About NETFLIX

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

Business Problem

Analysing the data and genarate insighs of Netflix to decide which type of content should be produced and how to grow as a business in different countries and finding strategy to create more revenue

Dataset Link:https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/000/000/940/original/netflix.csv

This dataset is consists of these parameters and variables

Show_id: Unique ID for every Movie / Tv Show Type: Identifier - A Movie or TV Show Title: Title of the Movie / Tv Show Director: Director of the Movie Cast: Actors involved in the movie/show Country: Country where the movie/show was produced Date_added: Date it was added on Netflix Release_year: Actual Release year of the movie/show Rating: TV Rating of the movie/show Duration: Total Duration - in minutes or number of seasons Listed_in: Genre Description: The summary description

1. Defining Problem Statement and Analysing basic metrics.

Problem Statement

Perform data exploration and visualisation on the Netflix dataset to uncover insights that could help Netflix in decisionmaking regarding which type of shows/movies to produce and how to grow the business in different countries.

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
!gdown https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/000/000/940/original/netflix.csv
df = pd.read_csv('netflix.csv')
```

```
Downloading...
From: https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/000/000/940/original/netflix.csv
To: /content/netflix.csv
100% 3.40M/3.40M [00:00<00:00, 25.8MB/s]
```

```
import warnings
import re
import plotly.express as px
import plotly.graph_objs as go
import plotly.figure_factory as ff
warnings.filterwarnings('ignore')
%matplotlib inline
```

```
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
```

Analysis of Basic Metrics The dataset contains 8807 rows and 12 columns. It has the following attributes-

Show id Type Title Director Cast Country Date added Release year Rating Duration Listed_in Description

2. Observations on the shape of data, data types of all the attributes, conversion of categorical attributes to 'category' (If required), missing value detection, statistical summary.

```
# exploring the dataset
df.head()
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90 min	Documentaries	As her father nears the end of his life, filmm...
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	After crossing paths at a party, a Cape Town t...
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...	To protect his family from a powerful drug lor...
3	s4	TV Show	Jailbirds New Orleans	NaN	NaN	NaN	September 24, 2021	2021	TV-MA	1 Season	Docuseries, Reality TV	Feuds, flirtations and toilet talk go down amo...
4	s5	TV Show	Kota Factory	NaN	Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...	India	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, Romantic TV Shows, TV ...	In a city of coaching centers known to train I...

```
df.tail()
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description
8802	s8803	Movie	Zodiac	David Fincher	Mark Ruffalo, Jake Gyllenhaal, Robert Downey J...	United States	November 20, 2019	2007	R	158 min	Cult Movies, Dramas, Thrillers	A political cartoonist, a crime reporter and a...
8803	s8804	TV Show	Zombie Dumb	NaN	NaN	NaN	July 1, 2019	2018	TV-Y7	2 Seasons	Kids' TV, Korean TV Shows, TV Comedies	While living alone in a spooky town, a young g...
8804	s8805	Movie	Zombieland	Ruben Fleischer	Jesse Eisenberg, Woody Harrelson, Emma Stone, ...	United States	November 1, 2019	2009	R	88 min	Comedies, Horror Movies	Looking to survive in a world taken over by zo...
8805	s8806	Movie	Zoom	Peter Hewitt	Tim Allen, Courteney Cox, Chevy Chase, Kate Ma...	United States	January 11, 2020	2006	PG	88 min	Children & Family Movies, Comedies	Dragged from civilian life, a former superhero...
8806	s8807	Movie	Zubaan	Mozez Singh	Vicky Kaushal, Sarah-Jane Dias, Raaghav Chanan...	India	March 2, 2019	2015	TV-14	111 min	Dramas, International Movies, Music & Musicals	A scrappy but poor boy worms his way into a ty...

```
#shape of the dataset
df.shape
```

```
(8807, 12)
```

```
#checking the columns
df.columns
```

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

```
#checking duplicate
df.duplicated().any()
```

```
     False
```

```
#checking the number of missing values
df.isnull().sum()
```

```
     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
```

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

```
     4307
```

Above we can clearly see that there are some null values in the dataset. There are total 4307 null values present in the entire dataset out of which 2634 missing points under 'director', 831 under 'country', 825 under 'cast', 10 under 'date_added', 4 under 'rating', and 3 under 'duration'. so before diving into EDA we first need to handle all these null values.

```
# Statistical Summary of Netflix Dataset
df.describe()
```

	release_year
count	8807.000000
mean	2014.180198
std	8.819312
min	1925.000000
25%	2013.000000
50%	2017.000000
75%	2019.000000
max	2021.000000

Statistical Summary : No of records available : 8807

mean of release year : 2014.18

Standard deviation of release year : 8.82

minimum of movies and TV Shows release year : 1925

25% of movies and TV Shows release year : 2013

50% of movies and TV Shows release year 2017

75% of movies and TV Shows release year 2019

max of movies and TV Shows release year 2021

3. Non-Graphical Analysis: Value counts and unique attributes.

