netflix-content-analysis

September 18, 2025

Netflix - Data Exploration and Visualisation

Problem Statement:

Netflix wants to optimize its content strategy to attract and retain subscribers across different countries. The goal is to analyze the available dataset of movies and TV shows to identify trends in content type, genres, release patterns and popular actors/directors. Insights from this analysis will help Netflix decide which type of shows or movies to produce and how to grow its business internationally.

Importing Python Libraries:

Python libraries allows us to accomplish tasks and run data analysis more efficiently by providing portions of crucial code already built for us.

[ ]:
```
import pandas as pd
!gdown https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/000/000/940/
↪original/netflix.csv
```

```
Downloading…
From: https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/000/000/940/ori
ginal/netflix.csv
To: /content/netflix.csv
100% 3.40M/3.40M [00:00<00:00, 20.8MB/s]
```

[ ]:
```
df=pd.read_csv('netflix.csv')
```

[ ]:
```
df.describe()
```

[ ]:
```
       release_year  duration_int  Movie_Minutes
count   8807.000000   8804.000000    6128.000000
mean    2014.180198     69.846888      99.577187
std        8.819312     50.814828      28.290593
min     1925.000000      1.000000       3.000000
25%     2013.000000      2.000000      87.000000
50%     2017.000000     88.000000      98.000000
75%     2019.000000    106.000000     114.000000
max     2021.000000    312.000000     312.000000
```

Data Cleaning:

```
[ ]: df.columns
```

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

```
[ ]: duplicate=df.duplicated().value_counts()
     print(duplicate)
```

```
False    8807
Name: count, dtype: int64
```

```
[ ]: # NAN values replaced by 'Missing
     df['director']=df['director'].fillna('unknown_director')
     #Spliting the comma from the list of values
     df['director'].apply(lambda x:x.split(', '))
     #converting to list
     a=df['director'].apply(lambda x:x.split(', ')).tolist()
     a
```

```
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      ['Ally Pankiw'],
      ['George Ford'],
      ['George Ford'],
      ['unknown_director'],
      ['Lee Kae-byeok'],
      ['unknown_director'],
      ['Jayan Moodley'],
      ['Daniel Benmayor'],
      ['Alex Díaz'],
      ['unknown_director'],
      ['Helena Bergström'],
      ['Alejandro De Grazia', 'Juan Stadler'],
      ['Myriam Fares'],
      ['Chiaki Kon'],
      ['unknown_director'],
      ['Rae Red'],
      ['Lance Hool'],
      ['Nicole Conn'],
      ['Les Mayfield'],
      ['Ellen Seidler', 'Megan Siler'],
      ['unknown_director'],
      ['Roger Christian'],
      ['unknown_director'],
      ['Peter Galison'],
      ['Lance Young'],
      ['Leandro Neri'],
      ['Thom Fitzgerald'],
      ['unknown_director'],
      ['Don Michael Paul'],
      ['Andrzej Bartkowiak'],
      ['Harold Becker'],
      ['unknown_director'],
      ['Andrew Jenks'],
      ['Ric Roman Waugh'],
      ['Rob Reiner'],
      ['Andy Tennant'],
      ['Tade Ogidan'],
      ['unknown_director'],
      ['Scott Spiegel'],
      ['Jessie Nelson'],
      ['Theodore Witcher'],
      ['Clint Eastwood'],
      ['Aurora Guerrero'],
      ['Michael Jai White'],
      ['James McTeigue'],
      ['Takuya Igarashi'],
      ['Michelle MacLaren'],
      ['unknown_director'],
      ['Hidenori Inoue'],
      ['Hidenori Inoue'],
      ['Don Michael Paul'],
      ['Todd Phillips'],
      ['Walter Hill'],
      ['Steve Ball'],
      ['Dominic Sena'],
      ['unknown_director'],
      ['Alan Alda'],
      ['Mika Kaurismäki'],
      ['Sydney Pollack'],
      ['Lorene Scafaria'],
      ['Barbra Streisand'],
      ['Clint Eastwood'],
      ['unknown_director'],
      ['Michael Winterbottom'],
      ['Emma Tammi'],
      ['Peter Hutchings'],
      ['George Ratliff'],
      ['unknown_director'],
      ['Bo Burnham'],
      ['Ekene Som Mekwunye'],
      ['David Frankel'],
      ['Kevin Johnson'],
      ['unknown_director'],
      ['José Larraza', 'Marc Pons'],
      ['Gary Sing'],
      ['unknown_director'],
      ['Julio Quintana'],
      ['unknown_director'],
      ['Paween Purijitpanya'],
      ['unknown_director'],
      ['Pablo Faro'],
      ['Soudade Kaadan'],
      ['Letizia Lamartire'],
      ['Ray Jiang'],
      ['unknown_director'],
      ['unknown_director'],
      ['Daniel Vernon'],
      ['Steve Gukas'],
      ['Tim Johnson'],
      ['unknown_director'],
      ['unknown_director'],
      ['unknown_director'],
      ['Vishwesh Krishnamoorthy'],
      ['unknown_director'],
      ['unknown_director'],
      ['Zack Snyder'],
      ['unknown_director'],
      ['unknown_director'],
      ['Uduak-Obong Patrick'],
      ['unknown_director'],
      ['Mohamed Diab'],
      ['Amr Salama'],
      ['Christopher Amos'],
      ['Prakash Satam'],
      ['unknown_director'],
      ['Robert Rodriguez'],
      ['Milan Luthria'],
      ['David Ayer'],
      ['Eshom Nelms', 'Ian Nelms'],
      ['James Moll'],
      ['unknown_director'],
      ['unknown_director'],
      ['James Redford'],
      ['Kaashvie Nair'],
      ['J.D. Dillard'],
      ['Nikhil Pherwani'],
      ['unknown_director'],
      ['Mae Czarina Cruz'],
      ['unknown_director'],
      ['Praveen Kandregula'],
      ['Cecilia Verheyden'],
      ['Daniel Minahan'],
      ['unknown_director'],
      ['Donovan Marsh'],
      ['Brent Dawes'],
      ['unknown_director'],
      ['unknown_director'],
      ['Leli Maki'],
      ['Uzodinma Okpechi'],
      ['Daniel Prochaska'],
      ['unknown_director'],
      ['Joe Wright'],
      ['unknown_director'],
      ['Matthew Vaughn'],
      ['Aditya Kripalani'],
      ['Adriano Rudiman'],
      ['David Pablos'],
      ['Alexandre Aja'],
      ['unknown_director'],
      ['Cai Cong'],
      ['Samuel Olatunji'],
      ['Ramon Térmens'],
      ['unknown_director'],
      ['Svetlana Cvetko'],
      ['unknown_director'],
      ['Martin Prakkat'],
      ['Baran bo Odar'],
      ['Zhang Chong'],
      ['Yılmaz Erdoğan'],
      ['Shantrelle P. Lewis'],
      ['unknown_director'],
      ['Ivan Ayr'],
      ['Anthony Mandler'],
      ['Vijay Roche'],
      ['unknown_director'],
      ["Stanley Menino D'Costa"],
      ['Jennifer Brea'],
      ['Julia von Heinz'],
      ['Niels Arden Oplev'],
      ['Don Argott', 'Sheena M. Joyce'],
      ['unknown_director'],
      ['Joshua Zeman'],
      ['unknown_director'],
      ['unknown_director'],
      ['Duncan Skiles'],
      ['unknown_director'],
      ['Sean McNamara'],
      ['unknown_director'],
      ['Vondie Curtis-Hall'],
      ['unknown_director'],
      ['Robert Radler'],
      ['Roel Reiné'],
      ['Todd Phillips'],
      ['Dean Parisot'],
      ['Paul Greengrass'],
      ['Lasse Hallström'],
      ['Justin Kelly'],
      ['Eric Darnell', 'Tom McGrath', 'Conrad Vernon'],
      ['unknown_director'],
      ['Suhas Kadav'],
      ['Suhas Kadav'],
      ['Suhas Kadav'],
      ['Suhas Kadav'],
      ['Suhas Kadav'],
      ['Clint Eastwood'],
      ['Jeff Wadlow'],
      ['Charles Martin'],
      ['Stella Corradi'],
      ['Roland Emmerich'],
      ['Kevin Macdonald'],
      ['Ann Deborah Fishman'],
      ['Chris Gorak'],
      ['Peter Jackson'],
      ['Roger Kumble'],
      ['Jonathan Lynn'],
      ['Courtney Hunt'],
      ['Pierre Greco', 'Nancy Florence Savard'],
      ['Andrew Davis'],
      ['Kevin Smith'],
      ['unknown_director'],
      ['Tosin Igho'],
      ['Chaitanya Tamhane'],
      ['Oriol Paulo'],
      ['Mike Rianda', 'Jeff Rowe'],
      ['Johannes Roberts'],
      ['unknown_director'],
      ['Robert Pulcini', 'Shari Springer Berman'],
      ['unknown_director'],
      ['Pedro Antonio'],
      ['unknown_director'],
      ['unknown_director'],
      ['John Wells'],
      ['Jonathan Liebesman'],
      ['Maria Pulera'],
      ['unknown_director'],
      ['Santhosh Viswanath'],
      ['Seema Pahwa'],
      ['unknown_director'],
      ['Ozan Açıktan'],
      ['Meltem Bozoflu'],
      ['Hakan Algül'],
      ['Selçuk Aydemir', 'Birkan Pusa'],
      ['Selçuk Aydemir'],
      ['Ömer Faruk Sorak'],
      ['Şenol Sönmez'],
      ['Alexis Morante'],
      ['Burak Aksak'],
      ['Kıvanç Baruönü'],
      ['Kıvanç Baruönü'],
      ['Rindala Kodeih'],
      ['Kongkiat Khomsiri'],
      ['Bedran Güzel'],
      ['Hakan Algül'],
      ['Marwan Nabil'],
      ['MIKIKO', 'Daito Manabe'],
      ['unknown_director'],
      ['Kayode Kasum'],
      ['Yılmaz Erdoğan', 'Ömer Faruk Sorak'],
      ['Takashi Shimizu'],
      ['unknown_director'],
      ['unknown_director'],
      ['Joe Penna'],
      …]
```

[ ]:
```
# separating the director name based on title by setting title as index
b=pd.DataFrame(a,index=df['title'])
b
```

[ ]:
```
                                     0     1     2     3     4     5     6  \
title
Dick Johnson Is Dead    Kirsten Johnson  None  None  None  None  None  None
Blood & Water          unknown_director  None  None  None  None  None  None
Ganglands               Julien Leclercq  None  None  None  None  None  None
Jailbirds New Orleans  unknown_director  None  None  None  None  None  None
Kota Factory           unknown_director  None  None  None  None  None  None
…                                    …    …     …     …     …     …     …
Zodiac                   David Fincher  None  None  None  None  None  None
Zombie Dumb            unknown_director  None  None  None  None  None  None
Zombieland              Ruben Fleischer  None  None  None  None  None  None
Zoom                      Peter Hewitt  None  None  None  None  None  None
Zubaan                     Mozez Singh  None  None  None  None  None  None

                          7     8     9    10    11    12
title
Dick Johnson Is Dead   None  None  None  None  None  None
Blood & Water          None  None  None  None  None  None
Ganglands              None  None  None  None  None  None
Jailbirds New Orleans  None  None  None  None  None  None
Kota Factory           None  None  None  None  None  None
…                        …    …     …     …     …     …
Zodiac                 None  None  None  None  None  None
Zombie Dumb            None  None  None  None  None  None
Zombieland             None  None  None  None  None  None
Zoom                   None  None  None  None  None  None
Zubaan                 None  None  None  None  None  None

[8807 rows x 13 columns]
```

[ ]:
```
#Using stack merging the columns to rows and shows 0,1 as per number of␣
 ↪directors
pd.DataFrame(a,index=df['title']).stack()
```

