Netflix Data Exploration Business Case

-Data Analysis by Piyush Joshi

https://colab.research.google.com/drive/1xuDINecC6qOuwxecQxJPifSCCYCeSYjx?pli=1#scrollTo=UD6Ienzcdabn&uniqifier=2

Importing and analysing the dataframe

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

```
!wget https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/000/000/940/original/netflix.csv
```

```
--2024-05-11 15:41:25--  https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/000/000/940/original/netflix.csv
Resolving d2beiqkhq929f0.cloudfront.net (d2beiqkhq929f0.cloudfront.net)... 13.35.37.31, 13.35.37.159, 13.35.37.102, ...
Connecting to d2beiqkhq929f0.cloudfront.net (d2beiqkhq929f0.cloudfront.net)|13.35.37.31|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 3399671 (3.2M) [text/plain]
Saving to: ‘netflix.csv’

netflix.csv         100%[===================>]   3.24M  4.25MB/s    in 0.8s

2024-05-11 15:41:27 (4.25 MB/s) - ‘netflix.csv’ saved [3399671/3399671]
```

```
df=pd.read_csv("netflix.csv")
df.head(5)
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	des
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90 min	Documentaries	As nea
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, TV Dramas, TV Mysteries	pa
					Sami						Crime TV	

Next steps: Generate code with df | View recommended plots

```
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
```

```
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')
```

Insight : The dataframe focuses on the Netflix providing insightful information about featured movies and TV show with unique show_id and titles spreading across 8807 rows and 12 columns

Recommendation: Data must be cleaned before coming to any actionable insights.

Basic Analysis

1. **Un-nesting the columns**:

```
#finding columns with cells having nested values
column = "show_id"
df[df[column].apply(lambda x: "," in str(x))]
```

show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description

```
#finding columns with cells having nested values
column = "title"
df[df[column].apply(lambda x: "," in str(x))]. head(4)
```

```
#Assuming "title","date_added" and "description" can have commas as substring
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_i
10	s11	TV Show	Vendetta: Truth, Lies and The Mafia	NaN	NaN	NaN	September 24, 2021	2021	TV-MA	1 Season	Crime T Show Docuserie Internation TV S
140	s141	Movie	El patrón, radiografía de un crimen	Sebastián Schindel	Joaquín Furriel, Luis Ziembrowski, Guillermo P...	Argentina, Venezuela	September 1, 2021	2014	TV-MA	100 min	Drama Internation Movie Thrille
			LSD: Love,	Dibakar	Nushrat Bharucha,		August 27				Drama Independe

```
column = "director"
df[df[column].apply(lambda x: "," in str(x))]. head(4)
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in
6	s7	Movie	My Little Pony: A New Generation	Robert Cullen, José Luis Ucha	Vanessa Hudgens, Kimiko Glenn, James Marsden, ...	NaN	September 24, 2021	2021	PG	91 min	Children & Family Movies
16	s17	Movie	Europe's Most Dangerous Man: Otto Skorzeny in ...	Pedro de Echave García, Pablo Azorín Williams	NaN	NaN	September 22, 2021	2020	TV-MA	67 min	Documentaries, International Movies
			Go! Go!		Maisie						

```
unnested_dir=df[["title","director"]]
unnested_dir['director'].fillna("unknown_director",inplace=True)
unnested_dir["unnested_director"]=unnested_dir["director"].apply(lambda x: str(x).split(", "))
unnested_dir= unnested_dir.explode("unnested_director").drop("director", axis="columns")
unnested_dir.head(5)
```

```
<ipython-input-8-e1f8f0176ebc>:2: 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_guide/indexing.html#returning-a
  unnested_dir['director'].fillna("unknown_director",inplace=True)
<ipython-input-8-e1f8f0176ebc>:3: 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_guide/indexing.html#returning-a
  unnested_dir["unnested_director"]=unnested_dir["director"].apply(lambda x: str(x).split(", "))
```

	title	unnested_director
0	Dick Johnson Is Dead	Kirsten Johnson
1	Blood & Water	unknown_director
2	Ganglands	Julien Leclercq
3	Jailbirds New Orleans	unknown_director
4	Kota Factory	unknown_director

Next steps: Generate code with unnested_dir | View recommended plots

```
merge_dir = pd.merge(
    left=df,
    right=unnested_dir,
    on="title"
)

merge_dir.head(7)
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	des
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90 min	Documentaries	As nea
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, TV Dramas, TV Mysteries	pa
2	s3	TV Show	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...	NaN	September 24, 2021	2021	TV-MA	1 Season	Crime TV Shows, International TV Shows, TV Act...	
3	s4	TV Show	Jailbirds New Orleans	NaN	NaN	NaN	September 24, 2021	2021	TV-MA	1 Season	Docuseries, Reality TV	anc
					Mayur More,						International	

