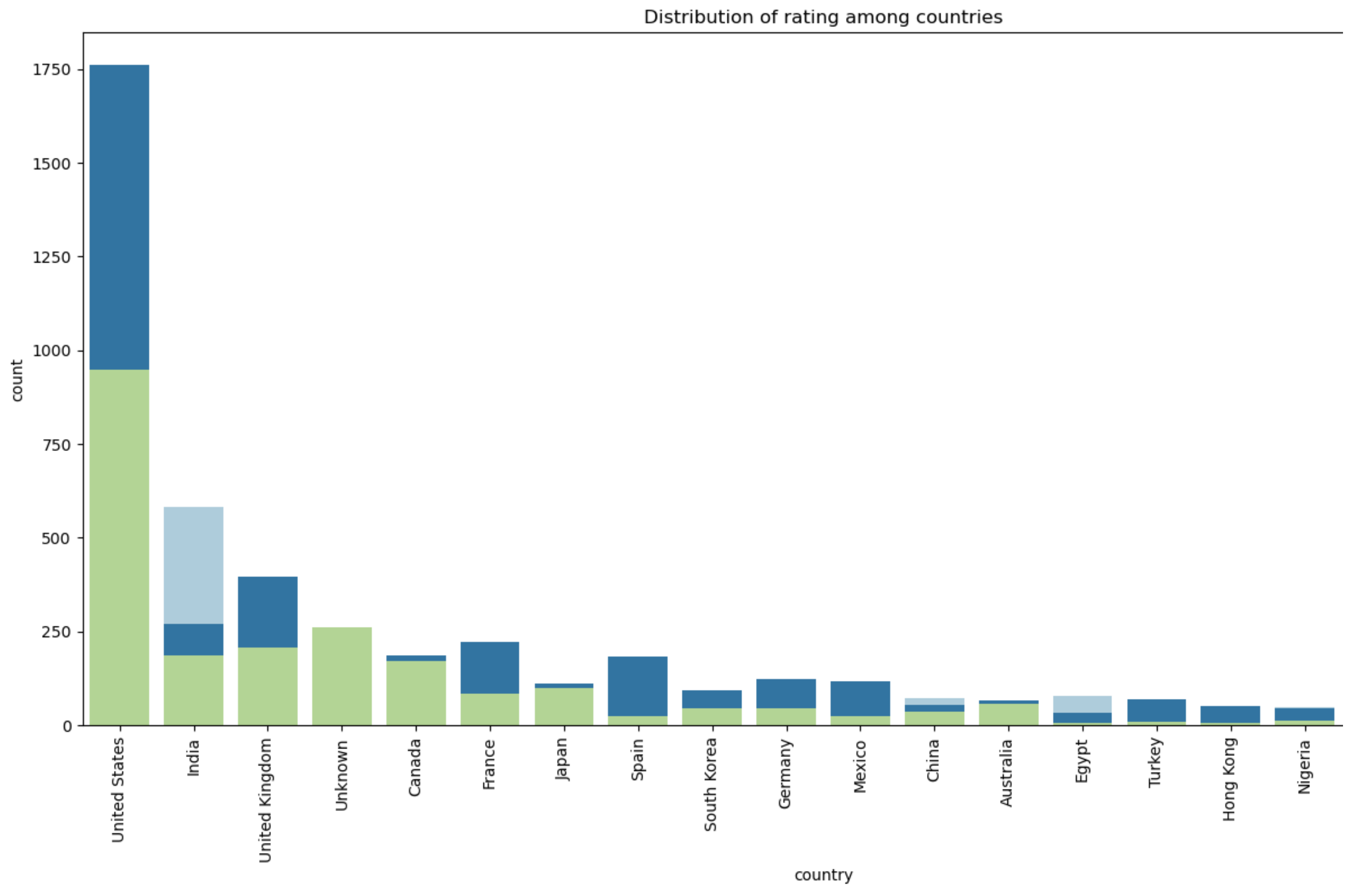
- We can observe that International(Blue color) and Drama(Red color) are the most type of content available on Netflix.

Recommendations

- Netflix should produce more different genres also in order to attract and increase viewership.

Lets see countrywise content rating classification.

```
df_temp = df_new.drop_duplicates(subset = ['country','title'])

plt.figure(figsize=(17,8))
plt.title('Distribution of rating among countries')
sns.countplot(data=df_temp, x='country', hue = 'rating', dodge=False, order = df_temp['countr
plt.xticks(rotation=90)
plt.show()
```



Inference

- We can see the in US and UK there is no content specially made for the teens, whereas in India we can see the that most of the content is made for teens.

Recommendation

- More content for teens should be added to atract newer audiences.

We have completed our Exploratory Data Analysis! Please Upvote if you liked the analysis. I am open to suggestions and recommendations. Thank You !