[ ]:
```
title
Dick Johnson Is Dead   0     Kirsten Johnson
Blood & Water          0    unknown_director
Ganglands              0     Julien Leclercq
Jailbirds New Orleans  0    unknown_director
```

```
Kota Factory             0    unknown_director
                                     …
Zodiac                   0       David Fincher
Zombie Dumb              0    unknown_director
Zombieland               0     Ruben Fleischer
Zoom                     0        Peter Hewitt
Zubaan                   0         Mozez Singh
Length: 9612, dtype: object
```

```
[ ]: #On Stacking pandas create the index name for the unnamed one by using stack
     pd.DataFrame(a,index=df['title']).stack().reset_index()
```

```
[ ]:                       title  level_1                 0
     0      Dick Johnson Is Dead        0   Kirsten Johnson
     1             Blood & Water        0  unknown_director
     2                 Ganglands        0   Julien Leclercq
     3     Jailbirds New Orleans        0  unknown_director
     4              Kota Factory        0  unknown_director
     …                        …     …                   …
     9607                 Zodiac        0     David Fincher
     9608            Zombie Dumb        0  unknown_director
     9609             Zombieland        0   Ruben Fleischer
     9610                   Zoom        0      Peter Hewitt
     9611                 Zubaan        0       Mozez Singh

     [9612 rows x 3 columns]
```

```
[ ]: director=pd.DataFrame(a,index=df['title']).stack().reset_index().drop(columns =␣
      ↪'level_1').rename(columns = {0:'director'})
     director
```

```
[ ]:                       title          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
     …                        …                 …
     9607                 Zodiac     David Fincher
     9608            Zombie Dumb  unknown_director
     9609             Zombieland   Ruben Fleischer
     9610                   Zoom      Peter Hewitt
     9611                 Zubaan       Mozez Singh

     [9612 rows x 2 columns]
```

```
[ ]: type_shows=df[['title','type']]
     type_shows
```

```
[ ]:                    title     type
     0      Dick Johnson Is Dead    Movie
     1             Blood & Water  TV Show
     2                 Ganglands  TV Show
     3     Jailbirds New Orleans  TV Show
     4              Kota Factory  TV Show
     …                         …      …
     8802                 Zodiac    Movie
     8803            Zombie Dumb  TV Show
     8804             Zombieland    Movie
     8805                   Zoom    Movie
     8806                 Zubaan    Movie

     [8807 rows x 2 columns]
```

```
[ ]: date_columns=df[['title','date_added','release_year']]
     date_columns
```

```
[ ]:                    title          date_added  release_year
     0      Dick Johnson Is Dead  September 25, 2021          2020
     1             Blood & Water  September 24, 2021          2021
     2                 Ganglands  September 24, 2021          2021
     3     Jailbirds New Orleans  September 24, 2021          2021
     4              Kota Factory  September 24, 2021          2021
     …                         …                 …           …
     8802                 Zodiac   November 20, 2019          2007
     8803            Zombie Dumb        July 1, 2019          2018
     8804             Zombieland    November 1, 2019          2009
     8805                   Zoom    January 11, 2020          2006
     8806                 Zubaan       March 2, 2019          2015

     [8807 rows x 3 columns]
```

```
[ ]: df['cast']=df['cast'].fillna('unknown_actor')
     df['cast'].apply(lambda x:x.split(', '))
     a1=df['cast'].apply(lambda x:x.split(', ')).tolist()
     cast=pd.DataFrame(a1,index=df['title'])
     pd.DataFrame(a1,index=df['title']).stack()
     pd.DataFrame(a1,index=df['title']).stack().reset_index()
     cast=pd.DataFrame(a1,index=df['title']).stack().reset_index().drop(columns =␣
      ↪'level_1').rename(columns = {0:'cast'})
     cast
```

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

     [64951 rows x 2 columns]
```

```
[ ]: df['country']=df['country'].fillna('Missing_countryname')
     df['country'].apply(lambda x:x.split(', '))
     a2=df['country'].apply(lambda x:x.split(', ')).tolist()
     country=pd.DataFrame(a2,index=df['title'])
     pd.DataFrame(a2,index=df['title']).stack()
     pd.DataFrame(a2,index=df['title']).stack().reset_index()
     country=pd.DataFrame(a2,index=df['title']).stack().reset_index().drop(columns =␣
      ↪'level_1').rename(columns = {0:'country'})
     country
```

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

     [10845 rows x 2 columns]
```

```
[ ]: df['listed_in']=df['listed_in'].fillna('unknown_genre')
     df['listed_in'].apply(lambda x:x.split(', '))
     a3=df['listed_in'].apply(lambda x:x.split(', ')).tolist()
     listed_in=pd.DataFrame(a3,index=df['title'])
     pd.DataFrame(a3,index=df['title']).stack()
     pd.DataFrame(a3,index=df['title']).stack().reset_index()
```

```
listed_in=pd.DataFrame(a3,index=df['title']).stack().reset_index().drop(columns␣
↪= 'level_1').rename(columns = {0:'listed_in'})
listed_in
```

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

[19323 rows x 2 columns]
```

[ ]:
```
def safe_int(x):
    try:
        return int(x.split(' ')[0])  # converting to an integer
    except (ValueError, AttributeError):
        return None  # Return None if conversion fails

df['duration'] = df['duration'].astype(str)
df['duration_int'] = df['duration'].apply(safe_int)  # Extract integer part of␣
↪duration
df['duration_type'] = df['duration'].str.extract(r'(\D+)')  # Extract the␣
↪Duration Type (min or Season)
df['Movie_Minutes'] = df[df.type=='Movie']['duration'].apply(safe_int)

# Select desired columns for the new DataFrame
new_df = df[['title', 'duration_int', 'duration_type','Movie_Minutes']]

# Display the new DataFrame
new_df
```

[ ]:
```
                      title  duration_int duration_type  Movie_Minutes
0      Dick Johnson Is Dead          90.0           min           90.0
1             Blood & Water           2.0       Seasons            NaN
2                 Ganglands           1.0        Season            NaN
3     Jailbirds New Orleans           1.0        Season            NaN
4              Kota Factory           2.0       Seasons            NaN
…                       …           …             …              …
8802                 Zodiac         158.0           min          158.0
8803            Zombie Dumb           2.0       Seasons            NaN
```

```
8804              Zombieland        88.0          min          88.0
8805                    Zoom        88.0          min          88.0
8806                  Zubaan       111.0          min         111.0

[8807 rows x 4 columns]
```

Data cleaning is crucial before analysis because it ensures the accuracy, consistency, and reliability of the data leading to more meaningful and trustworthy results. By removing errors, inconsistencies, and missing values data cleaning minimizes the risk of inaccurate analysis and helps in making informed decisions.

Merging the columns:

[ ]:
```
# Defining type_shows
type_shows = df[['title', 'type']]

# Merging dataframes
merge1 = director.merge(cast, on='title')
merge2 = merge1.merge(country, on='title')
merge3 = merge2.merge(listed_in, on='title')
merge4 = merge3.merge(type_shows, on='title') # type_shows used here
merge5 = merge4.merge(date_columns, on='title')
cleaned_data = merge5.merge(df[['title', 'Movie_Minutes']], on='title')
cleaned_data
```

[ ]:
```
                       title          director                     cast  \
0        Dick Johnson Is Dead  Kirsten Johnson            unknown_actor
1               Blood & Water  unknown_director             Ama Qamata
2               Blood & Water  unknown_director             Ama Qamata
3               Blood & Water  unknown_director             Ama Qamata
4               Blood & Water  unknown_director            Khosi Ngema
…                         …                …                        …
201986                 Zubaan       Mozez Singh         Anita Shabdish
201987                 Zubaan       Mozez Singh         Anita Shabdish
201988                 Zubaan       Mozez Singh  Chittaranjan Tripathy
201989                 Zubaan       Mozez Singh  Chittaranjan Tripathy
201990                 Zubaan       Mozez Singh  Chittaranjan Tripathy

              country              listed_in     type          date_added  \
0       United States          Documentaries    Movie  September 25, 2021
1        South Africa  International TV Shows  TV Show  September 24, 2021
2        South Africa              TV Dramas  TV Show  September 24, 2021
3        South Africa           TV Mysteries  TV Show  September 24, 2021
4        South Africa  International TV Shows  TV Show  September 24, 2021
…                 …                      …        …                  …
201986          India   International Movies    Movie       March 2, 2019
201987          India      Music & Musicals    Movie       March 2, 2019
201988          India                 Dramas    Movie       March 2, 2019
```

```
201989          India    International Movies    Movie       March 2, 2019
201990          India        Music & Musicals    Movie       March 2, 2019

        release_year  Movie_Minutes
0               2020           90.0
1               2021            NaN
2               2021            NaN
3               2021            NaN
4               2021            NaN
…                …             …
201986          2015          111.0
201987          2015          111.0
201988          2015          111.0
201989          2015          111.0
201990          2015          111.0

[201991 rows x 9 columns]
```

Merging is done to add variables to a dataset, append or add cases or observations to a dataset or remove duplicates and other incorrect information

Dropping Duplicates:

```
[ ]: cleaned_data.duplicated()
```

```
[ ]: 0         False
     1         False
     2         False
     3         False
     4         False
               …
     201986    False
     201987    False
     201988    False
     201989    False
     201990    False
     Length: 201991, dtype: bool
```

```
[ ]: cleaned_data.loc[cleaned_data.duplicated()]
```

```
[ ]:                      title        director              cast  \
     39336           Rust Creek     Jen McGowan    Micah Hauptman
     88516      Blood Will Tell    Miguel Cohan    Oscar Martínez
     88517      Blood Will Tell    Miguel Cohan    Oscar Martínez
     88518      Blood Will Tell    Miguel Cohan    Oscar Martínez
     88519      Blood Will Tell    Miguel Cohan    Oscar Martínez
     88520      Blood Will Tell    Miguel Cohan    Oscar Martínez
     88521      Blood Will Tell    Miguel Cohan    Oscar Martínez
```

88522	Blood Will Tell	Miguel Cohan	Dolores Fonzi
88523	Blood Will Tell	Miguel Cohan	Dolores Fonzi
88524	Blood Will Tell	Miguel Cohan	Dolores Fonzi
88525	Blood Will Tell	Miguel Cohan	Dolores Fonzi
88526	Blood Will Tell	Miguel Cohan	Dolores Fonzi
88527	Blood Will Tell	Miguel Cohan	Dolores Fonzi
88528	Blood Will Tell	Miguel Cohan	Diego Velázquez
88529	Blood Will Tell	Miguel Cohan	Diego Velázquez
88530	Blood Will Tell	Miguel Cohan	Diego Velázquez
88531	Blood Will Tell	Miguel Cohan	Diego Velázquez
88532	Blood Will Tell	Miguel Cohan	Diego Velázquez
88533	Blood Will Tell	Miguel Cohan	Diego Velázquez
88534	Blood Will Tell	Miguel Cohan	Paulina Garcia
88535	Blood Will Tell	Miguel Cohan	Paulina Garcia
88536	Blood Will Tell	Miguel Cohan	Paulina Garcia
88537	Blood Will Tell	Miguel Cohan	Paulina Garcia
88538	Blood Will Tell	Miguel Cohan	Paulina Garcia
88539	Blood Will Tell	Miguel Cohan	Paulina Garcia
88540	Blood Will Tell	Miguel Cohan	Luis Gnecco
88541	Blood Will Tell	Miguel Cohan	Luis Gnecco
88542	Blood Will Tell	Miguel Cohan	Luis Gnecco
88543	Blood Will Tell	Miguel Cohan	Luis Gnecco
88544	Blood Will Tell	Miguel Cohan	Luis Gnecco
88545	Blood Will Tell	Miguel Cohan	Luis Gnecco
88546	Blood Will Tell	Miguel Cohan	Malena Sánchez
88547	Blood Will Tell	Miguel Cohan	Malena Sánchez
88548	Blood Will Tell	Miguel Cohan	Malena Sánchez
88549	Blood Will Tell	Miguel Cohan	Malena Sánchez
88550	Blood Will Tell	Miguel Cohan	Malena Sánchez
88551	Blood Will Tell	Miguel Cohan	Malena Sánchez
88552	Blood Will Tell	Miguel Cohan	Emilio Vodanovich
88553	Blood Will Tell	Miguel Cohan	Emilio Vodanovich
88554	Blood Will Tell	Miguel Cohan	Emilio Vodanovich
88555	Blood Will Tell	Miguel Cohan	Emilio Vodanovich
88556	Blood Will Tell	Miguel Cohan	Emilio Vodanovich
88557	Blood Will Tell	Miguel Cohan	Emilio Vodanovich
88558	Blood Will Tell	Miguel Cohan	Norman Briski
88559	Blood Will Tell	Miguel Cohan	Norman Briski
88560	Blood Will Tell	Miguel Cohan	Norman Briski
88561	Blood Will Tell	Miguel Cohan	Norman Briski
88562	Blood Will Tell	Miguel Cohan	Norman Briski
88563	Blood Will Tell	Miguel Cohan	Norman Briski
135609	300 Miles to Heaven	Maciej Dejczer	Adrianna Biedrzyńska
135610	300 Miles to Heaven	Maciej Dejczer	Adrianna Biedrzyńska
135611	300 Miles to Heaven	Maciej Dejczer	Adrianna Biedrzyńska
135612	300 Miles to Heaven	Maciej Dejczer	Adrianna Biedrzyńska
135613	300 Miles to Heaven	Maciej Dejczer	Adrianna Biedrzyńska