Next steps: Generate code with merge_dir View recommended plots

```
column = "cast"
df[df[column].apply(lambda x: "," in str(x))]. head(4)
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	descr
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, TV Dramas, TV Mysteries	cı pat party, T
2	s3	TV	Ganglands	Julien	Sami Bouajila, Tracy Gotoas	NaN	September	2021	TV-MA	1 Season	Crime TV Shows, International	To his

```
unnest_cast=df[["title","cast"]]
unnest_cast['cast'].fillna("unknown_cast",inplace=True)
unnest_cast["unnested_cast"]=unnest_cast["cast"].apply(lambda x: str(x).split(", "))
unnest_cast= unnest_cast.explode("unnested_cast").drop("cast", axis="columns")
unnest_cast.head(10)
```

```
<ipython-input-11-3f8d9b9cd5d1>:2: 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_guide/indexing.html#returning-a
  unnest_cast['cast'].fillna("unknown_cast",inplace=True)
<ipython-input-11-3f8d9b9cd5d1>:3: 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_guide/indexing.html#returning-a
  unnest_cast["unnested_cast"]=unnest_cast["cast"].apply(lambda x: str(x).split(", "))
```

	title	unnested_cast
0	Dick Johnson Is Dead	unknown_cast
1	Blood & Water	Ama Qamata
1	Blood & Water	Khosi Ngema
1	Blood & Water	Gail Mabalane
1	Blood & Water	Thabang Molaba
1	Blood & Water	Dillon Windvogel
1	Blood & Water	Natasha Thahane
1	Blood & Water	Arno Greeff
1	Blood & Water	Xolile Tshabalala
1	Blood & Water	Getmore Sithole

Next steps: Generate code with unnest_cast View recommended plots

```
merge_cast = pd.merge(
    left=df,
    right=unnest_cast,
    on="title"
)
merge_cast.head(7)
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	desci
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90 min	Documentaries	As h nears o
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, TV Dramas, TV Mysteries	pa party
2	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, TV Dramas, TV Mysteries	pa party
3	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail	South Africa	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, TV Dramas, TV Mysteries	pa party

Next steps: Generate code with `merge_cast` View recommended plots

```
column = "country"
df[df[column].apply(lambda x: "," in str(x))]. head(4)
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	de
7	s8	Movie	Sankofa	Haile Gerima	Kofi Ghanaba, Oyafunmike Ogunlano, Alexandra D...	United States, Ghana, Burkina Faso, United Kin...	September 24, 2021	1993	TV-MA	125 min	Dramas, Independent Movies, International Movies	
12	s13	Movie	Je Suis Karl	Christian Schwochow	Luna Wedler, Jannis Niewöhner, Milan Peschel, ...	Germany, Czech Republic	September 23, 2021	2021	TV-MA	127 min	Dramas, International Movies	A l

```
unnest_country=df[["title","country"]]
unnest_country['country'].fillna("unknown_country",inplace=True)
unnest_country["unnested_country"]=unnest_country["country"].apply(lambda x: str(x).split(", "))
unnest_country= unnest_country.explode("unnested_country").drop("country", axis="columns")
unnest_country.head(10)
```

```
<ipython-input-14-8e5099cfec85>:2: 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_guide/indexing.html#returning-a
  unnest_country['country'].fillna("unknown_country",inplace=True)
<ipython-input-14-8e5099cfec85>:3: 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_guide/indexing.html#returning-a
  unnest_country["unnested_country"]=unnest_country["country"].apply(lambda x: str(x).split(", "))
```

	title	unnested_country
0	Dick Johnson Is Dead	United States
1	Blood & Water	South Africa
2	Ganglands	unknown_country
3	Jailbirds New Orleans	unknown_country
4	Kota Factory	India
5	Midnight Mass	unknown_country
6	My Little Pony: A New Generation	unknown_country
7	Sankofa	United States
7	Sankofa	Ghana
7	Sankofa	Burkina Faso

Next steps: Generate code with unnest_country | View recommended plots

```
merge_country = pd.merge(
    left=df,
    right=unnest_country,
    on="title"
)
merge_country.head(7)
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	des
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90 min	Documentaries	As nea
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, TV Dramas, TV Mysteries	pa
2	s3	TV Show	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...	NaN	September 24, 2021	2021	TV-MA	1 Season	Crime TV Shows, International TV Shows, TV Act...	
3	s4	TV Show	Jailbirds New Orleans	NaN	NaN	NaN	September 24, 2021	2021	TV-MA	1 Season	Docuseries, Reality TV	anc
					Mayur More,						International	

