Group no : 04

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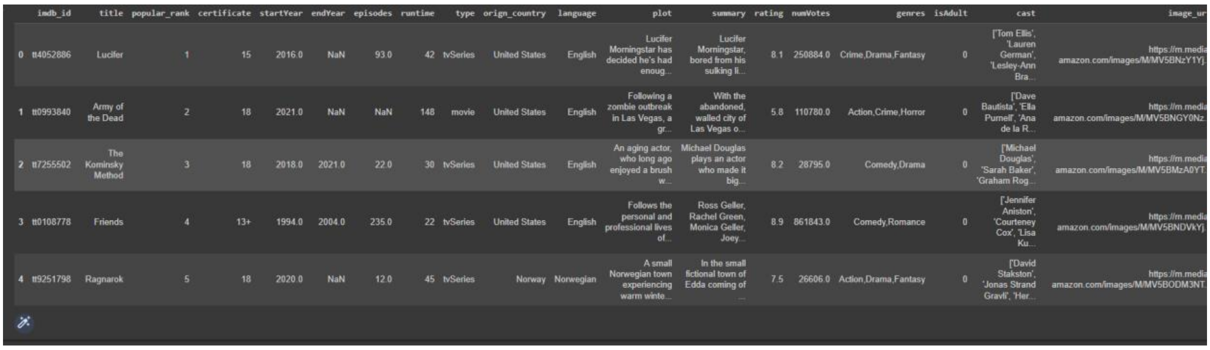
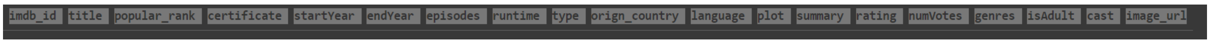
Dataset : Netflix

```
import pandas as pd

import numpy as np

import matplotlib.pyplot as plt

df = pd.read_csv('/content/netflix_list.csv')

df.head()
```



	imdb_id	title	popular_rank	certificate	startYear	endYear	episodes	runtime	type	orign_country	language	plot	summary	rating	numVotes	genres	isAdult	cast	image_ur
0	tt4052886	Lucifer	1	15	2016.0	NaN	93.0	42	tvSeries	United States	English	Lucifer Morningstar has decided he's had enoug...	Lucifer Morningstar, bored from his sulking li...	8.1	250884.0	Crime,Drama,Fantasy	0	['Tom Ellis', 'Lauren German', 'Lesley-Ann Bra...	https://m.media amazon.com/images/M/MV5BNzY1Yj
1	tt0993840	Army of the Dead	2	18	2021.0	NaN	NaN	148	movie	United States	English	Following a zombie outbreak in Las Vegas, a gr...	With the abandoned, walled city of Las Vegas o...	5.8	110780.0	Action,Crime,Horror	0	['Dave Bautista', 'Ella Purnell', 'Ana de la R...	https://m.media amazon.com/images/M/MV5BNGY0Nz
2	tt7255502	The Kominsky Method	3	18	2018.0	2021.0	22.0	30	tvSeries	United States	English	An aging actor, who long ago enjoyed a brush w...	Michael Douglas plays an actor who made it big...	8.2	28795.0	Comedy,Drama	0	['Michael Douglas', 'Sarah Baker', 'Graham Rog...	https://m.media amazon.com/images/M/MV5BMzA0YT
3	tt0108778	Friends	4	13+	1994.0	2004.0	235.0	22	tvSeries	United States	English	Follows the personal and professional lives of...	Ross Geller, Rachel Green, Monica Geller, Joey...	8.9	861843.0	Comedy,Romance	0	['Jennifer Aniston', 'Courteney Cox', 'Lisa Ku...	https://m.media amazon.com/images/M/MV5BNDVkYj
4	tt9251798	Ragnarok	5	18	2020.0	NaN	12.0	45	tvSeries	Norway	Norwegian	A small Norwegian town experiencing warm winte...	In the small fictional town of Edda coming of ...	7.5	26606.0	Action,Drama,Fantasy	0	['David Stakston', 'Jonas Strand Gravli', 'Her...	https://m.media amazon.com/images/M/MV5BODM3NT