```
# No of Movies & TV Shows reclease in country
df['country'].str.split(',', expand=True).stack().value_counts()
```

```
     United States     3211
     India             1008
     United Kingdom     628
      United States     479
     Canada             271
                       ...
      Ecuador             1
     Iran                 1
     Cyprus               1
      Mongolia            1
      Montenegro          1
     Length: 197, dtype: int64
```

```
# No of Release from Directors
df['director'].str.split(',', expand=True).stack().value_counts()
```

```
     Rajiv Chilaka       22
     Raúl Campos         18
      Jan Suter          18
     Marcus Raboy        16
     Suhas Kadav         16
                         ..
     Will Eisenberg       1
     Marina Seresesky     1
     Kenny Leon           1
     James Dearden        1
     Mozez Singh          1
     Length: 5120, dtype: int64
```

```
# No of Movies & TV Shows done by actor
df['cast'].str.split(',', expand=True).stack().value_counts()
```

```
      Anupam Kher              39
      Rupa Bhimani             31
      Takahiro Sakurai         30
      Julie Tejwani            28
      Om Puri                  27
                               ..
      Vedika                    1
      Tedros Teclebrhan         1
      Maryam Zaree              1
      Melanie Straub            1
      Chittaranjan Tripathy     1
     Length: 39296, dtype: int64
```

```
#movie release distribution
df.date_added.value_counts()
```

```
     January 1, 2020      109
     November 1, 2019      89
     March 1, 2018         75
     December 31, 2019     74
     October 1, 2018       71
                         ...
     December 4, 2016       1
     November 21, 2016      1
     November 19, 2016      1
     November 17, 2016      1
     January 11, 2020       1
     Name: date_added, Length: 1767, dtype: int64
```

```
#number of releases per year
df.release_year.value_counts()
```

```
     2018    1147
     2017    1032
     2019    1030
     2020     953
     2016     902
             ...
     1959       1
     1925       1
     1961       1
     1947       1
     1966       1
     Name: release_year, Length: 74, dtype: int64
```

```
#ratings distribution
df.rating.value_counts()
```

```
     TV-MA       3207
     TV-14       2160
     TV-PG        863
     R            799
     PG-13        490
     TV-Y7        334
     TV-Y         307
     PG           287
     TV-G         220
     NR            80
     G             41
     TV-Y7-FV       6
     NC-17          3
     UR             3
     74 min         1
     84 min         1
     66 min         1
     Name: rating, dtype: int64
```

```
df[df['type'] == "Movie"].duration.value_counts()
```

```
     90 min     152
     94 min     146
     93 min     146
     97 min     146
     91 min     144
               ...
     212 min      1
     8 min        1
     186 min      1
     193 min      1
     191 min      1
     Name: duration, Length: 205, dtype: int64
```

```
df[df['type'] == "TV Show"].duration.value_counts()
```

```
     1 Season      1793
     2 Seasons      425
     3 Seasons      199
     4 Seasons       95
     5 Seasons       65
     6 Seasons       33
     7 Seasons       23
     8 Seasons       17
     9 Seasons        9
     10 Seasons       7
     13 Seasons       3
     15 Seasons       2
     12 Seasons       2
     11 Seasons       2
     17 Seasons       1
     Name: duration, dtype: int64
```

```
df['listed_in'].str.split(',', expand=True).stack().reset_index(level=1, drop=True).to_frame('Genres').value_counts()
```

```
     Genres
      International Movies        2624
     Dramas                       1600
     Comedies                     1210
     Action & Adventure            859
     Documentaries                 829
                                  ...
     Romantic Movies                 3
     Spanish-Language TV Shows       2
     TV Sci-Fi & Fantasy             1
     LGBTQ Movies                    1
     Sports Movies                   1
     Length: 73, dtype: int64
```

```
# Number of unique data for each column
df.nunique()
```

```
     show_id         8807
     type               2
     title           8807
     director        4528
     cast            7692
     country          748
```

```
date_added      1767
release_year      74
rating            17
duration         220
listed_in        514
description     8775
dtype: int64
```

The Type attribute has 2666 TV shows and 6131 Movies. The Rating attribute has TV-MA ratings with 3209 occurrences followed by TV-14 with 2157 occurrences. The Listed in attribute with the highest count is International Movies with 2624 occurrences. ** Unique Attributes** The dataset contains 748 unique countries, 8807 unique titles, 4528 unique directors, 7692 unique cast members and 17 unique rating

4. Visual Analysis - Univariate, Bivariate after pre-processing of the data.

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

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

```
# unnesting the cast column
const=df['cast'].apply(lambda x:str(x).split(', ' )).tolist()
df_cast=pd.DataFrame(const,index=df['title'])
df_cast=df_cast.stack().reset_index()
df_cast.rename(columns={0:'actor'},inplace=True)
df_cast.drop(['level_1'],axis=1,inplace=True)
df_cast.head()
```

	title	actor
0	Dick Johnson Is Dead	nan
1	Blood & Water	Ama Qamata
2	Blood & Water	Khosi Ngema
3	Blood & Water	Gail Mabalane
4	Blood & Water	Thabang Molaba

```
# unnesting the country column

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

title	country

```
df.loc[df['duration'].isnull(),'duration']=df.loc[df['duration'].isnull(),'duration'].fillna(df['rating'])
df.loc[df['rating'].str.contains('min',na=False),'rating']='NR'
df.head()
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90 min	Documentaries	As her father nears the end of his life, filmm...
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	After crossing paths at a party, a Cape Town t...
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...	To protect his family from a powerful drug lor...
3	s4	TV Show	Jailbirds New Orleans	NaN	NaN	NaN	September 24, 2021	2021	TV-MA	1 Season	Docuseries, Reality TV	Feuds, flirtations and toilet talk go down amo...
4	s5	TV Show	Kota Factory	NaN	Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...	India	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, Romantic TV Shows, TV ...	In a city of coaching centers known to train I...