Next steps: Generate code with merge_country | View recommended plots

```
unnest_list=df[["title","listed_in"]]
unnest_list["unnested_list"]=unnest_list["listed_in"].apply(lambda x: str(x).split(", "))
unnest_list= unnest_list.explode("unnested_list").drop("listed_in", axis="columns")

merge_list= pd.merge(
    left=df,
    right=unnest_list,
    on="title"
)
merge_list.head(4)
```

```
<ipython-input-16-ca6797404eca>: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_guide/indexing.html#returning-a
  unnest_list["unnested_list"]=unnest_list["listed_in"].apply(lambda x: str(x).split(", "))
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	desc
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90 min	Documentaries	As h nears o
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, TV Dramas, TV Mysteries	pa party
					Ama Qamata,							

Next steps: Generate code with merge_list | View recommended plots

Note: we can unnest all columns in a single dataframe but that would lead to duplication of rows and wont be feasable for any aggregation operation.

Insight: Netflix has an array of Titles that encompases a spectrum of Internatinal audience spread across multidimensional genres collborated by wide range of directors and actors collaborating from time to time for unique content.

Recommendation: It's recommended to add and produce more such content that has an international target audience spread across nationalities with a winning combination of director and cast.

Basic Analysis

2. Handling null values : For categorical variables with null values, update those rows as unknown_column_name and replace continuous variables having null values with 0.

```
df.isna().sum() #checking columns for Null/NaN values in the entire dataframe
```

```
show_id          0
type             0
title            0
director      2634
cast           825
country        831
date_added      10
release_year     0
rating           4
duration         3
```

```
listed_in          0
description        0
dtype: int64
```

```
categorical_columns = df.select_dtypes(include=['object'])
categorical_columns.columns #finding list of categorical columns
```

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

```
df['director'].fillna("unknown_director",inplace=True)
df['cast'].fillna("unknown_cast",inplace=True)
df['country'].fillna("unknown_country",inplace=True)
df['date_added'].fillna("unknown_date_added",inplace=True)
df['rating'].fillna("unknown_rating",inplace=True)
df['duration'].fillna("unknown_duration",inplace=True)
df.isna().sum()
```

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

Converting Column "duration" from categorical to continuous for TV shows and movies respectively

```
df['Movie_Mins'] = df[df['type'] == 'Movie']['duration'].apply(lambda x: int(x.split(" ")[0]) if " " in x else 0)
df['Movie_Mins'].fillna(0,inplace=True)
df['Movie_Mins']=df['Movie_Mins'].astype(int)
df['Number_of_Seasons'] = df[df['type']=='TV Show']['duration'].apply(lambda x: int(x.split(" ")[0]) if " " in x else 0 )
df['Number_of_Seasons'].fillna(0,inplace=True)
df['Number_of_Seasons']=df['Number_of_Seasons'].astype(int)
```

Checking columns for Null/NaN values in the entire dataframe along with new continuous columns 'Movie_Mins' and 'Number_of_Seasons'

```
df.isna().sum()
```

```
show_id             0
type                0
title               0
director            0
cast                0
```

```
country             0
date_added          0
release_year        0
rating              0
duration            0
listed_in           0
description         0
Movie_Mins          0
Number_of_Seasons   0
dtype: int64
```

```
df.head(5)
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	unknown_cast	United States	September 25, 2021	2020	PG-13	90 min
1	s2	TV Show	Blood & Water	unknown_director	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	September 24, 2021	2021	TV-MA	2 Seasons
2	s3	TV Show	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...	unknown_country	September 24, 2021	2021	TV-MA	1 Season
3	s4	TV Show	Jailbirds New Orleans	unknown_director	unknown_cast	unknown_country	September 24, 2021	2021	TV-MA	1 Season
4	s5	TV	Kota	unknown_director	Mayur More, Jitendra	India	September	2021	TV-MA	2

Next steps: Generate code with df | View recommended plots

Insight: It's essential to handle missing values because it gives us the forsight to work around the missing data because that makes up a sizeable portion and should be handled for readability

Recommendation: The dataset is now available for further analysis.

What does 'good' look like?

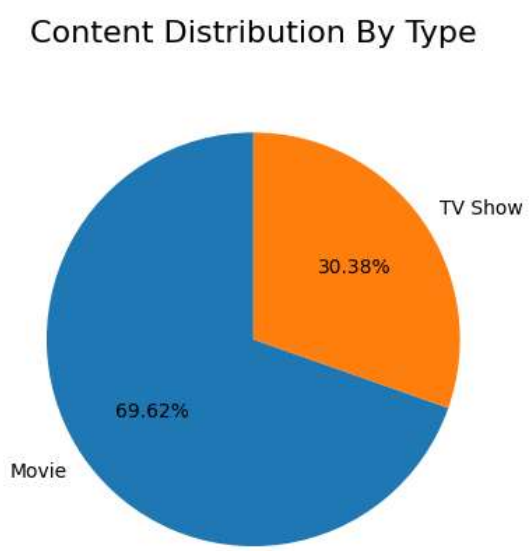
---

1. Find the counts of each categorical variable both using graphical and non-graphical analysis

```
#Count of movies and TV Show
type_count=df["type"].value_counts()
type_count
```