```
135614  300 Miles to Heaven  Maciej Dejczer  Adrianna Biedrzyńska

              country             listed_in   type         date_added  \
39336   United States             Thrillers  Movie  November 30, 2020
88516       Argentina                Dramas  Movie      June 21, 2019
88517       Argentina    Independent Movies  Movie      June 21, 2019
88518       Argentina  International Movies  Movie      June 21, 2019
88519   United States                Dramas  Movie      June 21, 2019
88520   United States    Independent Movies  Movie      June 21, 2019
88521   United States  International Movies  Movie      June 21, 2019
88522       Argentina                Dramas  Movie      June 21, 2019
88523       Argentina    Independent Movies  Movie      June 21, 2019
88524       Argentina  International Movies  Movie      June 21, 2019
88525   United States                Dramas  Movie      June 21, 2019
88526   United States    Independent Movies  Movie      June 21, 2019
88527   United States  International Movies  Movie      June 21, 2019
88528       Argentina                Dramas  Movie      June 21, 2019
88529       Argentina    Independent Movies  Movie      June 21, 2019
88530       Argentina  International Movies  Movie      June 21, 2019
88531   United States                Dramas  Movie      June 21, 2019
88532   United States    Independent Movies  Movie      June 21, 2019
88533   United States  International Movies  Movie      June 21, 2019
88534       Argentina                Dramas  Movie      June 21, 2019
88535       Argentina    Independent Movies  Movie      June 21, 2019
88536       Argentina  International Movies  Movie      June 21, 2019
88537   United States                Dramas  Movie      June 21, 2019
88538   United States    Independent Movies  Movie      June 21, 2019
88539   United States  International Movies  Movie      June 21, 2019
88540       Argentina                Dramas  Movie      June 21, 2019
88541       Argentina    Independent Movies  Movie      June 21, 2019
88542       Argentina  International Movies  Movie      June 21, 2019
88543   United States                Dramas  Movie      June 21, 2019
88544   United States    Independent Movies  Movie      June 21, 2019
88545   United States  International Movies  Movie      June 21, 2019
88546       Argentina                Dramas  Movie      June 21, 2019
88547       Argentina    Independent Movies  Movie      June 21, 2019
88548       Argentina  International Movies  Movie      June 21, 2019
88549   United States                Dramas  Movie      June 21, 2019
88550   United States    Independent Movies  Movie      June 21, 2019
88551   United States  International Movies  Movie      June 21, 2019
88552       Argentina                Dramas  Movie      June 21, 2019
88553       Argentina    Independent Movies  Movie      June 21, 2019
88554       Argentina  International Movies  Movie      June 21, 2019
88555   United States                Dramas  Movie      June 21, 2019
88556   United States    Independent Movies  Movie      June 21, 2019
88557   United States  International Movies  Movie      June 21, 2019
88558       Argentina                Dramas  Movie      June 21, 2019
```

```
88559       Argentina    Independent Movies  Movie      June 21, 2019
88560       Argentina  International Movies  Movie      June 21, 2019
88561   United States                Dramas  Movie      June 21, 2019
88562   United States    Independent Movies  Movie      June 21, 2019
88563   United States  International Movies  Movie      June 21, 2019
135609        Denmark                Dramas  Movie    October 1, 2019
135610        Denmark  International Movies  Movie    October 1, 2019
135611         France                Dramas  Movie    October 1, 2019
135612         France  International Movies  Movie    October 1, 2019
135613         Poland                Dramas  Movie    October 1, 2019
135614         Poland  International Movies  Movie    October 1, 2019

        release_year  Movie_Minutes
39336           2018          108.0
88516           2019          113.0
88517           2019          113.0
88518           2019          113.0
88519           2019          113.0
88520           2019          113.0
88521           2019          113.0
88522           2019          113.0
88523           2019          113.0
88524           2019          113.0
88525           2019          113.0
88526           2019          113.0
88527           2019          113.0
88528           2019          113.0
88529           2019          113.0
88530           2019          113.0
88531           2019          113.0
88532           2019          113.0
88533           2019          113.0
88534           2019          113.0
88535           2019          113.0
88536           2019          113.0
88537           2019          113.0
88538           2019          113.0
88539           2019          113.0
88540           2019          113.0
88541           2019          113.0
88542           2019          113.0
88543           2019          113.0
88544           2019          113.0
88545           2019          113.0
88546           2019          113.0
88547           2019          113.0
88548           2019          113.0
```

```
88549          2019          113.0
88550          2019          113.0
88551          2019          113.0
88552          2019          113.0
88553          2019          113.0
88554          2019          113.0
88555          2019          113.0
88556          2019          113.0
88557          2019          113.0
88558          2019          113.0
88559          2019          113.0
88560          2019          113.0
88561          2019          113.0
88562          2019          113.0
88563          2019          113.0
135609         1989           93.0
135610         1989           93.0
135611         1989           93.0
135612         1989           93.0
135613         1989           93.0
135614         1989           93.0
```

```
[ ]: cleaned_data.drop_duplicates(inplace=True)
```

```
[ ]: cleaned_data
```

```
[ ]:                      title          director                   cast  \
     0       Dick Johnson Is Dead   Kirsten Johnson          unknown_actor
     1              Blood & Water  unknown_director             Ama Qamata
     2              Blood & Water  unknown_director             Ama Qamata
     3              Blood & Water  unknown_director             Ama Qamata
     4              Blood & Water  unknown_director            Khosi Ngema
     …                       …                 …                      …
     201986                Zubaan       Mozez Singh         Anita Shabdish
     201987                Zubaan       Mozez Singh         Anita Shabdish
     201988                Zubaan       Mozez Singh  Chittaranjan Tripathy
     201989                Zubaan       Mozez Singh  Chittaranjan Tripathy
     201990                Zubaan       Mozez Singh  Chittaranjan Tripathy

                  country              listed_in     type          date_added  \
     0       United States          Documentaries    Movie  September 25, 2021
     1        South Africa  International TV Shows  TV Show  September 24, 2021
     2        South Africa              TV Dramas  TV Show  September 24, 2021
     3        South Africa            TV Mysteries  TV Show  September 24, 2021
     4        South Africa  International TV Shows  TV Show  September 24, 2021
     …              …                      …       …                 …
     201986          India   International Movies    Movie       March 2, 2019
```

```
201987          India        Music & Musicals    Movie       March 2, 2019
201988          India                  Dramas    Movie       March 2, 2019
201989          India    International Movies    Movie       March 2, 2019
201990          India        Music & Musicals    Movie       March 2, 2019

        release_year  Movie_Minutes
0               2020           90.0
1               2021            NaN
2               2021            NaN
3               2021            NaN
4               2021            NaN
…                …              …
201986          2015          111.0
201987          2015          111.0
201988          2015          111.0
201989          2015          111.0
201990          2015          111.0

[201936 rows x 9 columns]
```

[ ]:
```
cleaned_data['title'].nunique()
```

[ ]:
```
8807
```

[ ]:
```
cleaned_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 201936 entries, 0 to 201990
Data columns (total 9 columns):
 #   Column         Non-Null Count   Dtype  
---  ------         --------------   -----  
 0   title          201936 non-null  object 
 1   director       201936 non-null  object 
 2   cast           201936 non-null  object 
 3   country        201936 non-null  object 
 4   listed_in      201936 non-null  object 
 5   type           201936 non-null  object 
 6   date_added     201778 non-null  object 
 7   release_year   201936 non-null  int64  
 8   Movie_Minutes  145785 non-null  float64
dtypes: float64(1), int64(1), object(7)
memory usage: 15.4+ MB
```

Removed the duplicates and made changes permanently in the cleaned_data.

Analysis and Recommendations:

Non-Graphical Analysis:

[ ]:
```python
director_counts = cleaned_data['director'].value_counts()
print(director_counts)
cast_counts = cleaned_data['cast'].value_counts()
print(cast_counts)

country_counts = cleaned_data['country'].value_counts()
print(country_counts)

listed_in_counts = cleaned_data['listed_in'].value_counts()
print(listed_in_counts)

type_counts = cleaned_data['type'].value_counts()
print(type_counts)
```

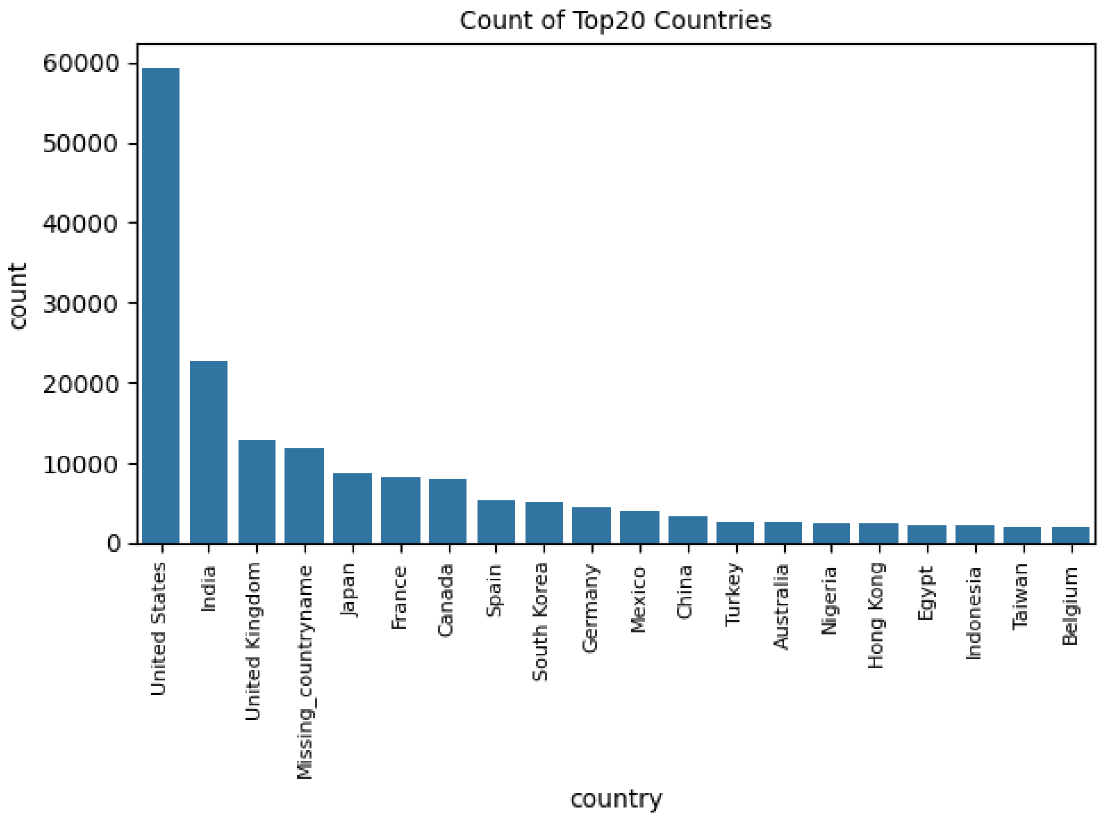
```
director
unknown_director       50643
Martin Scorsese          419
Youssef Chahine          409
Cathy Garcia-Molina      356
Steven Spielberg         355
                       …
Harvey Lilley              1
Jason Orley                1
Jeannie Gaffigan           1
Mario Rouleau              1
Richard Mears              1
Name: count, Length: 4994, dtype: int64
cast
unknown_actor      2146
Liam Neeson         161
Alfred Molina       160
John Krasinski      139
Salma Hayek         130
                   …
Damien Echols         1
Anne Lamott           1
Duncan Trussell       1
Leather Storrs        1
Christian James       1
Name: count, Length: 36440, dtype: int64
country
United States          59324
India                  22814
United Kingdom         12945
Missing_countryname    11897
Japan                   8679
                       …
```