#1) df[df.duplicated()]



imdb_id	title	popular_rank	certificate	startYear	endYear	episodes	runtime	type	orign_country	language	plot	summary	rating	numVotes	genres	isAdult	cast	image_url

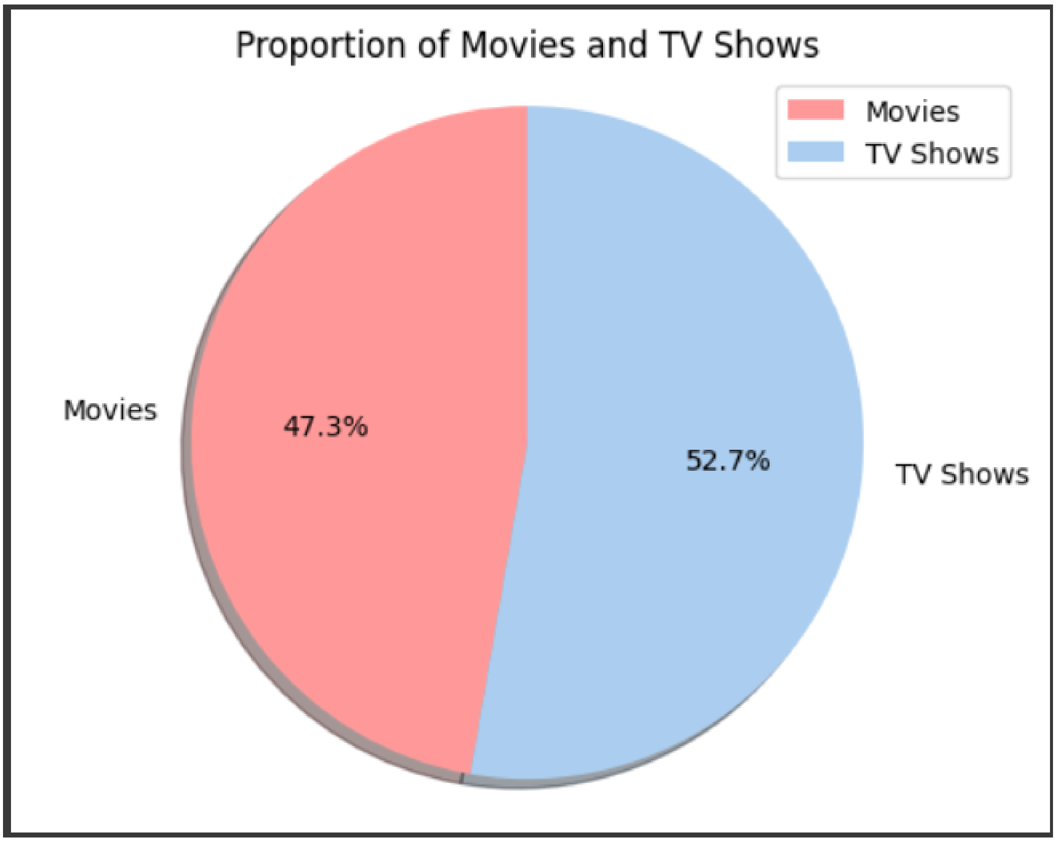
#2) df.runtime[(df.startYear == 2022) & (df.type != 'movie')].head(20)

```
1199    \N
1214    \N
1627    \N
3023    \N
3086    \N
3248    \N
3837    \N
3849    \N
4133    \N
4377    \N
4520    \N
4721    22
5063    \N
```

```
5081    \N
5255    \N
5357    \N
5490    \N
5575    \N
5664    \N
5756     7
Name: runtime, dtype: object
```

```
df.dtypes

#3) missing_values  = df.isnull().sum()

df['startYear'] = df['startYear'].fillna('Unknown')
df['episodes'] = df['episodes'].fillna('No Data')
df['certificate'] = df['certificate'].fillna('No certificate')
df['numVotes'] = df['numVotes'].fillna('No rate')
df['rating'] = df['rating'].fillna('No rate')
df['plot'] = df['certificate'].fillna('No Data')
df['language'] = df['language'].fillna('Unknown')
df['genres'] = df['genres'].fillna('No Genre')
df['type'] = df['type'].fillna('No Type')
df['runtime'] = df['runtime'].fillna('Unknown')

#4)  Calculate the sizes
movies = df.loc[df['type'].isin(['movie', 'short', 'tvMovie', 'video', 'videoGame', 'tvShort'])].shape[0]
tv_shows = df.loc[df['type'].isin(['tvSeries', 'tvEpisode', 'tvSpecial', 'tvMiniSeries'])].shape[0]

# Define the labels and colors
labels = ['Movies', 'TV Shows']
sizes = [movies, tv_shows]
colors = ['#ff9999', '#abcdef']  # Custom colors for the pie slices

#5) Create the pie chart
plt.pie(sizes, labels=labels, colors=colors, autopct='%1.1f%%', startangle=90, shadow=True)

#6) Customize the chart appearance
plt.title('Proportion of Movies and TV Shows')
plt.axis('equal')  # Ensure the pie chart is circular

#7) Add a legend
plt.legend(loc='upper right')

# Show the chart
plt.show()

 #8) Filter and aggregate the data

# Filter out rows where the 'rating' column is 'No rate'
df.rating = df.rating[df.rating != 'No rate']

# Filter out rows where the 'numVotes' column is 'No rate'
df.numVotes = df.numVotes[df.numVotes != 'No rate']

# Filter out rows where the 'startYear' column is 'Unknown'
df.startYear = df.startYear[df.startYear != 'Unknown']

# Group the filtered data by 'startYear' and calculate the mean of 'rating' and the sum of 'numVotes'
rate_per_year = df.groupby('startYear').agg({'rating':'mean','numVotes':'sum'})
```

```
# Select just the last 15 years until 2021
rate_per_year = rate_per_year.iloc[:-1].tail(15)
```