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

```
plt.pie(type_count,
        labels=type_count.index,
        startangle=90,
        autopct='%1.2f%%')
colors=['blue', 'orange']
autopct='%1.2f%%'
plt.title("Content Distribution By Type", fontdict={'fontsize': 16}, pad=20)
plt.show()
```



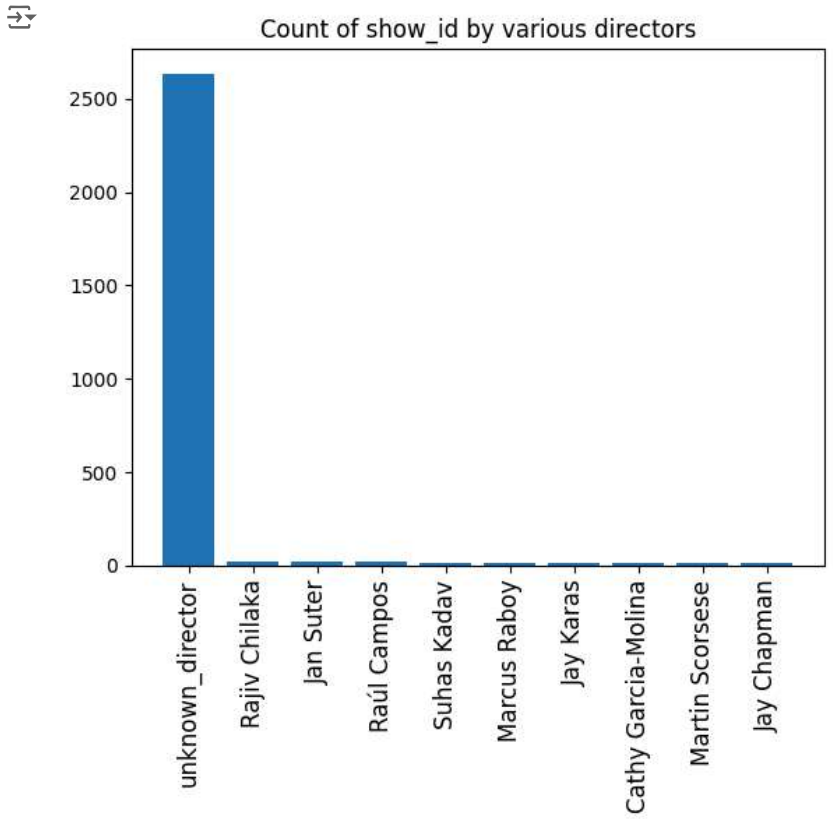

```
dir_count=unnest_dir["unnested_director"].value_counts()
dir_count
```

```
unnested_director
unknown_director    2634
Rajiv Chilaka         22
Jan Suter             21
Raúl Campos           19
Suhas Kadav           16
                    ...
Raymie Muzquiz         1
Stu Livingston         1
Joe Menendez           1
```

```
Eric Bross            1
Mozez Singh           1
Name: count, Length: 4994, dtype: int64
```

```
x_bar = dir_count.head(10).index
y_bar = dir_count.head(10)

plt.bar(x_bar, y_bar)
plt.title("Count of show_id by various directors")
plt.xticks(rotation=90, fontsize=12)
plt.show()
```




```
duration_count=df["duration"].value_counts()
duration_count
```

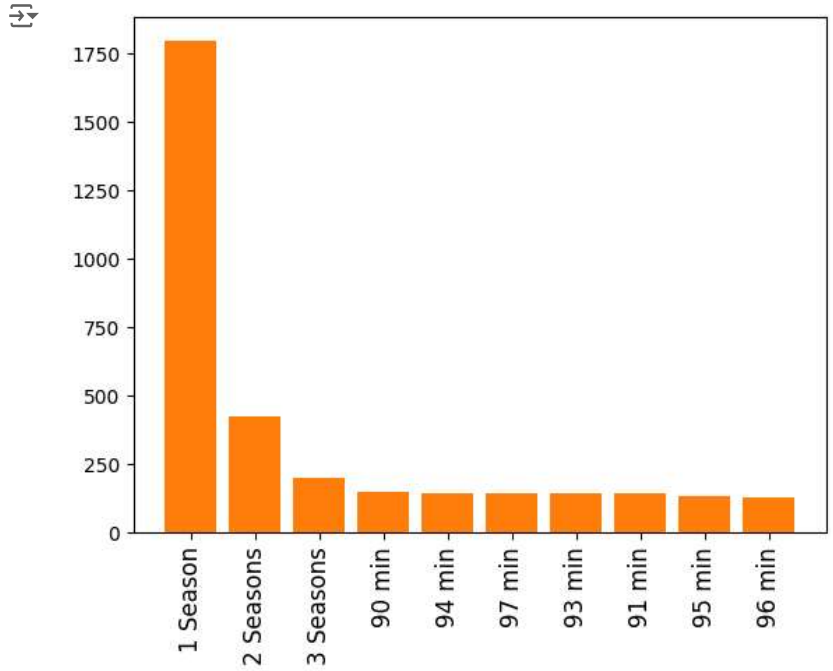
```
duration
1 Season     1793
2 Seasons     425
3 Seasons     199
90 min        152
94 min        146
             ...
189 min         1
```

```
10 min          1
3 min           1
229 min         1
191 min         1
Name: count, Length: 221, dtype: int64
```