```
Botswana                   2
United States,             1
Nicaragua                  1
Kazakhstan                 1
Uganda                     1
Name: count, Length: 128, dtype: int64
listed_in
Dramas                          29756
International Movies            28192
Comedies                        20829
International TV Shows          12845
Action & Adventure              12216
Independent Movies               9818
Children & Family Movies         9771
TV Dramas                        8942
Thrillers                        7106
Romantic Movies                  6412
TV Comedies                      4963
Crime TV Shows                   4733
Horror Movies                    4571
Kids' TV                         4568
Sci-Fi & Fantasy                 4037
Music & Musicals                 3077
Romantic TV Shows                3049
Documentaries                    2407
Anime Series                     2313
TV Action & Adventure            2288
Spanish-Language TV Shows        2126
British TV Shows                 1808
Sports Movies                    1531
Classic Movies                   1434
TV Mysteries                     1281
Korean TV Shows                  1122
Cult Movies                      1077
Anime Features                   1045
TV Sci-Fi & Fantasy              1045
TV Horror                         941
Docuseries                        845
LGBTQ Movies                      838
TV Thrillers                      768
Teen TV Shows                     742
Reality TV                        735
Faith & Spirituality              719
Stand-Up Comedy                   540
Movies                            412
TV Shows                          337
Classic & Cult TV                 272
Stand-Up Comedy & Talk Shows      268
```

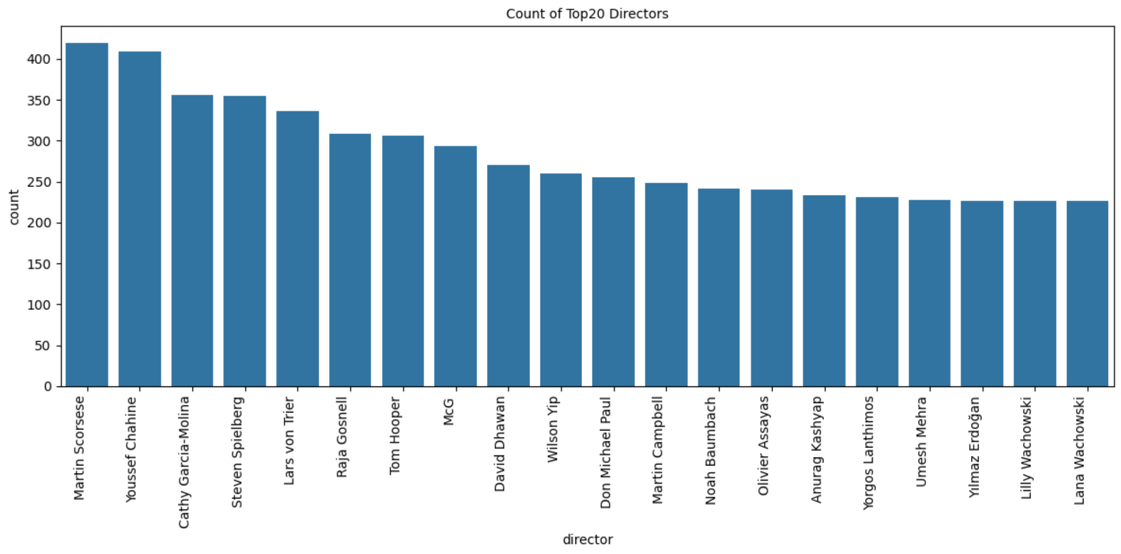
```
Science & Nature TV                157
Name: count, dtype: int64
type
Movie      145788
TV Show     56148
Name: count, dtype: int64
```

Graphical analysis (Univariate Analysis with bar plot):

```
[ ]: %matplotlib inline
     import matplotlib.pyplot as plt
     import seaborn as sns

     top_countries = cleaned_data['country'].value_counts().nlargest(20).index
     sns.countplot(x='country',data=cleaned_data,order=top_countries)
     plt.xticks(rotation=90, fontsize=8)
     plt.title('Count of Top20 Countries',fontsize=10)
     plt.tight_layout()
     plt.show()
```

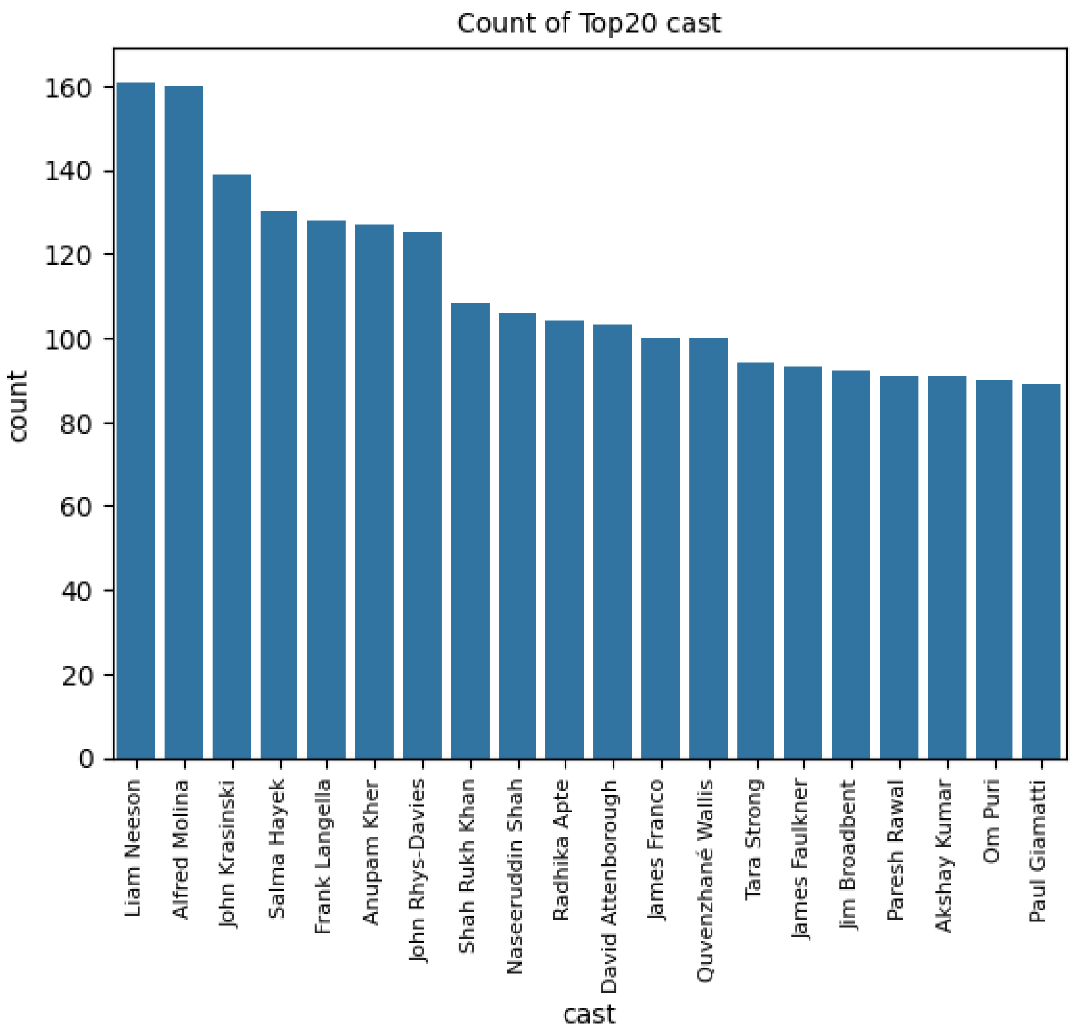


```
[ ]: %matplotlib inline
import matplotlib.pyplot as plt
import seaborn as sns

# Filter out 'unknown_director' rows before calculating top directors
filtered_data = cleaned_data[cleaned_data['director'] != 'unknown_director']

top_directors = filtered_data['director'].value_counts().nlargest(20).index
plt.figure(figsize=(12, 6))
sns.countplot(x='director', data=cleaned_data, order=top_directors)
plt.xticks(rotation=90, ha='right')
plt.title('Count of Top20 Directors',fontsize=10)
plt.tight_layout()
plt.show()
```



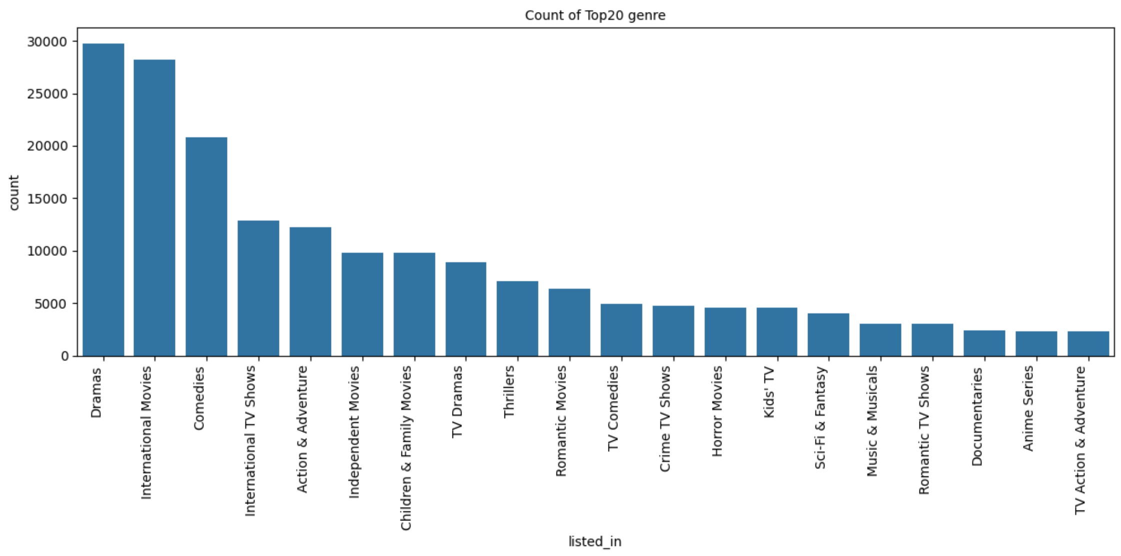
```
[ ]: %matplotlib inline
import matplotlib.pyplot as plt
import seaborn as sns
import re

# #cast contains $ and we were getting value error while plotting
# cleaned_data['cast'] = cleaned_data['cast'].str.replace('$', '', regex=True)

cleaned_data['cast'] = cleaned_data['cast'].str.replace('Joey Bada$$','Joey␣
↪Badass')
cleaned_data['cast'] = cleaned_data['cast'].str.replace('Too $hort','Too Short')
filtered_cast = cleaned_data[cleaned_data['cast'] != 'unknown_actor']
top_casts = filtered_cast['cast'].value_counts().nlargest(20).index
```

```
sns.countplot(x='cast',data=cleaned_data,order=top_casts, width = 0.8)
plt.title('Count of Top20 cast',fontsize=10)
plt.xticks(rotation=90, fontsize=8)
plt.show()
```

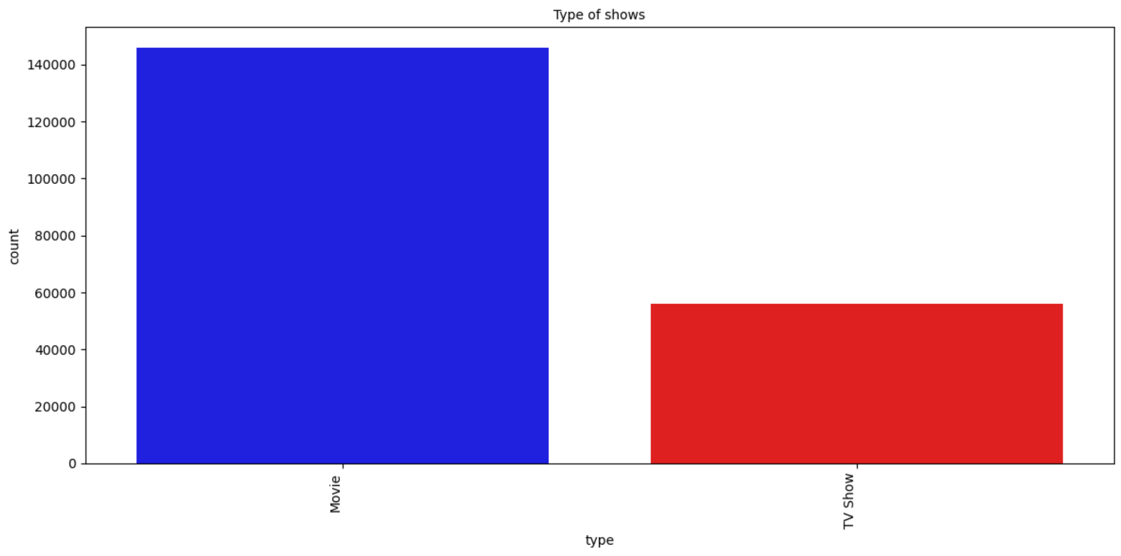


[ ]:
```
%matplotlib inline
import matplotlib.pyplot as plt
import seaborn as sns