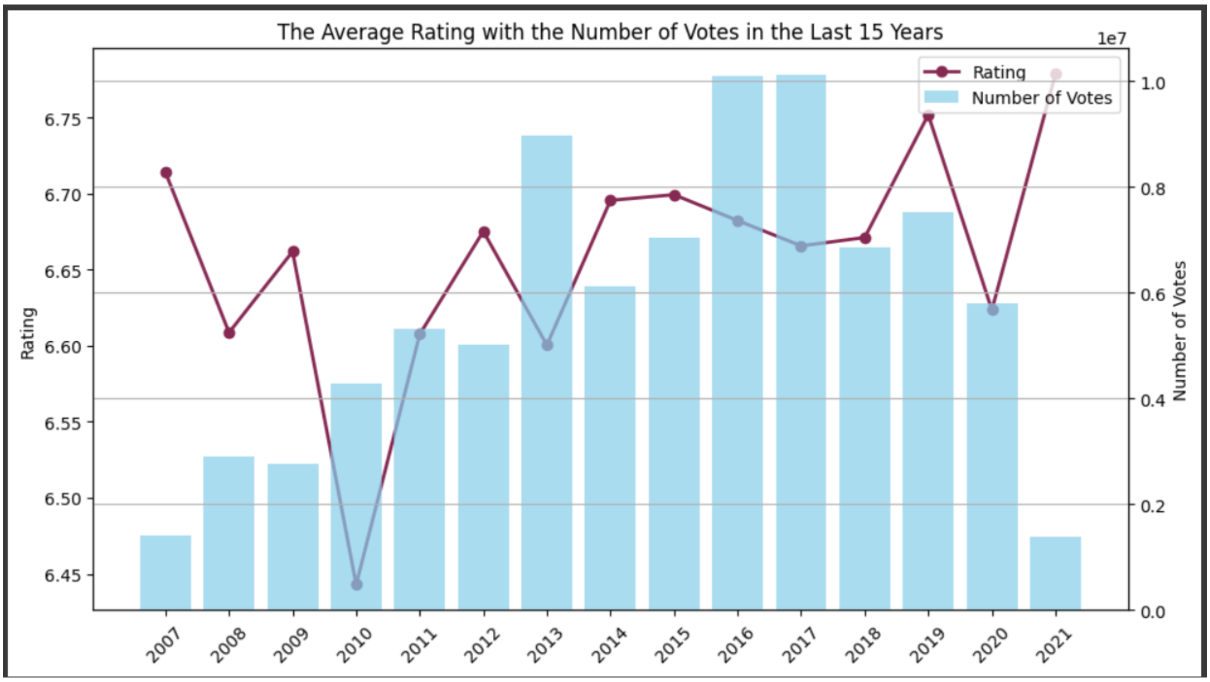


#9) Filter and aggregate the data

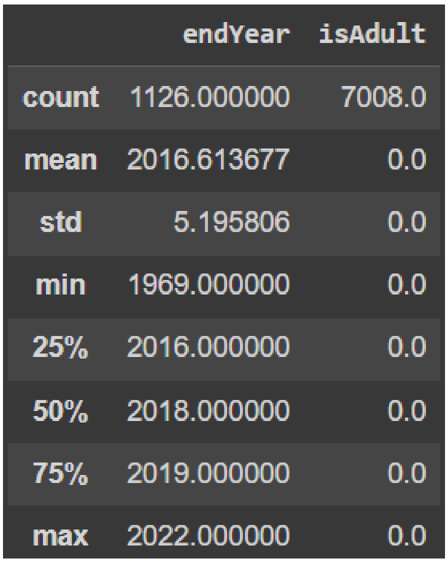
```
# Filter out rows where the 'rating' column is 'No rate'

df.rating = df.rating[df.rating != 'No rate']


# Filter out rows where the 'numVotes' column is 'No rate'

df.numVotes = df.numVotes[df.numVotes != 'No rate']


# Filter out rows where the 'startYear' column is 'Unknown'

df.startYear = df.startYear[df.startYear != 'Unknown']


# Group the filtered data by 'startYear' and calculate the mean of 'rating' and the sum of 'numVotes'

rate_per_year = df.groupby('startYear').agg({'rating':'mean','numVotes':'sum'})


# Select just the last 15 years until 2021
```

```
rate_per_year = rate_per_year.iloc[:-1].tail(15)

# Create the figure object and plot the data
fig, ax1 = plt.subplots(figsize=(11, 6))

# Plot the 'rating' column as a line chart with label 'Rating'
ax1.plot(rate_per_year['rating'], label='Rating', color='#852852', marker='o', linestyle='-', linewidth=2)

# Set the y-axis label for the line chart
ax1.set_ylabel('Rating')

# Create a second y-axis for the bar chart
ax2 = ax1.twinx()

# Plot the 'numVotes' column as a bar chart with label 'Number of Votes'
ax2.bar(rate_per_year.index, rate_per_year['numVotes'], label='Number of Votes', color='skyblue', alpha=0.7)

# Set the y-axis label for the bar chart
ax2.set_ylabel('Number of Votes')

# Set x-axis tick labels to every other index from rate_per_year
ax1.set_xticks(rate_per_year.index)
ax1.set_xticklabels(rate_per_year.index.astype(int), rotation=45)

# Add a legend to the plot
lines, labels = ax1.get_legend_handles_labels()
bars, bar_labels = ax2.get_legend_handles_labels()
ax1.legend(lines + bars, labels + bar_labels, loc='upper right')

# Add a title
```

```
plt.title("The Average Rating with the Number of Votes in the Last 15 Years")


# Add grid lines

plt.grid(True)


# Show the plot

plt.show()
```