Count of show_id against duration and runtime

```
x_bar = duration_count.head(10).index
y_bar = duration_count.head(10)
plt.bar(x_bar, y_bar)

plt.bar(x_bar, y_bar)
plt.xticks(rotation=90, fontsize=12)
plt.show()
```




```
merge_country['unnested_country'].fillna("unknown_country",inplace=True)
country_count=merge_country["unnested_country"].value_counts()
country_count
```

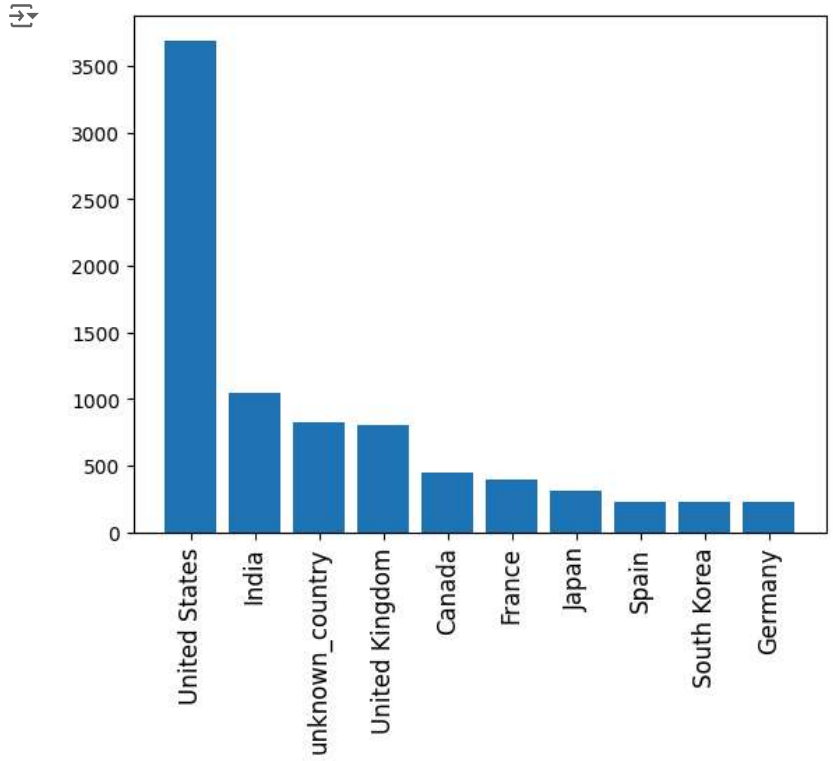
```
unnested_country
United States      3689
India              1046
unknown_country     831
United Kingdom      804
Canada              445
                   ...
Bermuda               1
```

```
Ecuador               1
Armenia               1
Mongolia              1
Montenegro            1
Name: count, Length: 128, dtype: int64
```

Count of content by target country audience

```
x_bar = country_count.head(10).index
y_bar = country_count.head(10)
plt.bar(x_bar, y_bar)


plt.xticks(rotation=90, fontsize=12)
plt.show()
```