```
# removing min from data
df['duration']=df['duration'].str.replace("min",'')
df.head()
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90	Documentaries	As her father nears the end of his life, filmm...
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	After crossing paths at a party, a Cape Town t...
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...	To protect his family from a powerful drug lor...
3	s4	TV Show	Jailbirds New Orleans	NaN	NaN	NaN	September 24, 2021	2021	TV-MA	1 Season	Docuseries, Reality TV	Feuds, flirtations and toilet talk go down amo...
4	s5	TV Show	Kota Factory	NaN	Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...	India	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, Romantic TV Shows, TV ...	In a city of coaching centers known to train I...

```
df['duration_copy']=df['duration'].copy()
df.head()
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description	duration_copy
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90	Documentaries	As her father nears the end of his life, filmm...	90
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	After crossing paths at a party, a Cape Town t...	2 Seasons
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...	To protect his family from a powerful drug lor...	1 Season
3	s4	TV Show	Jailbirds New Orleans	NaN	NaN	NaN	September 24, 2021	2021	TV-MA	1 Season	Docuseries, Reality TV	Feuds, flirtations and toilet talk go down amo...	1 Season
4	s5	TV Show	Kota Factory	NaN	Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...	India	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, Romantic TV Shows, TV ...	In a city of coaching centers known to train I...	2 Seasons