# Filter out 'unknown_director' rows before calculating top directors
filtered_data = cleaned_data[cleaned_data['listed_in'] != 'unknown_genre']

top_genres = filtered_data['listed_in'].value_counts().nlargest(20).index
plt.figure(figsize=(12, 6))
sns.countplot(x='listed_in', data=cleaned_data, order=top_genres)
```

```
plt.xticks(rotation=90, ha='right')
plt.title('Count of Top20 genre',fontsize=10)
plt.tight_layout()
plt.show()
```



```
[ ]: %matplotlib inline
     import matplotlib.pyplot as plt
     import seaborn as sns

     filtered_data = cleaned_data[cleaned_data['type'] != 'unknown_type']
     top_type = filtered_data['type'].value_counts().nlargest(20).index

     plt.figure(figsize=(12, 6))
     sns.countplot(x='type', data=cleaned_data, order=top_type, hue='type',␣
      ↪palette={'Movie': 'blue', 'TV Show': 'red'})
     plt.xticks(rotation=90, ha='right')
     plt.title('Type of shows', fontsize=10)
     plt.tight_layout()
     plt.show()
```



Analysis from the counts of each categorical variable in both graphical and non-graphical format:

Below are the count of each category of the cleaned dataset,

United States have the more counts of TV shows and Movies

Martin Scorsese and **Youssef Chahine** are the top most directors with

more counts

Liam Neeson and **Affred Molina** are top actors with more count of movies and tv shows

Dramas and **International movies** are the most listed genres

Count of movies is greater than count of tv shows.

It is recommended that based on these counts Netflix can get an idea of how to improve the same logic in other countries too.

Comparison Analysis:

```
[ ]: groupby_movies=cleaned_data[cleaned_data['type']=='Movie'].
       ↪groupby('country')['title'].count()
     groupby_movies.sort_values(ascending=False).head(10)
```

```
[ ]: country
     United States          45791
     India                  21411
     United Kingdom          8560
     France                  6605
     Missing_countryname     6199
     Canada                  5738
```

```
Japan                   3525
Spain                   3469
Germany                 3427
China                   2377
Name: title, dtype: int64
```

```
[ ]: groupby_tvShows=cleaned_data[cleaned_data['type']=='TV Show'].
      ↪groupby('country')['title'].count()
     groupby_tvShows.sort_values(ascending=False).head(10)
```

```
[ ]: country
     United States          13533
     Missing_countryname     5698
     Japan                   5154
     United Kingdom          4385
     South Korea             3754
     Canada                  2177
     Mexico                  2018
     Spain                   1846
     Taiwan                  1719
     France                  1647
     Name: title, dtype: int64
```

Analysis of comparison between tv shows and movies among each country:

US ranks1st in TV shows and Movies production in Netflix.

Hence Netflix can focus more on countries that have large production numbers like **US,India, United Kingdom, Japan, Canada, South Korea** to release tv shows or movies.

Analysis between Cast and shows:

```
[ ]: filtered_cast_data = cleaned_data[cleaned_data['cast'] != 'unknown_actor']
     groupby_cast_tvShow=filtered_cast_data[filtered_cast_data['type']=='TV Show'].
      ↪groupby('cast')['title'].count()
     groupby_cast_tvShow = groupby_cast_tvShow.sort_values(ascending=False).head(10)
     print(groupby_cast_tvShow)
```

```
cast
David Attenborough    82
Takahiro Sakurai      56
Yuki Kaji             45
Ai Kayano             41
Junichi Suwabe        39
Daisuke Ono           38
Yuichi Nakamura       38
Jun Fukuyama          38
Kate Harbour          37
Amandla Stenberg      35
```

```
Name: title, dtype: int64
```

```
[ ]: filtered_cast_data = cleaned_data[cleaned_data['cast'] != 'unknown_actor']
     groupby_cast_movie=filtered_cast_data[filtered_cast_data['type']=='Movie'].
       ↪groupby('cast')['title'].count()
     groupby_cast_movie = groupby_cast_movie.sort_values(ascending=False).head(10)
     print(groupby_cast_movie)
```

```
cast
Liam Neeson          161
Alfred Molina        157
John Krasinski       138
Salma Hayek          130
Frank Langella       128
Anupam Kher          118
John Rhys-Davies     116
Shah Rukh Khan       108
Naseeruddin Shah     106
Quvenzhané Wallis    100
Name: title, dtype: int64
```

Analysis on Cast with shows:

David Attenborough acted in most number of TVshows.

Liam Neeson acted in most number of Movies.

Netflix should focus more on releasing tvshows/Movies casted by the above actors to attract more subscribers

Analysis based on Directors:

```
[ ]: filtered_director_data = cleaned_data[cleaned_data['director'] !=␣
       ↪'unknown_director']
     groupby_director_tvshow=filtered_director_data[filtered_director_data['type']=='TV␣
       ↪Show'].groupby('director')['title'].count()
     groupby_director_tvshow.sort_values(ascending=False).head(10)
```

```
[ ]: director
     Noam Murro           189
     Thomas Astruc        160
     Damien Chazelle      104
     Alan Poul            104
     Houda Benyamina      104
     Laïla Marrakchi      104
     Rob Seidenglanz      103
     Alejandro Lozano      90
     Jay Oliva             81
     Manolo Caro           78
     Name: title, dtype: int64
```

[ ]:
```
filtered_director_data = cleaned_data[cleaned_data['director'] !=␣
  ↪'unknown_director']
groupby_director_movie=filtered_director_data[filtered_director_data['type']=='Movie'].
  ↪groupby('director')['title'].count()
groupby_director_movie.sort_values(ascending=False).head(10)
```

[ ]:
```
director
Martin Scorsese        419
Youssef Chahine        409
Cathy Garcia-Molina    356
Steven Spielberg       355
Lars von Trier         336
Raja Gosnell           308
Tom Hooper             306
McG                    293
David Dhawan           270
Wilson Yip             260
Name: title, dtype: int64
```

Analysis on Directors with shows:

Noam Murro have directed more TV shows.

Martin Scorsese have directed more Movies

Netflix should focus more on releasing tvshows/Movies directed by the above actors to attract more subscribers to Neflix

Analysis on listed_in (genre):

[ ]:
```
India_data = cleaned_data[cleaned_data['country'] == 'India']

# Group by listed_in and count
most_watched = India_data['listed_in'].value_counts().
  ↪sort_values(ascending=False)

# Printing the results
print(most_watched)
```

```
listed_in
International Movies          7059
Dramas                        5569
Comedies                      2685
Independent Movies            1394
Action & Adventure            1187
Romantic Movies                931
Music & Musicals               847
Thrillers                      743
International TV Shows         428
```

```
Horror Movies                   307
TV Dramas                       272
Children & Family Movies        225
TV Shows                        207
TV Comedies                     141
Sports Movies                   121
Sci-Fi & Fantasy                111
Classic Movies                   98
Romantic TV Shows                68
Crime TV Shows                   61
Kids' TV                         57
TV Action & Adventure            44
Cult Movies                      42
LGBTQ Movies                     33
Documentaries                    32
TV Horror                        28
TV Sci-Fi & Fantasy              27
Faith & Spirituality             20
British TV Shows                 19
Docuseries                       15
TV Mysteries                     11
Stand-Up Comedy & Talk Shows      8
Reality TV                        7
Stand-Up Comedy                   7
Teen TV Shows                     7
TV Thrillers                      3
Name: count, dtype: int64
```

Analysis on most watched genre in India:

International movies,Dramas,Comedies are the most watched genres in India. Hence Netflix can focus more on adding such genres in India.

Analysis on Duration based on minutes:

[ ]:
```python
type_shows = df[['title', 'type', 'Movie_Minutes']]

horror_movies = cleaned_data[cleaned_data['listed_in'].str.contains('Horror')]

# Calculating the average duration
average_duration = horror_movies['Movie_Minutes'].mean()

# Printing the result
print(f"The average duration of horror movies is:{average_duration} minutes")
```

```
The average duration of horror movies is:99.01903303434698 minutes
```

Analysis of Avg duration of horror movies:

My friend wants to know the average duration of horror movies. So I made an analysis above and the average duration of horror movies is **99 minutes**.

Analysis on Duration based on seasons:

```
[ ]: tv_shows = cleaned_data[cleaned_data['type'] == 'TV Show']
     tv_show_counts = tv_shows.groupby('title')['title'].count().
      ↪reset_index(name='watch_count')

     # Merging with original dataframe to get duration (number of seasons)
     tv_show_counts = pd.merge(tv_show_counts, df[['title', 'duration']],␣
      ↪on='title', how='left')

     # Converting duration to numeric (number of seasons) and handling non-numeric␣
      ↪values
     tv_show_counts['duration'] = tv_show_counts['duration'].str.extract('(\d+)').
      ↪astype(float)

     # Sorting by duration (number of seasons) and then watch count
     tv_show_counts = tv_show_counts.sort_values(['duration', 'watch_count'],␣
      ↪ascending=[False, False])


     # To get the top show based on the highest number of seasons
     top_show_by_seasons = tv_show_counts.iloc[0]

     # Printing the result
     print(f"The TV show with the most seasons is: {top_show_by_seasons['title']}")
     print(f"Number of seasons: {top_show_by_seasons['duration']}")
     print(f"Watch count: {top_show_by_seasons['watch_count']}")
```

```
The TV show with the most seasons is: Grey's Anatomy
Number of seasons: 17.0
Watch count: 30
```

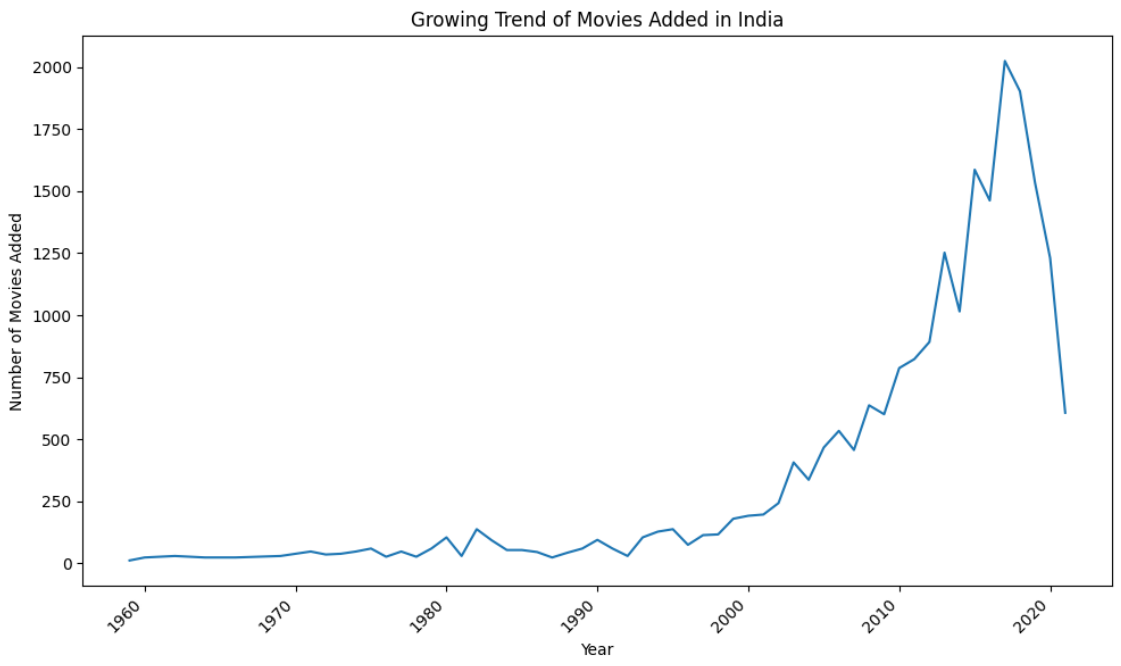
Analysis on TV shows with most seasons:

Grey's Anatomy is the tv show with most seasons with 17 seasons which can be preferred for binge watching

Graphical Analysis of growing trend:

```
[ ]: import matplotlib.pyplot as plt
     import seaborn as sns

     # Filtering data for movies in India
     india_movies = cleaned_data[(cleaned_data['country'] == 'India') &␣
      ↪(cleaned_data['type'] == 'Movie')]

     # Group by year added and count occurrences
```

```
movie_counts_by_year = india_movies.groupby('release_year')['title'].count().
  ↪reset_index(name='count')