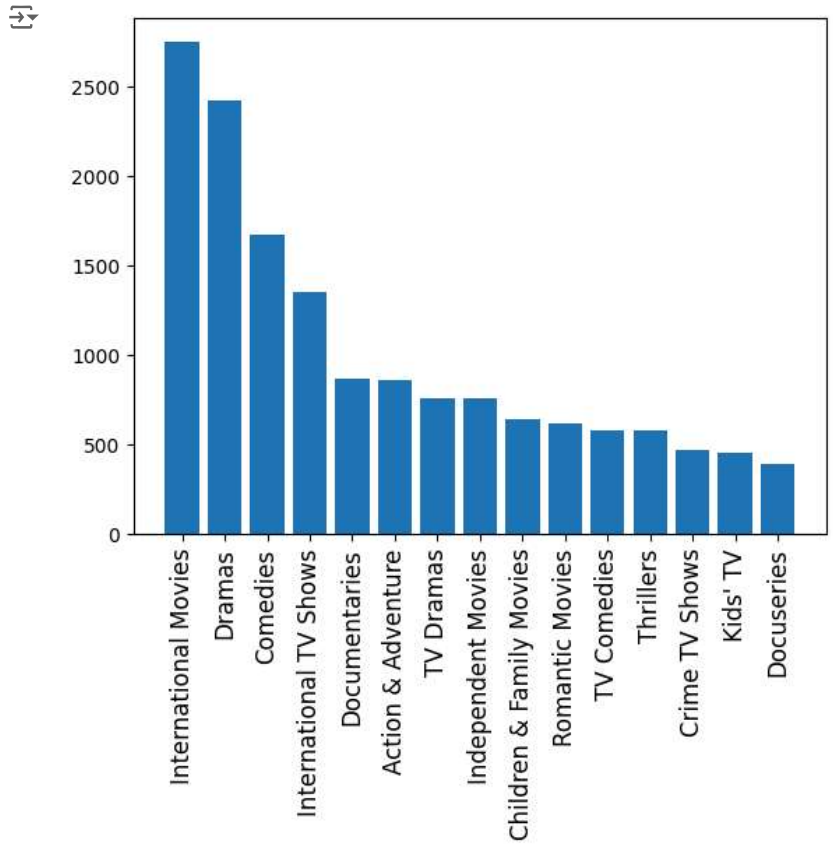

```
count_list=unnest_list["unnested_list"].value_counts()
count_list.head(5)
```

```
unnested_list
International Movies      2752
Dramas                    2427
Comedies                  1674
International TV Shows    1351
```

```
Documentaries              869
Name: count, dtype: int64
```

Count of Content by different genres

```
x_bar = count_list.head(15).index
y_bar = count_list.head(15)
plt.bar(x_bar, y_bar)
plt.xticks(rotation=90, fontsize=12)
plt.show()
```



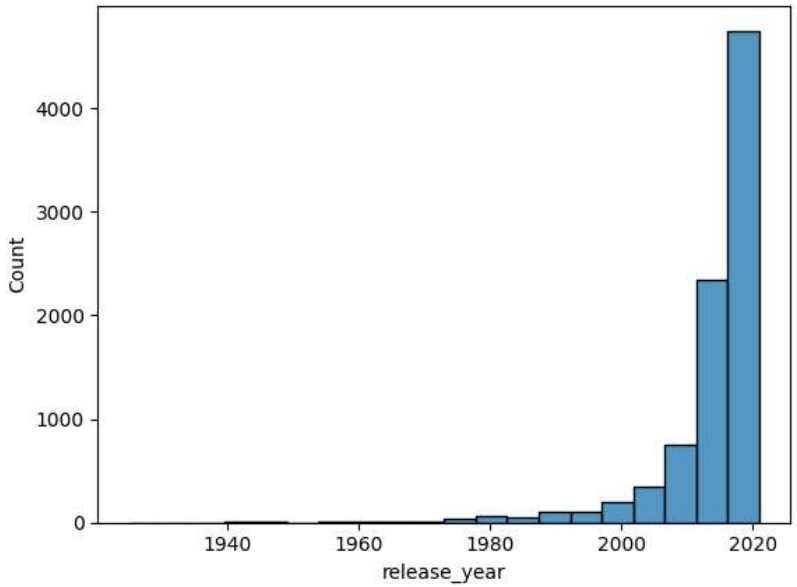

```
count_yrs=df["release_year"].value_counts()
count_yrs.head(5)
```

```
release_year
2018    1147
2017    1032
2019    1030
2020     953
2016     902
Name: count, dtype: int64
```

Distribution of Titles released of the years

```
import seaborn as sns
sns.histplot(df["release_year"],bins=20)
```

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



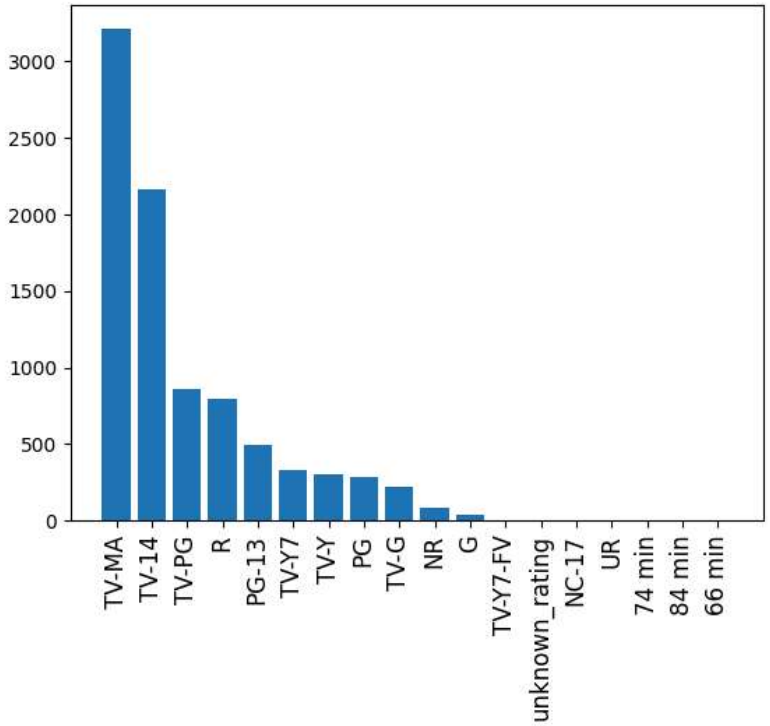

```
count_rating=df["rating"].value_counts()
count_rating.head(5)
```

```
rating
TV-MA    3207
TV-14    2160
TV-PG     863
R         799
PG-13     490
Name: count, dtype: int64
```