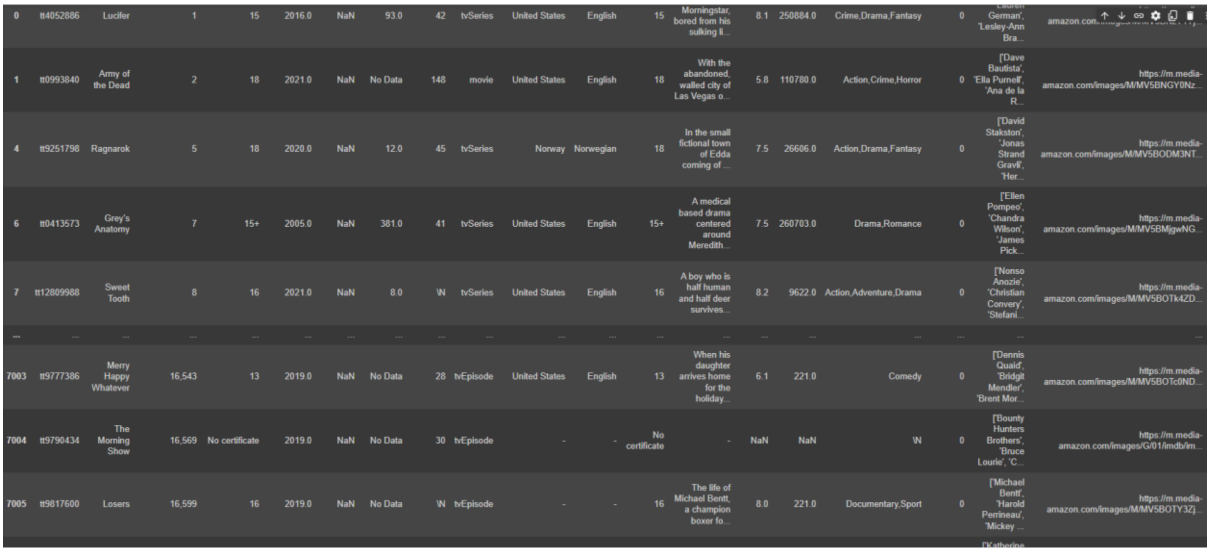


10) df.describe()



	endYear	isAdult
count	1126.000000	7008.0
mean	2016.613677	0.0
std	5.195806	0.0
min	1969.000000	0.0
25%	2016.000000	0.0
50%	2018.000000	0.0
75%	2019.000000	0.0
max	2022.000000	0.0

11) df[df.endYear.isnull()]