# Creating a line plot
plt.figure(figsize=(10, 6))
sns.lineplot(x='release_year', y='count', data=movie_counts_by_year)
plt.title('Growing Trend of Movies Added in India')
plt.xlabel('Year')
plt.ylabel('Number of Movies Added')
plt.xticks(rotation=45, ha='right')
plt.tight_layout()
plt.show()
```



Analysis on Growing Trend of Movies Added in India:

Since the year 2000, the growing trend of movies has been increased in India with upto 2000 movies

If Netflix focus on doing the same by adding more movies in other countries also same like India, subscribers will increase and Netflix can also see more profit on their side.

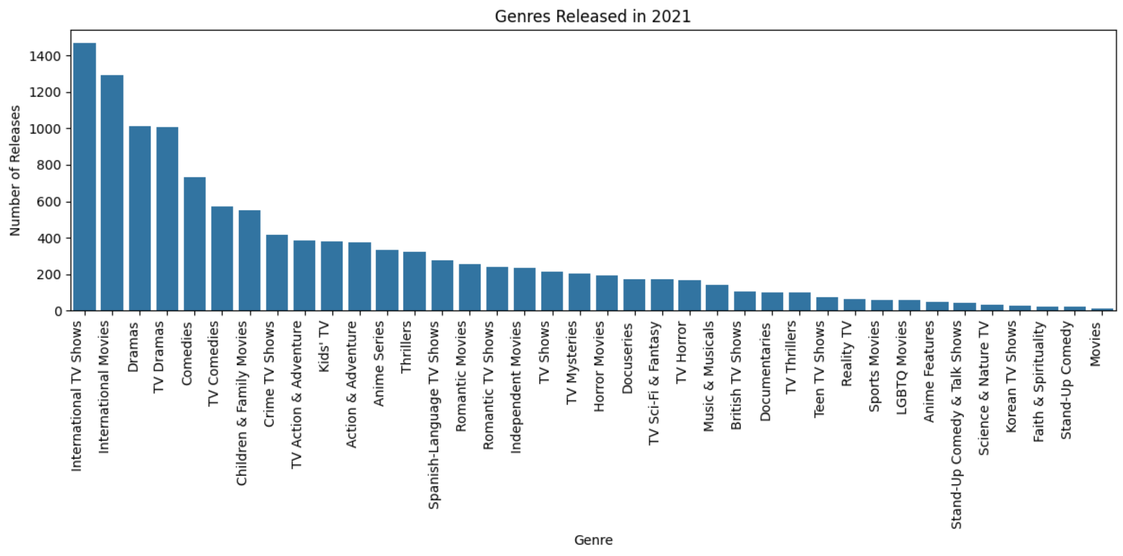
Graphical & Non-Graphical Analysis on recently added genre based on date_added:

[ ]:
```
# Converting 'date_added' to datetime objects
cleaned_data['date_added'] = pd.to_datetime(cleaned_data['date_added'],␣
  ↪errors='coerce')

# Extracting the year
```

```
cleaned_data['year_added'] = cleaned_data['date_added'].dt.year

# To Find the most recent year
most_recent_year = cleaned_data['year_added'].max()

# Printing the result
print(f"The most recent year added is: {most_recent_year}")
```

```
The most recent year added is: 2021.0
```

```
[ ]: import matplotlib.pyplot as plt
     import seaborn as sns

     # Filtering data for content released in 2021
     released_2021 = cleaned_data[cleaned_data['release_year'] == 2021]

     # Group by genre and count occurrences
     genre_counts = released_2021.groupby('listed_in')['title'].count().
      ↪reset_index(name='count')

     # Sort by count in descending order
     genre_counts = genre_counts.sort_values('count', ascending=False)

     # Create a bar plot
     plt.figure(figsize=(12, 6))
     sns.barplot(x='listed_in', y='count', data=genre_counts)
     plt.title('Genres Released in 2021')
     plt.xlabel('Genre')
     plt.ylabel('Number of Releases')
     plt.xticks(rotation=90, ha='right')
     plt.tight_layout()
     plt.show()
```



Analysis of Recently added Genre:

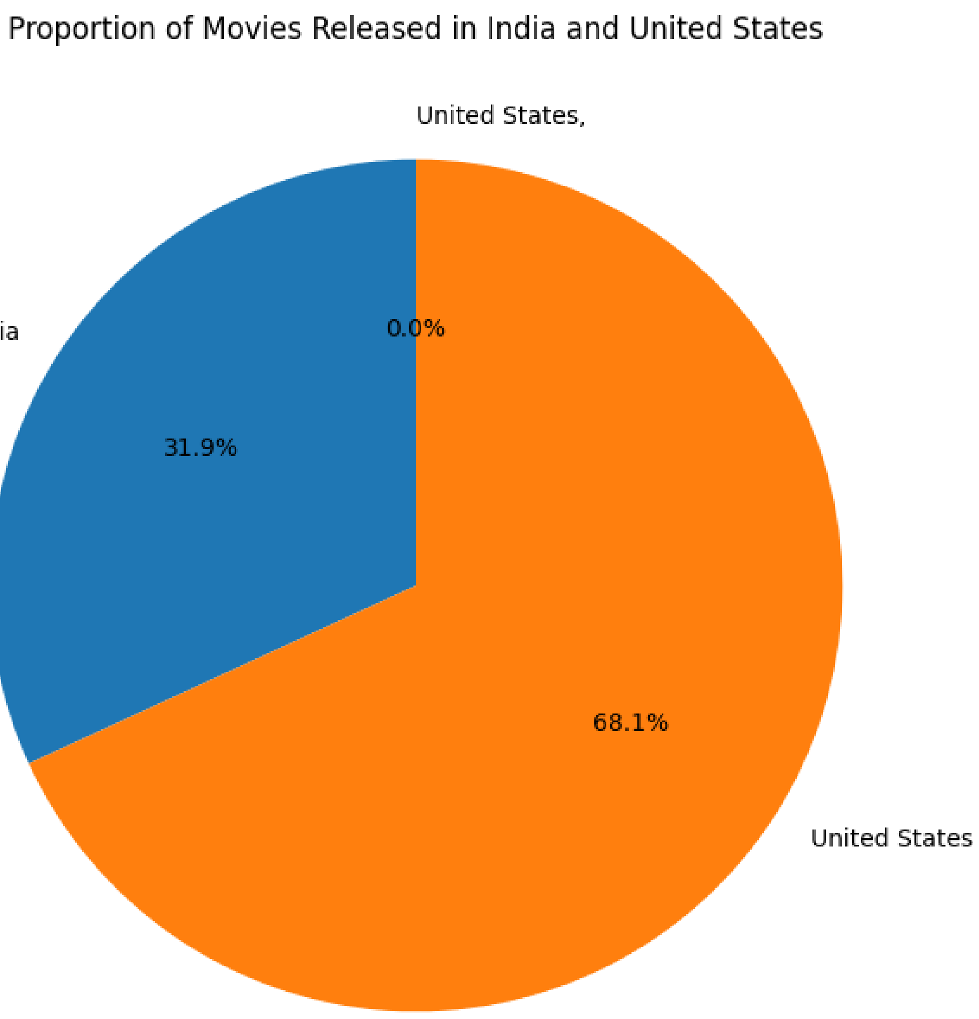
2021 is the recent year where genres are added.

In analysis, **International TV Shows** tops the list of recently added genre.

This analysis will help people who are looking out for recently added tv shows/movies in 2021

Graphical Analysis made on basis of Proportion:

```
[ ]: import matplotlib.pyplot as plt

     # Filtering data for movies
     movies_data = cleaned_data[cleaned_data['type'] == 'Movie']

     # Filtering for India and United States
     india_us_movies = movies_data[movies_data['country'].apply(lambda x: 'India' in␣
      ↪x or 'United States' in x)]

     # Group by country and count occurrences
     country_counts = india_us_movies.groupby('country')['title'].count()

     # Creating a pie chart
     plt.figure(figsize=(8, 8))  # Adjust figure size as needed
     plt.pie(country_counts, labels=country_counts.index, autopct='%1.1f%%',␣
      ↪startangle=90)
     plt.title('Proportion of Movies Released in India and United States')
     plt.show()
```



Analysis of proportion between US movie count and India movie count:

Even though India ranked 2nd in the count of movies released still it has much difference with the United States which ranked top.

Netflix can focus in increasing more movies in India.

Analysis based on Cast:

```
[ ]: indian_movies = cleaned_data[(cleaned_data['country'] == 'India') &␣
      ↪(cleaned_data['type'] == 'Movie')]
     filtered_cast_data = indian_movies[indian_movies['cast'] != 'unknown_actor']
     actor_counts = filtered_cast_data.groupby('cast')['title'].count().
      ↪reset_index(name='movie_count')
```

```
print (actor_counts)
```

```
                      cast  movie_count
0              A.K. Hangal           12
1              A.R. Rahman            3
2          A.S. Sasi Kumar            3
3             Aabhas Yadav            3
4            Aachal Munjal            2
…                      …          …
3677          Zohra Sehgal            3
3678          Zoya Hussain            3
3679           Zul Vellani            3
3680  Ólafur Darri Ólafsson           2
3681           Şafak Sezer            3

[3682 rows x 2 columns]
```

Analysis of actor with most released movies in India:

A.K. Hangal has the highest released movie count in India with 12 movie counts.

Indians are therefore having various recommendations for A.K.Hangal movies

Analysis based on year added of movies:

```
[ ]: movies_data = cleaned_data[cleaned_data['type'] == 'Movie']
     import pandas as pd

     cleaned_data['date_added'] = pd.to_datetime(cleaned_data['date_added'],␣
       ↪errors='coerce')
     cleaned_data['year_added'] = cleaned_data['date_added'].dt.year
     max_year = cleaned_data[cleaned_data['type'] == 'Movie'].
       ↪groupby('year_added')['title'].count().reset_index(name='movie_count').
       ↪loc[lambda df: df['movie_count'].idxmax()]

     print(f"The year with the most movies added to Netflix is:␣
       ↪{max_year['year_added']}")
     print(f"Number of movies added: {max_year['movie_count']}")
```

```
The year with the most movies added to Netflix is: 2019.0
Number of movies added: 34392.0
```

Analysis on year with most movies added in Netflix:

Most movies were added in Netflix in the year **2019** with the count of **34,446 movies**.

Here subscribers have plenty of options to explore movies released in 2019.

Analysis based on cast and listed_in(genre):

```
[ ]: exploded_genres = cleaned_data.explode('listed_in')

     filtered_cast_data = exploded_genres[exploded_genres['cast'] != 'unknown_actor']

     actor_genres = filtered_cast_data.groupby('cast')['listed_in'].nunique().
      ↪reset_index(name='genre_count')

     multi_genre_actors = actor_genres[actor_genres['genre_count'] > 1]

     multi_genre_actors = multi_genre_actors.sort_values('genre_count',␣
      ↪ascending=False)
     print("Actors who have acted in multiple genres:")
     print(multi_genre_actors)
```

```
Actors who have acted in multiple genres:
                      cast  genre_count
28716          Ron Perlman           17
18153       Kiernan Shipka           16
11174            Gary Cole           16
11641          Glenn Close           15
29600     Samuel L. Jackson          14
…                      …            …
25892         Pascal Atuma            2
25882       Parvati Sehgal            2
25876     Parthveer Shukla            2
25906        Pasi Ruohonen            2
25905   Pasha D. Lychnikoff           2

[32665 rows x 2 columns]
```

Analysis on actors who acted in multiple genre:

Ron Perlman has acted in multiple genre with count of 17 followed by Kiernan Shipka, Gary Cole, Glenn close, Samuel L.Jackson

Analysis based on month:

```
[ ]: import pandas as pd
     import calendar

     cleaned_data['date_added'] = pd.to_datetime(cleaned_data['date_added'],␣
      ↪errors='coerce')
     cleaned_data['release_month'] = cleaned_data['date_added'].dt.month

     tv_shows = cleaned_data[cleaned_data['type'] == 'TV Show']
     monthly_releases = tv_shows.groupby('release_month')['title'].count()

     most_released_month_number = monthly_releases.idxmax()
```

```
most_released_month_name = calendar.month_name[int(most_released_month_number)]␣
  ↪ # Convert to int

print(f"The most released month for TV shows is: {most_released_month_name}")
```

```
The most released month for TV shows is: December
```

Analysis of most released month of a tv show:

This analysis shows that the maximum number of tv shows are released in the month of December.

Hence it recommends viewers to look into particular month if they need various options.