Count of Titles by Ratings

```
x_bar = count_rating.index
y_bar = count_rating
plt.bar(x_bar, y_bar)

plt.xticks(rotation=90, fontsize=12)
plt.show()
```



Insight:

1. There are 6131 movies and 2676 TV Shows on Netflix
2. Most popular director after missing values is Rajiv Chilaka
3. Although, there are greater no. of movies available on Netflix, TV shows or Miniseries with fewer season are more popular than 90 minute movies listed on the platform.
4. With highest number of TV-MA ratings, Netflix features most of its content for mature audience.
5. Netflix audience base is mostly English speaking with USA as the top producer of movies and shows, India is second on the list, Indian viewer are multilingual hence there is huge demand and supply of content in Indian regional languages as well as English language content.
6. International movies and dramas are the most popular genre.
7. Netflix features old clasical movies and TV shows, the oldest was released in 1925.Although, the most number of content was added in recent years,the latest one was added in 2021

Recommendation

1. Since India is the leading content producer after USA, it'd be fruitful to invest in Indian content.
2. Netflix should invest in mineries and TV shows with fewer seasons. Also 90 minutes movies are more desireable than longer duration content.
3. Netflix features most of its content for mature audience thus more conent with genres comprising of Drama, Comedy ,International movies and TV shows with TV-MA ratings should be added.

4. Old Classical movies and TV shows can be added to cater to older audience.

2. Comparison of tv shows vs. movies

a. Find the number of movies produced in each country and pick the top 10 countries

```
grouped = merge_country.groupby("type").get_group("Movie")
grouped["unnested_country"].value_counts().head(10)
```

```
unnested_country
United States      2751
India               962
United Kingdom      532
unknown_country     440
Canada              319
France              303
Germany             182
Spain               171
Japan               119
China               114
Name: count, dtype: int64
```

```
merge_country[merge_country["type"] == "Movie"]["unnested_country"].value_counts().head(10)
```

```
unnested_country
United States      2751
India               962
United Kingdom      532
unknown_country     440
Canada              319
France              303
Germany             182
Spain               171
Japan               119
China               114
Name: count, dtype: int64
```

```
#Alternate way
merge_country[merge_country["type"] == "Movie"].groupby("unnested_country")["title"].count().sort_values(ascending=[False]).head(10)
```

```
unnested_country
United States      2751
India               962
United Kingdom      532
unknown_country     440
Canada              319
France              303
Germany             182
Spain               171
Japan               119
China               114
Name: title, dtype: int64
```

```
#Alternate way
merge_country.loc[merge_country["type"] == "Movie"].groupby("unnested_country")["title"].count().sort_values(ascending=[False]).head(10)
```

```
unnested_country
United States      2751
India               962
United Kingdom      532
unknown_country     440
Canada              319
France              303
Germany             182
Spain               171
Japan               119
China               114
Name: title, dtype: int64
```

b. Find the number of Tv-Shows produced in each country and pick the top 10 countries.

```
merge_country[merge_country["type"] == "TV Show"].groupby("unnested_country")["title"].count().sort_values(ascending=[False]).head(10)
```

```
unnested_country
United States      938
unknown_country    391
United Kingdom     272
Japan              199
South Korea        170
Canada             126
France              90
India               84
Taiwan              70
Australia           66
Name: title, dtype: int64
```

Insight:

1. United States is the biggest producer of Movies
2. United States is the biggest producer of TV Shows
3. Content coming from USA is more popular than any other english speaking country

Recommendation: USA's Movies and TV shows should be given preference over other english speaking countries because the USA based content is majorly popular in rest of the the English speaking world.