```
df.loc[df['duration_copy'].str.contains('Season',na=False),'duration_copy']=0
df['duration_copy']=df['duration_copy'].astype('int')
df.head()
```

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description	duration_copy
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90	Documentaries	As her father nears the end of his life, filmm...	90
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	After crossing paths at a party, a Cape Town t...	0
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...	To protect his family from a powerful drug lor...	0
3	s4	TV Show	Jailbirds New Orleans	NaN	NaN	NaN	September 24, 2021	2021	TV-MA	1 Season	Docuseries, Reality TV	Feuds, flirtations and toilet talk go down amo...	0
4	s5	TV Show	Kota Factory	NaN	Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...	India	September 24, 2021	2021	TV-MA	2 Seasons	International TV Shows, Romantic TV Shows, TV ...	In a city of coaching centers known to train I...	0

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

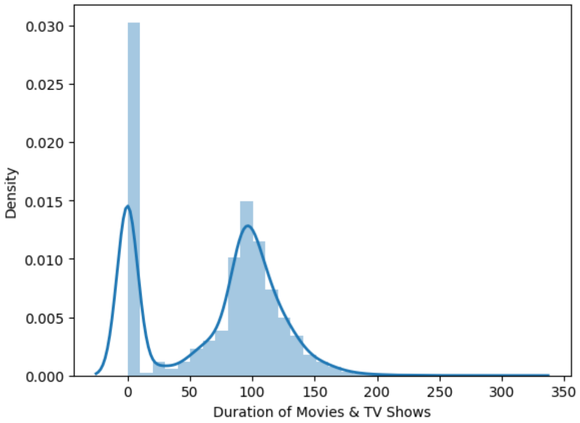
```
array([ 90,   0,  91, 125, 104, 127,  67,  94, 161,  61, 166, 147, 103,
        97, 106, 111, 110, 105,  96, 124, 116,  98,  23, 115, 122,  99,
        88, 100, 102,  93,  95,  85,  83, 113,  13, 182,  48, 145,  87,
        92,  80, 117, 128, 119, 143, 114, 118, 108,  63, 121, 142, 154,
       120,  82, 109, 101,  86, 229,  76,  89, 156, 112, 107, 129, 135,
       136, 165, 150, 133,  70,  84, 140,  78,  64,  59, 139,  69, 148,
       189, 141, 130, 138,  81, 132, 123,  65,  68,  66,  62,  74, 131,
        39,  46,  38, 126, 155, 159, 137,  12, 273,  36,  34,  77,  60,
        49,  58,  72, 204, 212,  25,  73,  29,  47,  32,  35,  71, 149,
        33,  15,  54, 224, 162,  37,  75,  79,  55, 158, 164, 173, 181,
       185,  21,  24,  51, 151,  42,  22, 134, 177,  52,  14,  53,   8,
        57,  28,  50,   9,  26,  45, 171,  27,  44, 146,  20, 157,  17,
       203,  41,  30, 194, 233, 237, 230, 195, 253, 152, 190, 160, 208,
       180, 144,   5, 174, 170, 192, 209, 187, 172,  16, 186,  11, 193,
       176,  56, 169,  40,  10,   3, 168, 312, 153, 214,  31, 163,  19,
       179,  43, 200, 196, 167, 178, 228,  18, 205, 201, 191])
```

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

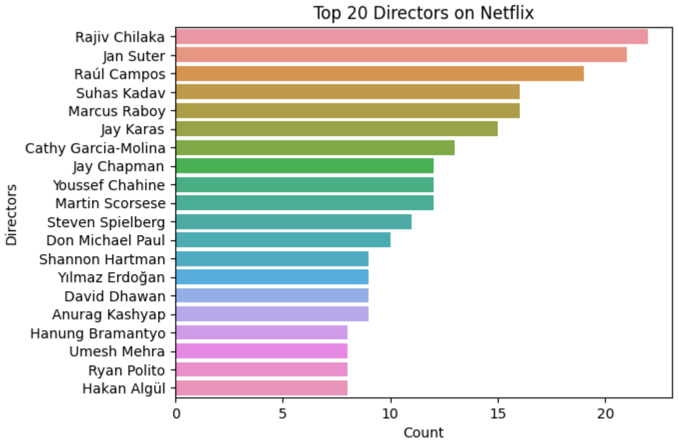
```
array(['90 ', '2 Seasons', '1 Season', '91 ', '125 ', '9 Seasons', '104 ',
       '127 ', '4 Seasons', '67 ', '94 ', '5 Seasons', '161 ', '61 ',
       '166 ', '147 ', '103 ', '97 ', '106 ', '111 ', '3 Seasons', '110 ',
       '105 ', '96 ', '124 ', '116 ', '98 ', '23 ', '115 ', '122 ', '99 ',
       '88 ', '100 ', '6 Seasons', '102 ', '93 ', '95 ', '85 ', '83 ',
       '113 ', '13 ', '182 ', '48 ', '145 ', '87 ', '92 ', '80 ', '117 ',
       '128 ', '119 ', '143 ', '114 ', '118 ', '108 ', '63 ', '121 ',
       '142 ', '154 ', '120 ', '82 ', '109 ', '101 ', '86 ', '229 ',
       '76 ', '89 ', '156 ', '112 ', '107 ', '129 ', '135 ', '136 ',
       '165 ', '150 ', '133 ', '70 ', '84 ', '140 ', '78 ', '7 Seasons',
       '64 ', '59 ', '139 ', '69 ', '148 ', '189 ', '141 ', '130 ',
       '138 ', '81 ', '132 ', '10 Seasons', '123 ', '65 ', '68 ', '66 ',
       '62 ', '74 ', '131 ', '39 ', '46 ', '38 ', '8 Seasons',
       '17 Seasons', '126 ', '155 ', '159 ', '137 ', '12 ', '273 ', '36 ',
       '34 ', '77 ', '60 ', '49 ', '58 ', '72 ', '204 ', '212 ', '25 ',
       '73 ', '29 ', '47 ', '32 ', '35 ', '71 ', '149 ', '33 ', '15 ',
       '54 ', '224 ', '162 ', '37 ', '75 ', '79 ', '55 ', '158 ', '164 ',
       '173 ', '181 ', '185 ', '21 ', '24 ', '51 ', '151 ', '42 ', '22 ',
       '134 ', '177 ', '13 Seasons', '52 ', '14 ', '53 ', '8 ', '57 ',
       '28 ', '50 ', '9 ', '26 ', '45 ', '171 ', '27 ', '44 ', '146 ',
       '20 ', '157 ', '17 ', '203 ', '41 ', '30 ', '194 ', '15 Seasons',
       '233 ', '237 ', '230 ', '195 ', '253 ', '152 ', '190 ', '160 ',
       '208 ', '180 ', '144 ', '5 ', '174 ', '170 ', '192 ', '209 ',
       '187 ', '172 ', '16 ', '186 ', '11 ', '193 ', '176 ', '56 ',
       '169 ', '40 ', '10 ', '3 ', '168 ', '312 ', '153 ', '214 ', '31 ',
       '163 ', '19 ', '12 Seasons', '179 ', '11 Seasons', '43 ', '200 ',
       '196 ', '167 ', '178 ', '228 ', '18 ', '205 ', '201 ', '191 '],
      dtype=object)
```

4.1 For continuous variable(s): Distplot, countplot, histogram for univariate analysis.

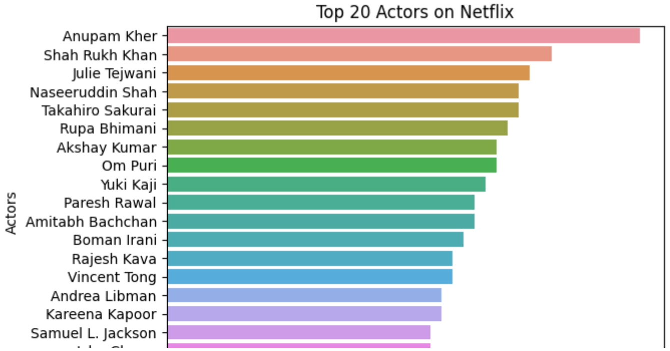
```
# Continous variable displot
sns.distplot(df['duration_copy'], kde_kws={'linewidth':2})
plt.xlabel('Duration of Movies & TV Shows')
plt.xlabel('Duration of Movies & TV Shows')
plt.ylabel('Density')
plt.show()
```



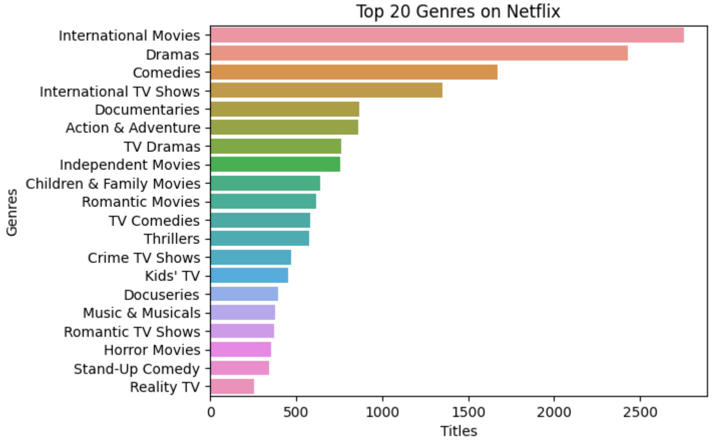
```
# count plot for Top 20 Deirectors
filtered_directors = df.set_index('title').director.str.split(', ', expand=True).stack().reset_index(level=1, drop=True)
sns.countplot(y = filtered_directors, order=filtered_directors.value_counts().index[:20])
plt.title('Top 20 Directors on Netflix')
plt.xlabel('Count')
plt.ylabel('Directors')
plt.show()
```



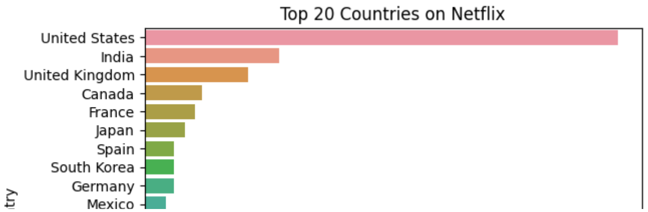
```
# count plot for Top 20 Actors
filtered_cast = df.set_index('title').cast.str.split(', ', expand=True).stack().reset_index(level=1, drop=True)
sns.countplot(y = filtered_cast, order=filtered_cast.value_counts().index[:20])
plt.title('Top 20 Actors on Netflix')
plt.xlabel('Count')
plt.ylabel('Actors')
plt.show()
```



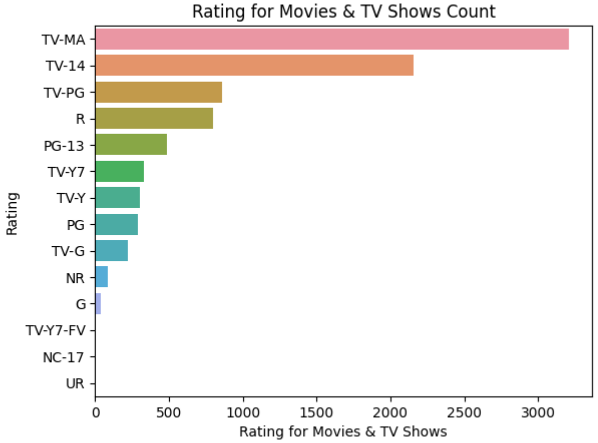
```
# count plot for Top 20 Genres
filtered_genres = df.set_index('title').listed_in.str.split(', ', expand=True).stack().reset_index(level=1, drop=True);