```
[ ]: import pandas as pd
     import calendar

     cleaned_data['date_added'] = pd.to_datetime(cleaned_data['date_added'],␣
       ↪errors='coerce')
     cleaned_data['release_month'] = cleaned_data['date_added'].dt.month

     movies = cleaned_data[cleaned_data['type'] == 'Movie']
     monthly_releases = movies.groupby('release_month')['title'].count()

     most_released_month_number = monthly_releases.idxmax()
     most_released_month_name = calendar.month_name[int(most_released_month_number)]␣
       ↪ # Convert to int

     print(f"The most released month for movies is: {most_released_month_name}")
```

```
The most released month for movies is: July
```

Analysis of most released month of a movie:

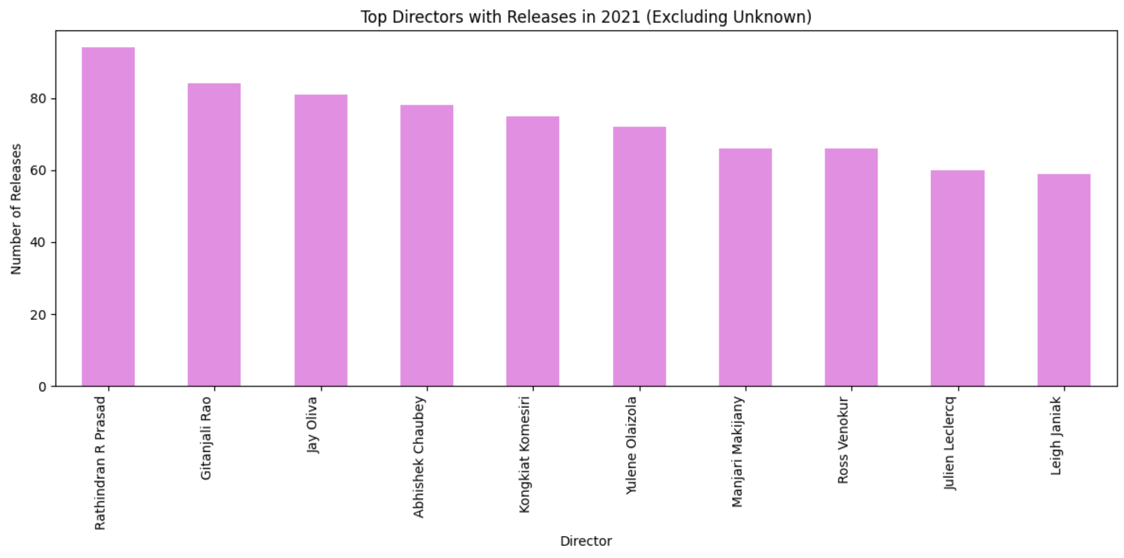
This analysis shows that the maximum number of movies are released in the month of July.

Hence it recommends viewers to look into particular month if they need various options in movies.

Graphical (Bivariate Cat-Num) Analysis based on Directors and release_year:

```
[ ]: import pandas as pd
     import matplotlib.pyplot as plt
     import seaborn as sns

     most_recent_year = cleaned_data['release_year'].max()
     recent_releases = cleaned_data[(cleaned_data['release_year'] ==␣
       ↪most_recent_year) & (cleaned_data['director'] != 'unknown_director')]

     director_counts = recent_releases.groupby('director')['title'].count().
       ↪reset_index(name='count')
     top_directors = director_counts.sort_values('count', ascending=False).head(10)
```

```
plt.figure(figsize=(12,6))
sns.barplot(x='director', y='count', data=top_directors, color='violet', width␣
  ↪= 0.5)
plt.xticks(rotation=90, ha='right')
plt.title(f'Top Directors with Releases in {most_recent_year} (Excluding␣
  ↪Unknown)')
plt.xlabel('Director')
plt.ylabel('Number of Releases')
plt.tight_layout()
plt.show()
```



Analysis of Directors with recent released year:

It is found in analysis that Director Rathindran R Prasad has more movies released in 2021 which is the recent year.

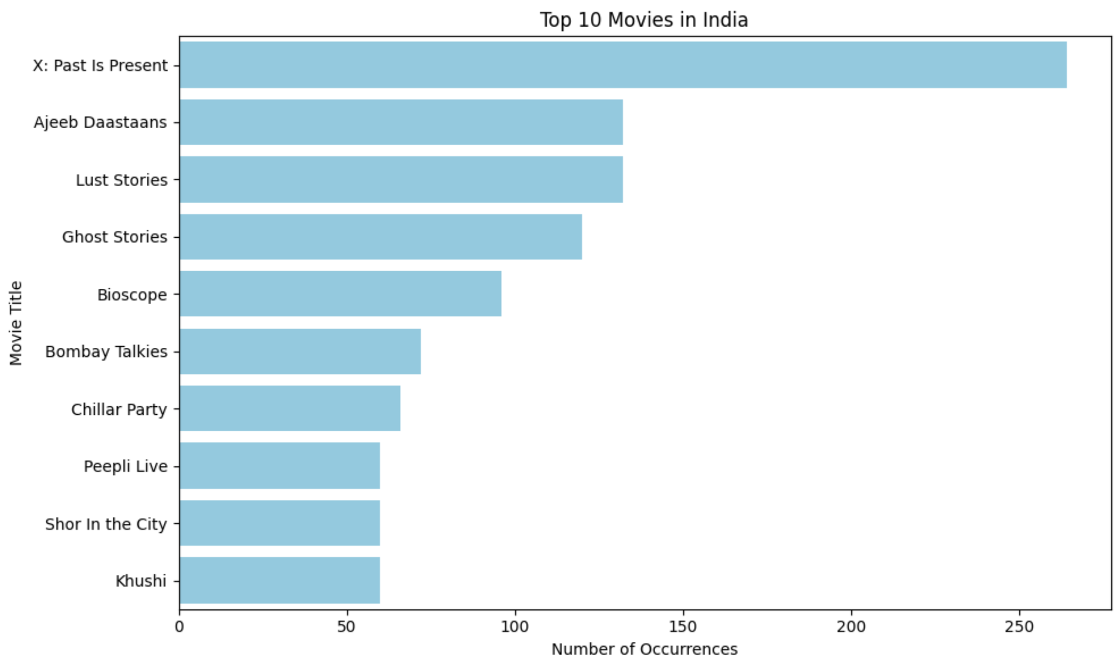
Other directors are also there with only minimum difference.

This analysis will help the audience and Netflix to focus more on those directors

Analysis based on Movies in India:

[ ]:
```
import matplotlib.pyplot as plt
import seaborn as sns


india_movies = cleaned_data[(cleaned_data['country'] == 'India') &␣
  ↪(cleaned_data['type'] == 'Movie')]

top_10_movies = india_movies['title'].value_counts().head(10)
```

```
plt.figure(figsize=(10, 6))
sns.barplot(y=top_10_movies.index, x=top_10_movies.values, orient='h',␣
 ↪color='skyblue')
plt.title('Top 10 Movies in India')
plt.xlabel('Number of Occurrences')
plt.ylabel('Movie Title')
plt.tight_layout()
plt.show()
```



Analysis of top 10 movies in India:

Me and my friend wants to know which movie is in top with most number of occurences.

This analysis will give me the top 10 movies.

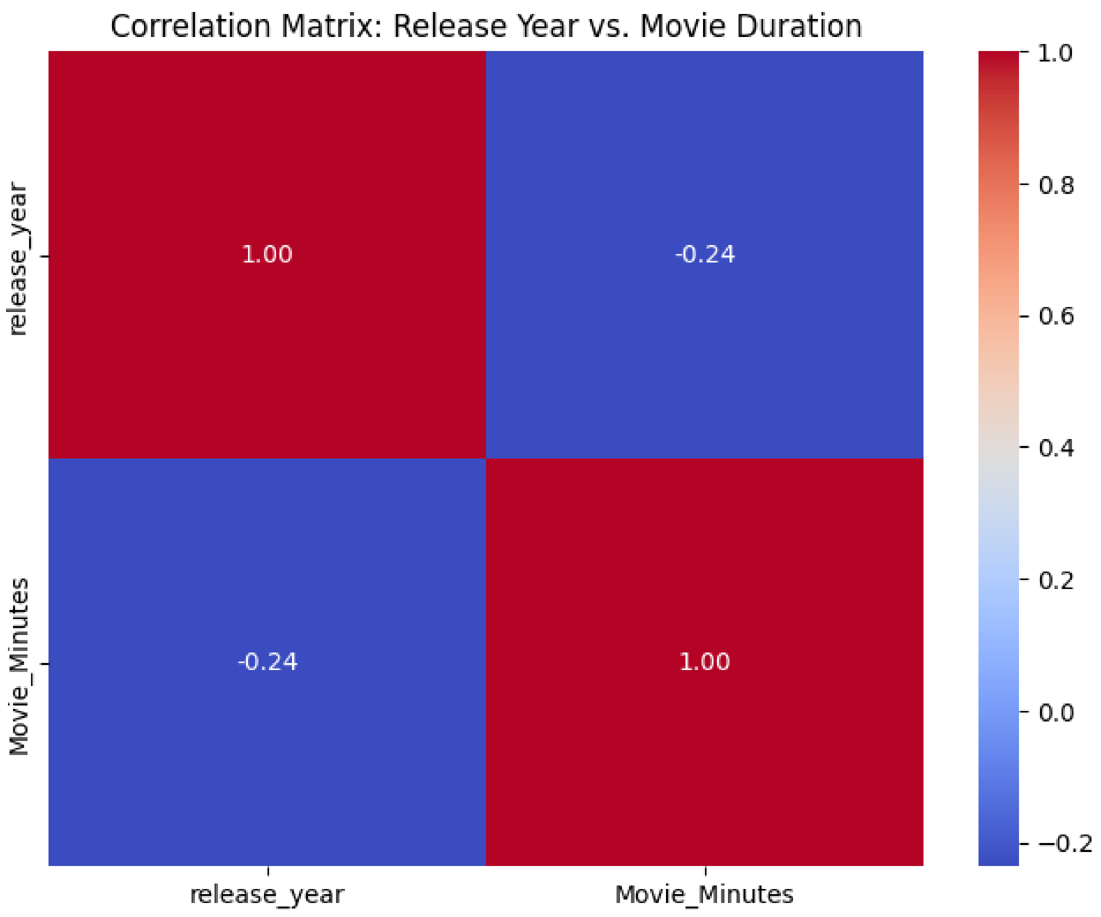
The movie **X: Past is Present** is the movie with most number of occurences followed by Ajeeb Daastaans, Lust stories, Ghost stories etc

This analysis will be helpful when people wants to watch movie with most number of occurences.

Corelation Analysis using heat map:

```
[ ]: import pandas as pd
     import seaborn as sns
     import matplotlib.pyplot as plt


     movies_data = cleaned_data[cleaned_data['type'] == 'Movie']
```

```
correlation_data = movies_data[['release_year', 'Movie_Minutes']]

correlation_matrix = correlation_data.corr()

plt.figure(figsize=(8, 6))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', fmt=".2f")
plt.title('Correlation Matrix: Release Year vs. Movie Duration')
plt.show()
```



Analysis between movie release year and duration:

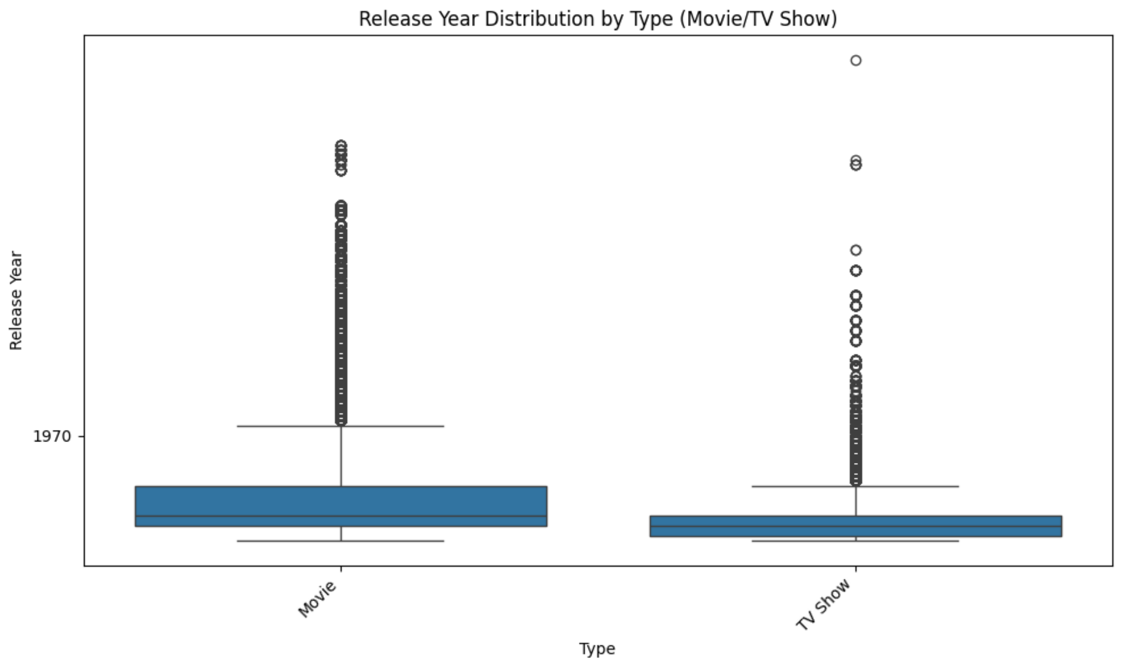
The heatmap generated by the code provides a visual representation of the correlation between movie release year and duration.

By analyzing the color intensity and the annotation value, we can gain insights into the strength and direction of this relationship, helping us understand potential trends in movie durations over time.

However, it's crucial to remember that correlation does not equal causation, and the interpretation should be made cautiously considering the context of the data and research question.

Analysis of Categorical variables using Box plot:

```
[ ]: import pandas as pd
     import seaborn as sns
     import matplotlib.pyplot as plt

     plt.figure(figsize=(10, 6))
     sns.boxplot(x='type', y='release_year', data=cleaned_data)
     plt.title('Release Year Distribution by Type (Movie/TV Show)')
     plt.xlabel('Type')
     plt.ylabel('Release Year')
     plt.xticks(rotation=45, ha='right')
     plt.gca().invert_yaxis()
     plt.tight_layout()
     plt.show()
```



Analysis of relationship between type (Movie or TV Show) and release_year using a box plot:

Movies on Netflix have a wider range of release years, including older titles.

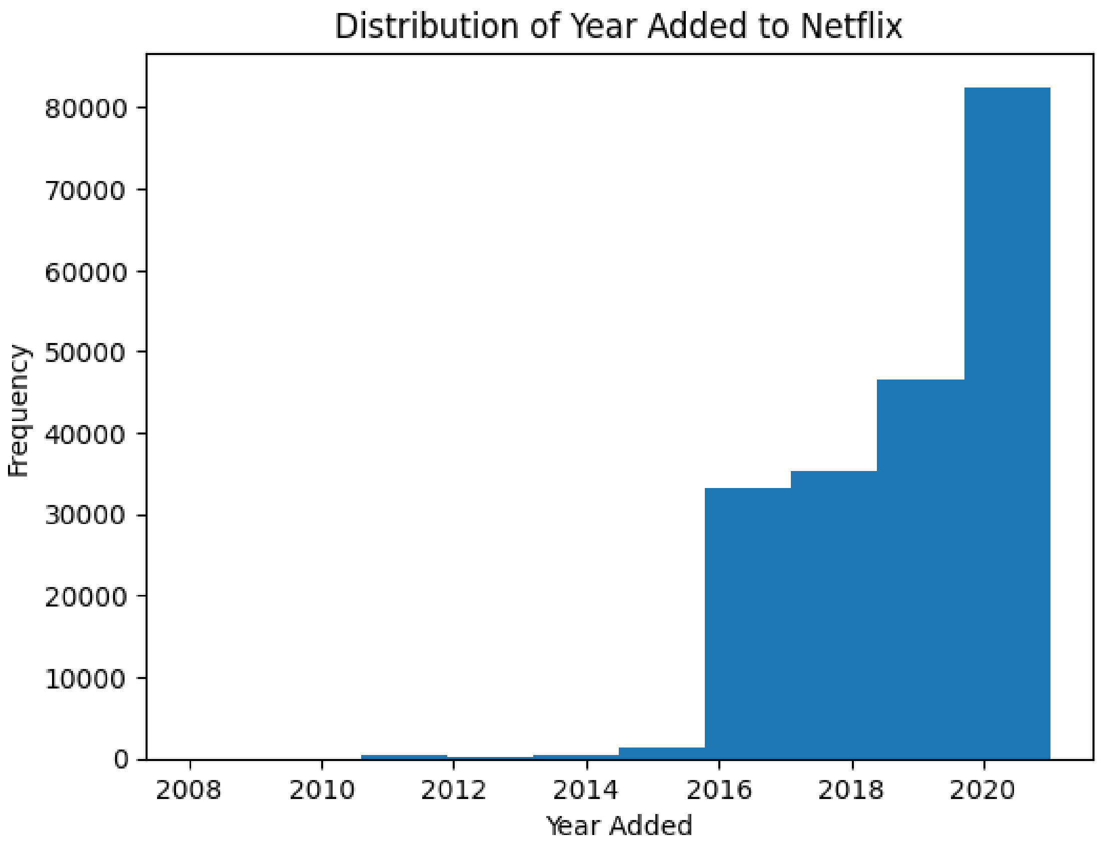
TV shows tend to have more recent releases compared to movies.

Outliers in release years could indicate unusual content or data anomalies.

Netflix could focus on acquiring more recent TV show releases, diversify content by including a mix of new and classic titles and investigate outliers for insights into content decisions or data quality

Graphical Analysis based on Histogram:

[ ]:
```python
import matplotlib.pyplot as plt

plt.hist(cleaned_data['year_added'], bins=10)
plt.xlabel('Year Added')
plt.ylabel('Frequency')
plt.title('Distribution of Year Added to Netflix')
plt.show()
```



Analysis of frequency and year added using Histogram:

Netflix has seen a significant increase in content additions over recent years, with a peak around 2019.

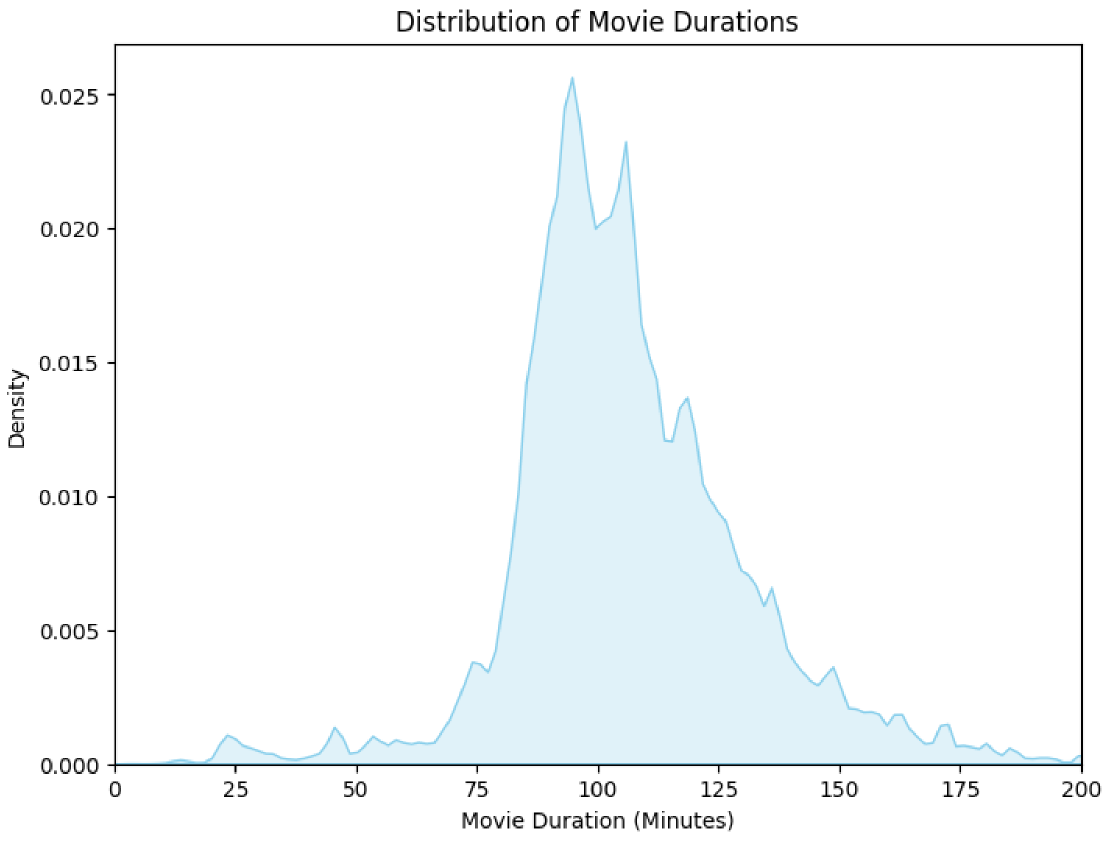
Recommendation: Leverage this trend by focusing on acquiring and promoting newer content.

Analyze audience preferences within specific years to further tailor content strategies and recommendations for user engagement.

Consider expanding content libraries with a balance of both recent and classic titles to cater to diverse viewer interests.

KDE analysis of Movie minutes:

```
[ ]: import seaborn as sns
     import matplotlib.pyplot as plt

     plt.figure(figsize=(8, 6))
     sns.kdeplot(data=cleaned_data, x='Movie_Minutes', fill=True, color='skyblue',␣
       ↪bw_adjust=0.5)
     plt.title('Distribution of Movie Durations')
     plt.xlabel('Movie Duration (Minutes)')
     plt.ylabel('Density')
     plt.xlim(0, 200)
     plt.show()
```



Analysis of Movie minutes using KDE plot:

Most movies on Netflix have durations clustered around 90-100 minutes, with a gradual decrease in density for longer films.

Recommendation: Focus on acquiring movies within the popular duration range to cater to viewer preferences. Consider offering more diverse content with shorter or longer durations to expand audience reach. Analyze genre-specific duration preferences to further optimize content acquisition.

Promote movie duration as a search/filter option to enhance user experience.

Overall Insights:

Here's a detailed overview of the analysis I've performed on the Netflix dataset, broken down into steps:

1. Data Cleaning and Preparation: I started by importing the necessary libraries like pandas and downloaded the Netflix dataset using gdown and then performed data cleaning steps such as:

a) Handling missing values by replacing them with appropriate placeholders (e.g., 'unknown_director', 'unknown_actor').

b) Splitting comma-separated values in columns like 'director', 'cast', 'country', and 'listed_in' to create separate rows for each item.

c) Extracting numerical duration from the 'duration' column and creating separate columns for duration value and type (minutes or seasons).

d) Merging the cleaned dataframes into a single 'cleaned_data' dataframe.

e) Dropping duplicate rows.

2. Univariate Analysis (Counts and Distributions)

I've analyzed the frequency distributions of categorical variables such as 'director', 'cast', 'country', 'listed_in' and 'type' using both:

Non-graphical methods: Calculating and printing value counts.

Graphical methods: Creating bar plots to visualize the distributions, focusing on the top categories.

3. Bivariate Analysis (Relationships and Comparisons)

I've explored relationships between variables, including:

a) Comparing movie and TV show production by country.

b) Identifying top actors and directors for both movies and TV shows.

c) Analyzing the most watched genres in India.

d) Determining the average duration of horror movies.

e) Finding the TV show with the most seasons.

f) Examining the growing trend of movie releases in India over time using a line plot.

g) Analyzing the most recently added genres.

h) Comparing the proportion of movies released in India and the United States using a pie chart.

i) Identifying the year with the most movies added to Netflix.

j) Investigating actors who have acted in multiple genres.

k) Determining the months with the most releases for both TV shows and movies.

l) Identifying the correlation between movie release year and duration.

m) Finding relationship between type (Movie or TV Show) and release year.

n) Analyzing frequency and year added by Netflix.

o) Examining the length of movie minutes.

4. Key Insights and Recommendations

I've derived several insights from my analysis, including observations about top countries, directors, actors, genres and release trends.

I've provided recommendations for Netflix based on these insights, such as focusing on specific countries, genres or actors to attract more subscribers and increase viewership.

5. Visualization and Reporting

I effectively used visualizations (bar plots, line plots, pie charts) to present my findings in a clear and understandable manner.

I documented my analysis with Markdown cells, explaining the steps, insights and recommendations.

Overall, I've conducted a comprehensive data analysis of the Netflix dataset, starting from data cleaning to deriving valuable insights and providing actionable recommendations.

I've also effectively used a combination of techniques and visualizations to support my findings.

About Outlier treatment:

The Netflix analysis focused on initial exploration and visualization, where outlier treatment wasn't the main priority.

Extreme values might be valid in this context or implicitly handled by the chosen methods.

Outlier treatment is often more crucial for predictive modeling, which might be a later step.

The large dataset size could also reduce the impact of outliers on overall insights.