3. What is the best time to launch a TV show?

a. Find which is the best week to release the Tv-show or the movie. Do the analysis separately for Tv-shows and Movies

```
pd.read_csv("netflix.csv").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
```

```
original_df=pd.read_csv("netflix.csv")
original_df["date_added"]=pd.to_datetime(original_df["date_added"],format='mixed')
original_df.head(5)
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	des
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	2021-09-25	2020	PG-13	90 min	Documentaries	As nea
1	s2	TV Show	Blood & Water	NaN	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...	South Africa	2021-09-24	2021	TV-MA	2 Seasons	International TV Shows, TV Dramas, TV Mysteries	pa

```
original_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   datetime64[ns]
 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: datetime64[ns](1), int64(1), object(10)
memory usage: 825.8+ KB
```

```
original_df['Release_Week']=original_df['date_added'].dt. day_name()
```

Best week to release a movie

```
original_df[original_df["type"]=="Movie"]["Release_Week"].value_counts().head(1).index[0]
```

```
'Friday'
```

Best week to release the Tv-show

```
original_df[original_df["type"]=="TV Show"]["Release_Week"].value_counts().head(1).index[0]
```

```
'Friday'
```

b. Find which is the best month to release the Tv-show or the movie. Do the analysis separately for Tv-shows and Movies

```
original_df['Release_month']=original_df['date_added'].dt.month_name()
```

Best month to release a movie

```
original_df[original_df["type"]=="Movie"]["Release_month"].value_counts().head(1).index[0]
```

```
'July'
```

Best month to release a TV Show

```
original_df[original_df["type"]=="TV Show"]["Release_month"].value_counts().head(1).index[0]
```

```
'December'
```

Insight:

1. Best month to release a movie is July and TV Show is December
2. Best week to release a movie and TV Show is Friday

Reccomendations:

1. Release month should be decided catering to festival seasons of the counties of the target audience.
2. Efforts should be made to put in more advertisement and promotion of content before its release.

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

a. Identify the top 10 directors who have appeared in most movies or TV shows.

Top 10 directors who have appeared in most movies

```
merge_dir['unnested_director'].fillna("unknown_director",inplace=True)
merge_dir[merge_dir["type"]=="Movie"].groupby("unnested_director")["title"].count().sort_values(ascending=[False]).head(10)
```

```
unnested_director
unknown_director       188
Rajiv Chilaka           22
Jan Suter               21
Raúl Campos             19
Suhas Kadav             16
Marcus Raboy            15
Jay Karas               15
Cathy Garcia-Molina     13
Youssef Chahine         12
Martin Scorsese         12
Name: title, dtype: int64
```

Top 10 directors who have appeared in most TV Show

```
merge_dir[merge_dir["type"]=="TV Show"].groupby("unnested_director")["title"].count().sort_values(ascending=[False]).head(10)
```

```
unnested_director
unknown_director         2446
Ken Burns                   3
Alastair Fothergill         3
Jung-ah Im                  2
Joe Berlinger               2
Hsu Fu-chun                 2
Stan Lathan                 2
Gautham Vasudev Menon       2
Lynn Novick                 2
Shin Won-ho                 2
Name: title, dtype: int64
```

Insight:

1. Keeping aside missing values, Rajiv Chilaka has directed most films
2. Keeping aside missing values, Ken Burns has directed most TV shows

Reccomendations:

1. Efforts should be made to bring in directors from all walks of genres which are critically accclaimed and celebrated.
2. Efforts should be made to promote up and new coming directors.

5. Which genre movies are more popular or produced more?

```
# Concatenate all words in the 'listed_in' column
text = ' '.join(item for item in merge_list[merge_list["type"]=="Movie"]["unnested_list"])
```

```
# Generate the word cloud
from wordcloud import WordCloud
wordcloud = WordCloud(width=480, height=480, colormap="Blues", background_color="white").generate(text)
```

```
# Display the word cloud

plt.imshow(wordcloud)
plt.axis("off")
plt.show()
```

Insight: International movies are most popular genre.

Reccomendations: Audience are more intrested Intenation content that can be mixed with comedy, drama and family genres.

---

6. Find after how many days the movie will be added to Netflix after the release of the movie (you can consider the recent past data)

```
#Converting "release_year" to datetime format
original_df["release_year"]=pd.to_datetime(original_df["release_year"],format='mixed')
original_df['Difference'] = (original_df['date_added'] - original_df['release_year']).dt.days
```

```
#Days the movie will be added to Netflix after the release of the movie
int(original_df[original_df['type']=="Movie"]["Difference"].mode())
```

```
<ipython-input-23-16d2442760d9>:2: FutureWarning: Calling int on a single element Series is deprecated and will raise a TypeError in the future. Use int(ser.iloc[0]) instead
  int(original_df[original_df['type']=="Movie"]["Difference"].mode())
18261
```

Insight: A movie would take approx 18261 days after its release before it's added on Netflix.

Reccomendation: Efforts should be made to collaborate with studios and production houses so that an agreement can be reached for an eariler release.

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