g = sns.countplot(y = filtered_genres, order=filtered_genres.value_counts().index[:20])
plt.title('Top 20 Genres on Netflix')
plt.xlabel('Titles')
plt.ylabel('Genres')
plt.show()
```



```
# count plot for Top 20 Countries
filtered_countries = df.set_index('title').country.str.split(', ', expand=True).stack().reset_index(level=1, drop=True);
g = sns.countplot(y = filtered_countries, order=filtered_countries.value_counts().index[:20])
plt.title('Top 20 Countries on Netflix')
plt.xlabel('Titles')
plt.ylabel('Country')
plt.show()
```



```
# Netflix content By Ratings.
sns.barplot(x=df.rating.value_counts(), y=df.rating.value_counts().index,data=df)
plt.xlabel('Rating for Movies & TV Shows')
plt.ylabel('Rating')
plt.title('Rating for Movies & TV Shows Count')
plt.show()
```

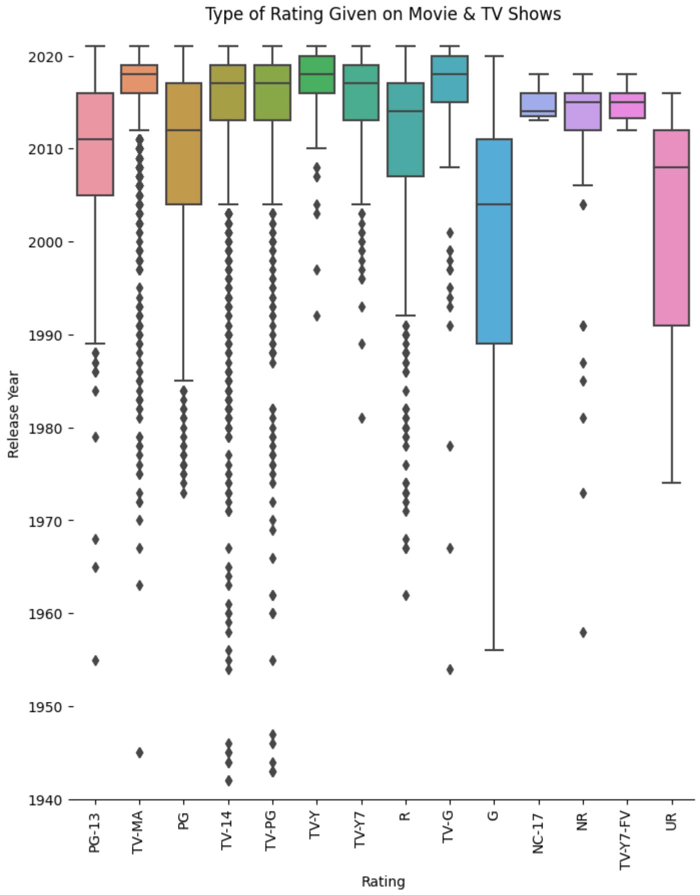


```
# Release Year wise count
sns.countplot(y="release_year",data=df, order = df.release_year.value_counts().index[0:15])
plt.xlabel('Movie & Tv Shows Count')
plt.ylabel('Release Year')
plt.title('Movies & TV Shows Releases Yearly')
plt.show()
```

Movies & TV Shows Releases Yearly

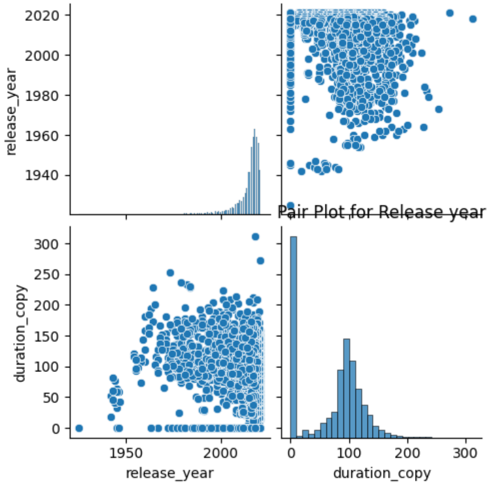
4.2 For categorical variable(s): Boxplot. :