0	tt4052886	Lucifer	1	15	2016.0	NaN	93.0	42	tvSeries	United States	English	15	Morningstar, bored from his sulking li...	8.1	250884.0	Crime,Drama,Fantasy	0	Lauren German', 'Lesley-Ann Bra...	amazon.com
1	tt0993840	Army of the Dead	2	18	2021.0	NaN	No Data	148	movie	United States	English	18	With the abandoned, walled city of Las Vegas o...	5.8	110780.0	Action,Crime,Horror	0	['Dave Bautista', 'Ella Purnell', 'Ana de la R...	https://m.media-amazon.com/images/M/MV5BNGY0Nz...
4	tt9251798	Ragnarok	5	18	2020.0	NaN	12.0	45	tvSeries	Norway	Norwegian	18	In the small fictional town of Edda coming of ...	7.5	26606.0	Action,Drama,Fantasy	0	['David Stakston', 'Jonas Strand Gravli', 'Her...	https://m.media-amazon.com/images/M/MV5BODM3NT...
6	tt0413573	Grey's Anatomy	7	15+	2005.0	NaN	381.0	41	tvSeries	United States	English	15+	A medical based drama centered around Meredith...	7.5	260703.0	Drama,Romance	0	['Ellen Pompeo', 'Chandra Wilson', 'James Pick...	https://m.media-amazon.com/images/M/MV5BMjgwNG...
7	tt12809988	Sweet Tooth	8	16	2021.0	NaN	8.0	\N	tvSeries	United States	English	16	A boy who is half human and half deer survives...	8.2	9622.0	Action,Adventure,Drama	0	['Nonso Anozie', 'Christian Convery', 'Stefani...	https://m.media-amazon.com/images/M/MV5BOTk4ZD...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7003	tt9777386	Merry Happy Whatever	16,543	13	2019.0	NaN	No Data	28	tvEpisode	United States	English	13	When his daughter arrives home for the holiday...	6.1	221.0	Comedy	0	['Dennis Quaid', 'Bridgit Mendler', 'Brent Mor...	https://m.media-amazon.com/images/M/MV5BOTc0ND...
7004	tt9790434	The Morning Show	16,569	No certificate	2019.0	NaN	No Data	30	tvEpisode	-	-	No certificate	-	NaN	NaN	\N	0	['Bounty Hunters Brothers', 'Bruce Lourie', 'C...	https://m.media-amazon.com/images/G/01/imdb/im...
7005	tt9817600	Losers	16,599	16	2019.0	NaN	No Data	\N	tvEpisode	-	-	16	The life of Michael Bentt, a champion boxer fo...	8.0	221.0	Documentary,Sport	0	['Michael Bentt', 'Harold Perrineau', 'Mickey ...	https://m.media-amazon.com/images/M/MV5BOTY3Zj...
																		['Katherine	

#12) Find maximum number of votes

vote=df['numVotes'].max()

print(" maximum number of votes:",vote)

```
maximum number of votes: 1697849.0
```

