CSE - 5334 - 001 : Data Mining

Assignment 1 - Exploratory Data Analysis

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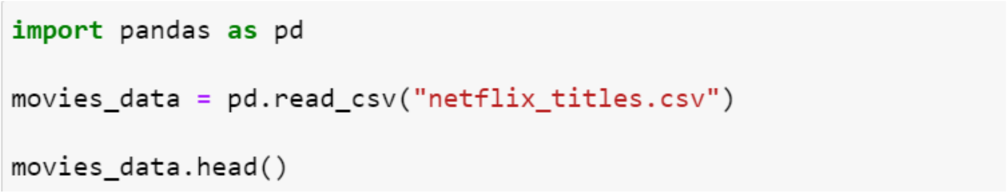
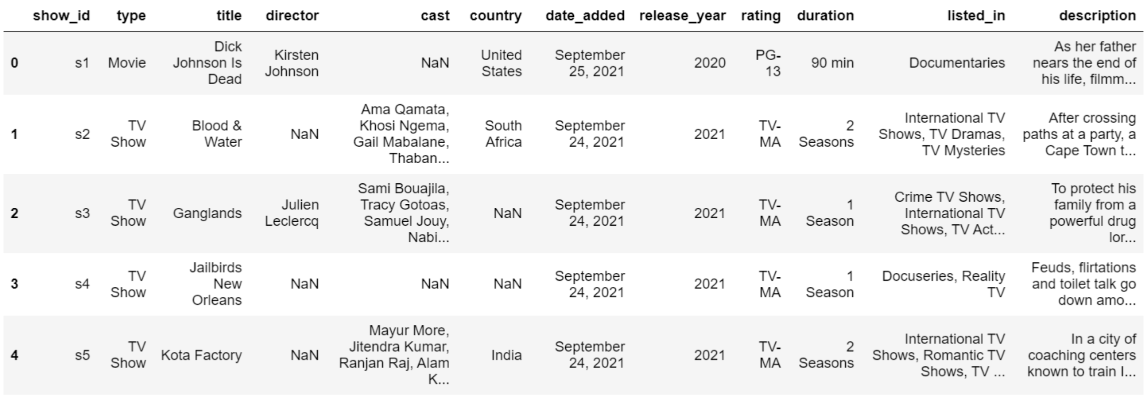


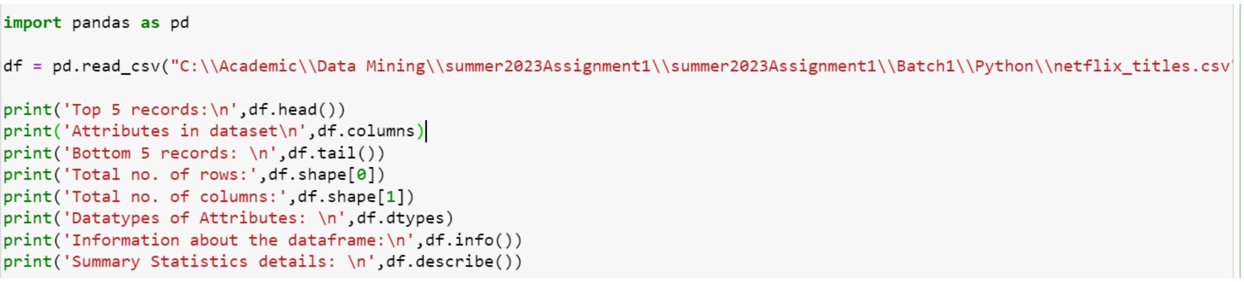
```python
import pandas as pd

movies_data = pd.read_csv("netflix_titles.csv")

movies_data.head()
```



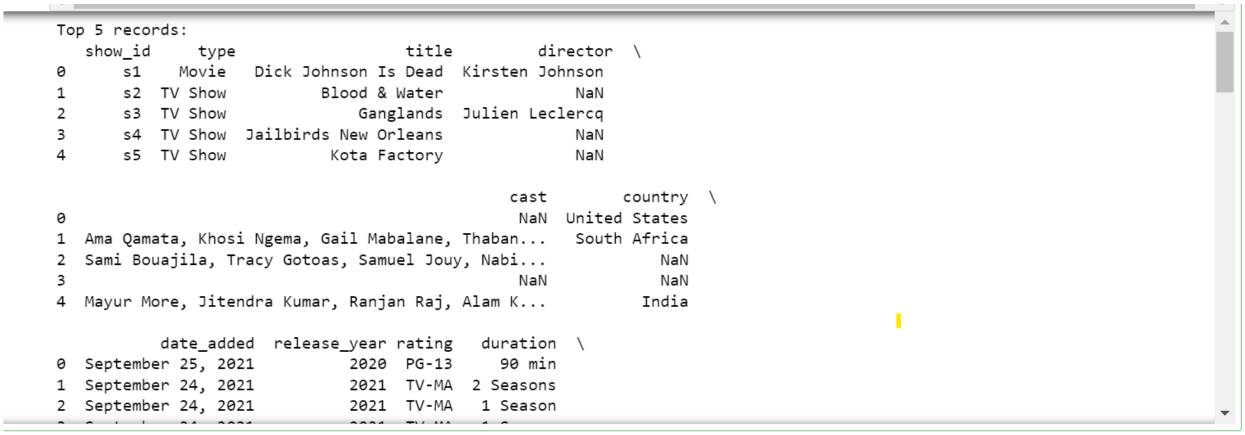
	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description
0	s1	Movie	Dick Johnson Is Dead	Kirsten Johnson	NaN	United States	September 25, 2021	2020	PG-13	90 min	Documentaries	As her father nears the end of his life, filmm...
1	s2	TV Show	Blood & Water	NaN	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 l...