```
# The box plots tell more than just the average release year
plt.figure(figsize=(8,10))
sns.boxplot(y='release_year', x='rating', data=df)
sns.despine(left=True)
plt.xticks(rotation=90)
plt.ylim(1940,2023)
plt.xlabel('Rating')
plt.ylabel('Release Year')
plt.title('Type of Rating Given on Movie & TV Shows')
plt.show()
```



4.3 For correlation: Heatmaps, Pairplots.

```
sns.pairplot(df)
plt.title('Pair Plot for Release year')
plt.show()
```



5. Missing Value & Outlier check (Treatment optional).

```
# unnesting the listed_in column
const=df['listed_in'].apply(lambda x:str(x).split(', ' )).tolist()
df_genre=pd.DataFrame(const,index=df['title'])
df_genre=df_genre.stack().reset_index()
df_genre.rename(columns={0:'genre'},inplace=True)
df_genre.drop(['level_1'],axis=1,inplace=True)
df_genre.head()
```

	title	genre
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

```
# merging the unnested director data with unnested actors data
df_merge1=df_cast.merge(df_director,on=['title'],how='inner')
# merging the above merge data with unnested genre data
df_merge2=df_merge1.merge(df_genre,on=['title'],how='inner')
# merging the above merged data with unnested country data
df_merge=df_merge2.merge(df_country,on=['title'],how='inner')
df_merge['actor'].replace(['nan'],['Unknown Actor'],inplace=True)
df_merge['director'].replace(['nan'],['Unknown Director'],inplace=True)
df_merge['country'].replace(['nan'],[np.nan],inplace=True)
df_merge.head()
```

	title	actor	director	genre	country
0	Dick Johnson Is Dead	Unknown Actor	Kirsten Johnson	Documentaries	United States
1	Blood & Water	Ama Qamata	Unknown Director	International TV Shows	South Africa
2	Blood & Water	Ama Qamata	Unknown Director	TV Dramas	South Africa
3	Blood & Water	Ama Qamata	Unknown Director	TV Mysteries	South Africa
4	Blood & Water	Khosi Ngema	Unknown Director	International TV Shows	South Africa

```
# merging our unnested data with the original data
df_final=df_merge.merge(df[['show_id', 'type', 'title', 'date_added', 'release_year', 'rating', 'duration']],on=['title'],how='left')
```

```
df_final.head()
```

	title	actor	director	genre	country	show_id	type	date_added	release_year	rating	duration
0	Dick Johnson Is Dead	Unknown Actor	Kirsten Johnson	Documentaries	United States	s1	Movie	September 25, 2021	2020	PG-13	90
1	Blood & Water	Ama Qamata	Unknown Director	International TV Shows	South Africa	s2	TV Show	September 24, 2021	2021	TV-MA	2 Seasons
2	Blood & Water	Ama Qamata	Unknown Director	TV Dramas	South Africa	s2	TV Show	September 24, 2021	2021	TV-MA	2 Seasons
3	Blood & Water	Ama Qamata	Unknown Director	TV Mysteries	South Africa	s2	TV Show	September 24, 2021	2021	TV-MA	2 Seasons
4	Blood & Water	Khosi Ngema	Unknown Director	International TV Shows	South Africa	s2	TV Show	September 24, 2021	2021	TV-MA	2 Seasons

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

```
title               0
actor               0
director            0
genre               0
country         11897
show_id             0
type                0
date_added        158
release_year        0
rating             67
duration            0
dtype: int64
```

```
# In duration column, it was observed that the nulls had values
# which were written in corresponding ratings column,
 # i.e. you can't expect ratings to be in min. # So the duration column nulls are replaced by corresponding
# values in ratings column
df_final.loc[df_final['duration'].isnull(),'duration']=df_final.loc[df_final['duration'].isnull(),'duration'].fillna(df_final['rating'])
df_final.isnull().sum()
```

```
title               0
actor               0
director            0
genre               0
country         11897
show_id             0
type                0
date_added        158
release_year        0
rating             67
duration            0
dtype: int64
```

```
# Ratings can't be min, so it has been made NR(Non-Rated)
df_final.loc[df_final['rating'].str.contains('min',na=False),'rating']='NR'
df_final['rating'].fillna('NR',inplace=True)
df_final.isnull().sum()
```

```
title               0
actor               0
director            0
genre               0
country         11897
show_id             0
type                0
date_added        158
release_year        0
rating              0
duration            0
dtype: int64
```

```
# date added column is imputed on the basis of release year,i.e- suppose there's a null for date_added
# when release year was 2013.So below piece of code just checks the mode of date added for release year=2013
 # and imputes in place of nulls the corresponding mode
for i in df_final[df_final['date_added'].isnull()]['release_year'].unique():
  imp=df_final[df_final['release_year']==i]['date_added'].mode().values[0]
  df_final.loc[df_final['release_year']==i,'date_added']=df_final.loc[df_final['release_year']==i,'date_added'].fillna(imp)
df_final.isnull().sum()
```

```
     title               0
     actor               0
     director            0
     genre               0
     country         11897
     show_id             0
     type                0
     date_added          0
     release_year        0
     rating              0
     duration            0
     dtype: int64
```