#13) Top ten series

print("Top ten series are:",df.iloc[1:11])

```
Top ten series are:        imdb_id                  title popular_rank
certificate startYear  \
1    tt0993840     Army of the Dead            2           18    2021.0
2    tt7255502  The Kominsky Method            3           18    2018.0
3    tt0108778              Friends            4          13+    1994.0
4    tt9251798             Ragnarok            5           18    2020.0
5    tt5028002              StartUp            6           18    2016.0
6    tt0413573        Grey's Anatomy            7          15+    2005.0
7   tt12809988          Sweet Tooth            8           16    2021.0
8    tt2741602         The Blacklist            9          16+    2013.0
9    tt5774002      Jupiter's Legacy           10           18    2021.0
10   tt7945720           Dirty John           11           16    2018.0
```

```
   endYear episodes runtime       type  orign_country   language plot
\
1      NaN  No Data     148      movie  United States    English   18
2   2021.0     22.0      30   tvSeries  United States    English   18
3   2004.0    235.0      22   tvSeries  United States    English  13+
4      NaN     12.0      45   tvSeries         Norway  Norwegian   18
5   2018.0     30.0      44   tvSeries  United States    English   18
6      NaN    381.0      41   tvSeries  United States    English  15+
7        NaN      8.0       \N  tvSeries  United States    English   16
8        NaN    175.0       43  tvSeries  United States    English  16+
9     2021.0      8.0       56  tvSeries  United States    English   18
10       NaN     16.0       44  tvSeries  United States    English   16

                                                 summary rating  numVotes
\
1   With the abandoned, walled city of Las Vegas o...     5.8  110780.0
2   Michael Douglas plays an actor who made it big...     8.2   28795.0
3   Ross Geller, Rachel Green, Monica Geller, Joey...     8.9  861843.0
4   In the small fictional town of Edda coming of ...     7.5   26606.0
5   Miami - A desperate banker needs to conceal st...     8.0   16980.0
6   A medical based drama centered around Meredith...     7.5  260703.0
7   A boy who is half human and half deer survives...     8.2    9622.0
8   A highly articulate, erudite and intelligent b...     8.0  207174.0
9   The first generation of superheroes kept the w...     6.8   27309.0
10  Debra Newell (Connie Britton) has a seemingly ...     7.2   16578.0

                      genres  isAdult  \
1      Action,Crime,Horror        0
2             Comedy,Drama        0
3           Comedy,Romance        0
4     Action,Drama,Fantasy        0
5           Crime,Thriller        0
6            Drama,Romance        0
7   Action,Adventure,Drama        0
8      Crime,Drama,Mystery        0
9   Action,Adventure,Drama        0
10             Crime,Drama        0

                                                 cast  \
1   ['Dave Bautista', 'Ella Purnell', 'Ana de la R...
2   ['Michael Douglas', 'Sarah Baker', 'Graham Rog...
3   ['Jennifer Aniston', 'Courteney Cox', 'Lisa Ku...
4   ['David Stakston', 'Jonas Strand Gravli', 'Her...
5   ['Adam Brody', 'Edi Gathegi', 'Otmara Marrero'...
6   ['Ellen Pompeo', 'Chandra Wilson', 'James Pick...
7   ['Nonso Anozie', 'Christian Convery', 'Stefani...