```
# country column is imputed on the basis of director,i.e- suppose there's a null for country
# when we have a director whose other movies have a country given. # So below piece of code just checks the mode of country for the director
# and imputes in place of nulls the corresponding mode
for i in df_final[df_final['country'].isnull()]['director'].unique():
  if i in df_final[~df_final['country'].isnull()]['director'].unique():
    imp=df_final[df_final['director']==i]['country'].mode().values[0]
    df_final.loc[df_final['director']==i,'country']=df_final.loc[df_final['director']==i,'country'].fillna(imp)
df_final.isnull().sum()
```

```
     title              0
     actor              0
     director           0
     genre              0
     country         4276
     show_id            0
     type               0
     date_added         0
     release_year       0
     rating             0
     duration           0
     dtype: int64
```

```
# So we imputed the country column on the basis of directors
# whose other movie titles had countries given.
# But there might be directors who have only one occurence # in our data. In that scenario, I have used Actors as a basis.
# i.e- for this Actor majorly acts in movies of which country? # Imputation has been done on this basis. For remaining rows,
# country has been filled as Unknown Country
for i in df_final[df_final['country'].isnull()]['actor'].unique():
  if i in df_final[~df_final['country'].isnull()]['actor'].unique():
    imp=df_final[df_final['actor']==i]['country'].mode().values[0]
    df_final.loc[df_final['actor']==i,'country']=df_final.loc[df_final['actor']==i,'country'].fillna(imp)
df_final.isnull().sum()
```

```
     title              0
     actor              0
     director           0
     genre              0
     country         2069
     show_id            0
     type               0
     date_added         0
     release_year       0
     rating             0
     duration           0
     dtype: int64
```

```
# If there are still nulls, I just replace it by Unknown Country
df_final['country'].fillna('Unknown Country',inplace=True)
df_final.isnull().sum()
```

```
     title           0
     actor           0
     director        0
     genre           0
     country         0
     show_id         0
     type            0
     date_added      0
     release_year    0
     rating          0
     duration        0
     dtype: int64
```

```
df_final.head()
```

	title	actor	director	genre	country	show_id	type	date_added	release_year	rating	duration
0	Dick Johnson Is Dead	Unknown Actor	Kirsten Johnson	Documentaries	United States	s1	Movie	September 25, 2021	2020	PG-13	90
1	Blood & Water	Ama Qamata	Unknown Director	International TV Shows	South Africa	s2	TV Show	September 24, 2021	2021	TV-MA	2 Seasons
2	Blood & Water	Ama Qamata	Unknown Director	TV Dramas	South Africa	s2	TV Show	September 24, 2021	2021	TV-MA	2 Seasons
3	Blood & Water	Ama Qamata	Unknown Director	TV Mysteries	South Africa	s2	TV Show	September 24, 2021	2021	TV-MA	2 Seasons
4	Blood & Water	Khosi Ngema	Unknown Director	International TV Shows	South Africa	s2	TV Show	September 24, 2021	2021	TV-MA	2 Seasons

6. Insights based on Non-Graphical and Visual Analysis.

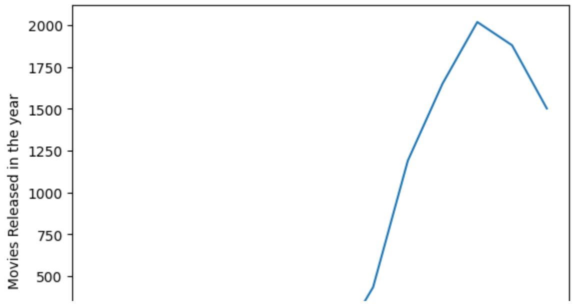
```
df_final['duration_copy']=df_final['duration'].copy()
df_final1=df_final.copy()
df_final1.loc[df_final1['duration_copy'].str.contains('Season'),'duration_copy']=0
df_final1['duration_copy']=df_final1['duration_copy'].astype('int')
df_final1.head()
```

	title	actor	director	genre	country	show_id	type	date_added	release_year	rating	duration	duration_copy
0	Dick Johnson Is Dead	Unknown Actor	Kirsten Johnson	Documentaries	United States	s1	Movie	September 25, 2021	2020	PG-13	90	90
1	Blood & Water	Ama Qamata	Unknown Director	International TV Shows	South Africa	s2	TV Show	September 24, 2021	2021	TV-MA	2 Seasons	0
2	Blood & Water	Ama Qamata	Unknown Director	TV Dramas	South Africa	s2	TV Show	September 24, 2021	2021	TV-MA	2 Seasons	0
3	Blood & Water	Ama Qamata	Unknown Director	TV Mysteries	South Africa	s2	TV Show	September 24, 2021	2021	TV-MA	2 Seasons	0
4	Blood & Water	Khosi Ngema	Unknown Director	International TV Shows	South Africa	s2	TV Show	September 24, 2021	2021	TV-MA	2 Seasons	0

```
# Converting the 'date_added' column to datetime format
df_final1["date_added"] = pd.to_datetime(df_final1['date_added'])
df_final1['month_added']=df_final1['date_added'].dt.month
df_final1['week_Added']=df_final1['date_added'].dt.week
df_final1['year']=df_final1['date_added'].dt.year
df_final1.head()
```

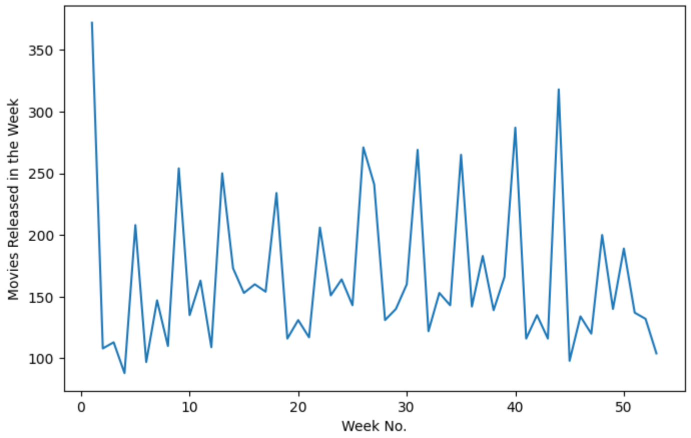
	title	actor	director	genre	country	show_id	type	date_added	release_year	rating	duration	duration_copy	month_added	week_Added	year
0	Dick Johnson Is Dead	Unknown Actor	Kirsten Johnson	Documentaries	United States	s1	Movie	2021-09-25	2020	PG-13	90	90	9	38	2021
1	Blood & Water	Ama Qamata	Unknown Director	International TV Shows	South Africa	s2	TV Show	2021-09-24	2021	TV-MA	2 Seasons	0	9	38	2021
2	Blood & Water	Ama Qamata	Unknown Director	TV Dramas	South Africa	s2	TV Show	2021-09-24	2021	TV-MA	2 Seasons	0	9	38	2021
3	Blood & Water	Ama Qamata	Unknown Director	TV Mysteries	South Africa	s2	TV Show	2021-09-24	2021	TV-MA	2 Seasons	0	9	38	2021
4	Blood & Water	Khosi Ngema	Unknown Director	International TV Shows	South Africa	s2	TV Show	2021-09-24	2021	TV-MA	2 Seasons	0	9	38	2021

```
df_year=df_final1.groupby(['year']).agg({"title":"nunique"}).reset_index()
sns.lineplot(data=df_year,x='year',y='title')
plt.ylabel("Movies Released in the year")
plt.xlabel("Year")
plt.show()
```



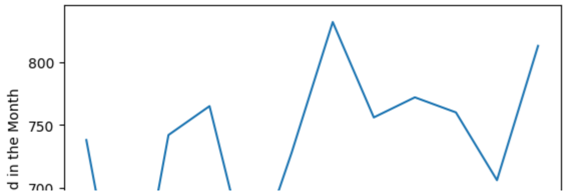
The Amount of Content across Netflix has increased from 2008 continuously till 2019. Then started decreasing from here(probably due to Covid)

```
df_week=df_final1.groupby(['week_Added']).agg({"title":"nunique"}).reset_index()
plt.figure(figsize=(8,5))
sns.lineplot(data=df_week, x='week_Added', y='title')
plt.ylabel("Movies Released in the Week")
plt.xlabel("Week No.")
plt.show()
```



Most of the Content across Netflix is added in the first week of the year

```
df_month=df_final1.groupby(['month_added']).agg({"title":"nunique"}).reset_index()
sns.lineplot(data=df_month, x='month_added', y='title')
plt.ylabel("Movies Released in the Month")
plt.xlabel("Month")
plt.show()
```



Most of the content is added in the first and last months across Netflix

6.1 Comments on the range of attributes.

The data ranges from 1925 to 2021, containing international TV shows and movies with multiple genres and ratings.

We can see that there are total 8807 rows and 12 columns present in the dataset. the summary also includes list of all columns with their data types and the number of non-null values in each column.

The data distributed across years and ranges from 1925 to 2021 with an average of 2014. Duration: The duration data ranges for TV Show is 1 to 16 Seasons with a mean of 1.7, and for Movies is 1 to 312 minutes with a mean of 99.4minutes.

6.2 Comments on the distribution of the variables and relationship between them

The data is mostly based on avarage values,we see a trend of declining releases after 2020

most of the releases were during 1st or last week of the year

The duration of movies and tv shows are declining in length with year

6.3 Comments for each univariate and bivariate plot

Univariate and Bivariate plots show that the data is centred around the average value, with a few observations having values much higher or lower. A few outliers are detected in the duration attribute. The distribution of duration in minutes for different types of TV shows and movies does not show any significant differences.

Business Insights.

This data analysis shows that the short duration movies and tv series are more popular among viewers.TV-MA has the most viewers ,so these kind of contents should be pushed more. inernational movies and drama is popular irrespective of country .

Drama and comedy are most viewed genre

United States is leading across both TV Shows and Movies, UK also provides great content across TV Shows and Movies. Surprisingly India is much more prevalent in Movies as compared TV Shows.

8. Recommendations.

```
1.   As Drama and comedy is the most popular genre then more content like those
can be released
2.   Indian market is more prevalent movies as compared to tvs so more movies
can be relaesed than TV shows
3.   Shorter length contents have more viewership,so those kind of content can
```

1. As Drama and comedy is the most popular genre then more content like those can be released
2. Indian market is more prevalent movies as compared to tvs so more movies can be relaesed than TV shows
3. Shorter length contents have more viewership,so those kind of content can be released more
4. The releases are more during 1st or last quarter of the year,so release dates can be distributed in a way that there is a uniformity,so that it can engage viewers whole year,and earning more profit through continueous subscription

```
be released more
4. The releases are more during 1st or last quarter of the year,so release
dates can be distributed in a way that there is a uniformity,so that it can
engage viewers whole year,and earning more profit through continueous
subscription
```

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