8   ['James Spader', 'Megan Boone', 'Diego Klatten...
9   ['Josh Duhamel', 'Ben Daniels', 'Leslie Bibb',...
10  ['Connie Britton', 'Christian Slater', 'Eric B...

                                            image_url
1   https://m.media-amazon.com/images/M/MV5BNGY0Nz...
2   https://m.media-amazon.com/images/M/MV5BMzA0YT...
3   https://m.media-amazon.com/images/M/MV5BNDVkYj...
4   https://m.media-amazon.com/images/M/MV5BODM3NT...
5   https://m.media-amazon.com/images/M/MV5BMTAxNT...
6   https://m.media-amazon.com/images/M/MV5BMjgwNG...
7   https://m.media-amazon.com/images/M/MV5BOTk4ZD...
8   https://m.media-amazon.com/images/M/MV5BZDA1Mz...
9   https://m.media-amazon.com/images/M/MV5BMDU4MW...
10  https://m.media-amazon.com/images/M/MV5BNmJhYT...
```

14) Find the series which are ongoing

```
ongoing=df['endYear']
```

print("The ongoing series are:",df.isnull())

```
The ongoing series are:       imdb_id  title  popular_rank  certificate
startYear  endYear  episodes  \
0        False  False         False        False       False     True
False
1        False  False         False        False       False     True
False
2        False  False         False        False       False    False
False
3        False  False         False        False       False    False
False
4        False  False         False        False       False     True
False
...        ...    ...           ...          ...         ...      ...
...
7003     False  False         False        False       False     True
False
7004     False  False         False        False       False     True
False
7005     False  False         False        False       False     True
False
7006     False  False         False        False       False     True
False
7007     False  False         False        False       False     True
False

      runtime   type  orign_country  language   plot  summary  rating
\
0        False  False          False     False  False    False   False
1        False  False          False     False  False    False   False
2        False  False          False     False  False    False   False
3        False  False          False     False  False    False   False
4        False  False          False     False  False    False   False
...        ...    ...            ...       ...    ...      ...     ...
7003     False  False          False     False  False    False   False
7004     False  False          False     False  False    False    True
7005     False  False          False     False  False    False   False
7006     False  False          False     False  False    False   False
7007     False  False          False     False  False    False   False

      numVotes  genres  isAdult   cast  image_url
0        False   False    False  False      False
1        False   False    False  False      False
2        False   False    False  False      False
3        False   False    False  False      False
4        False   False    False  False      False
...        ...     ...      ...    ...        ...
7003     False   False    False  False      False
7004      True   False    False  False      False
7005     False   False    False  False      False
7006     False   False    False  False      False
7007     False   False    False  False      False

[7008 rows x 19 columns]
```

#15) Print the summary of given dataset

```
Summary_status = df.describe()
```

16) what are the countries who distributed more films & Movies ?

```
df.orign_country.value_counts()
```

```
United States 2836 - 551 United Kingdom 508 Japan 406 South Korea 316
... Cyprus 1 Bahamas 1 Croatia 1 Puerto Rico 1 Haiti 1 Name:
orign_country, Length: 82, dtype: int64
```

#17) display mean of number of voters overall

```
print("Mean number of voters overall is:",df['numVotes'].mean())
```

```
Mean number of voters overall is: 19617.784833333335
```

#18) to check duplicate data

```
netflix[netflix.duplicated()]
```

#19) how many movies and tv shows of same genre?

```
netflix.genres.value_counts().head(20)
```

```
Comedy 713 Drama 448 Documentary 431 Action,Adventure,Animation 253
Comedy,Drama 193 Drama,Romance 164 Adventure,Animation,Comedy 149
Crime,Drama,Mystery 145 Comedy,Drama,Romance 135 Action,Crime,Drama 133
Comedy,Romance 121 Reality-TV 118 Crime,Drama,Thriller 101 \N 87
Action,Adventure,Drama 87 Drama,Thriller 85 Crime,Drama 74
Comedy,Documentary 73 Crime,Documentary 69 Thriller 65
```

#20) know the data type for each column?

```
netflix.dtypes
```

```
imdb_id object title object popular_rank object certificate object
startYear float64 endYear float64 episodes float64 runtime object type
object orign_country object language object plot object summary object
rating float64 numVotes float64 genres object isAdult int64 cast object
image_url object dtype: object
```

```
# Calculate the sizes

movies = df.loc[df['type'].isin(['movie', 'short', 'tvMovie', 'video', 'videoGame', 'tvShort'])].shape[0]

tv_shows = df.loc[df['type'].isin(['tvSeries', 'tvEpisode', 'tvSpecial', 'tvMiniSeries'])].shape[0]
```

```
# Define the labels and colors

labels = ['Movies', 'TV Shows']

sizes = [movies, tv_shows]

colors = ['#ff9999', '#abcdef']  # Custom colors for the pie slices


# Filter out rows where the 'rating' column is 'No rate'

df.rating = df.rating[df.rating != 'No rate']


# Filter out rows where the 'numVotes' column is 'No rate'

df.numVotes = df.numVotes[df.numVotes != 'No rate']


# Filter out rows where the 'startYear' column is 'Unknown'

df.startYear = df.startYear[df.startYear != 'Unknown']



# Group the filtered data by 'startYear' and calculate the mean of 'rating' and the sum of 'numVotes'

rate_per_year = df.groupby('startYear').agg({'rating':'mean','numVotes':'sum'})

# Select just the last 15 years until 2021

rate_per_year = rate_per_year.iloc[:-1].tail(15)


# Read in the Netflix code dataset

netflix= pd.read_csv('/content/netflix_list.csv')


#21) Check for missing values

print('Number of missing values in the dataset:', netflix.isnull().sum().sum())
```

```
Number of missing values in the dataset: 18121
```

```
# Remove rows with missing values

netflix = netflix.dropna()


#22) Check for duplicated rows
```

```
print('Number of duplicated rows in the dataset:', netflix.duplicated().sum())
```

```
Number of duplicated rows in the dataset: 0
```

```
# Calculate the mean rating for each category

mean_ratings = netflix.groupby('type')['rating'].mean()


#23) Print the top 10 categories by mean rating

print('Top 10 categories by mean rating:')

print(mean_ratings.nlargest(10))
```

```
Top 10 categories by mean rating:
type
tvSeries        7.619205
tvMiniSeries    7.416667
Name: rating, dtype: float64
```