Task 1A:

Display all the details about the dataset.



```python
import pandas as pd

df = pd.read_csv("C:\\Academic\\Data Mining\\summer2023Assignment1\\summer2023Assignment1\\Batch1\\Python\\netflix_titles.csv

print('Top 5 records:\n',df.head())
print('Attributes in dataset\n',df.columns)
print('Bottom 5 records: \n',df.tail())
print('Total no. of rows:',df.shape[0])
print('Total no. of columns:',df.shape[1])
print('Datatypes of Attributes: \n',df.dtypes)
print('Information about the dataframe:\n',df.info())
print('Summary Statistics details: \n',df.describe())
```

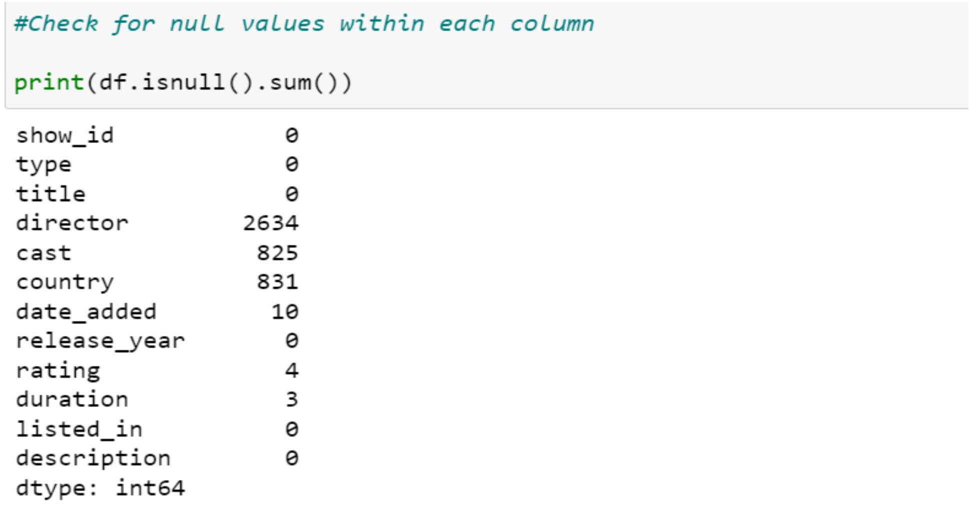


```
Top 5 records:
   show_id     type                 title         director  \
0      s1    Movie  Dick Johnson Is Dead  Kirsten Johnson   
1      s2  TV Show         Blood & Water              NaN   
2      s3  TV Show             Ganglands  Julien Leclercq   
3      s4  TV Show  Jailbirds New Orleans             NaN   
4      s5  TV Show          Kota Factory              NaN   

                                                cast        country  \
0                                                NaN  United States   
1  Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban...   South Africa   
2  Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi...            NaN   
3                                                NaN            NaN   
4  Mayur More, Jitendra Kumar, Ranjan Raj, Alam K...          India   

          date_added  release_year rating   duration  \
0  September 25, 2021          2020  PG-13     90 min   
1  September 24, 2021          2021  TV-MA  2 Seasons   
2  September 24, 2021          2021  TV-MA   1 Season   
```

Task 1B:

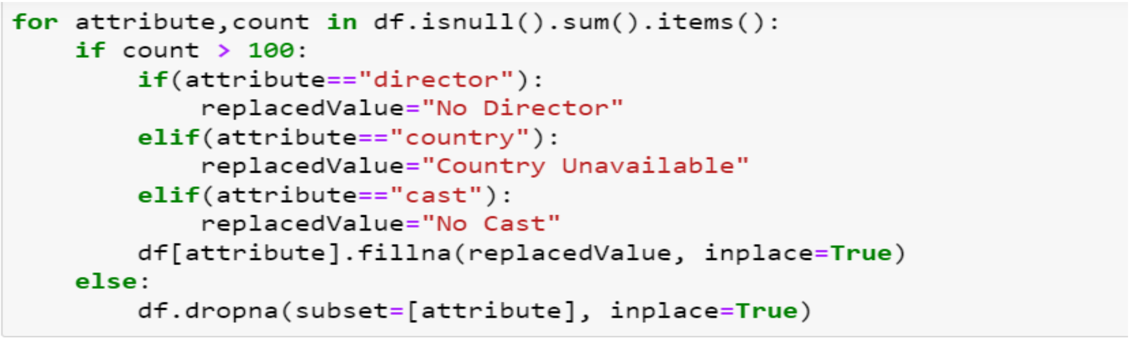
Display all the details about the dataset.

1. Check for null values within each column.
2. Fill the values for more than 100 missing columns with certain labels such as No Director, Country Unavailable, etc. Drop the rows for the rest of the missing columns.

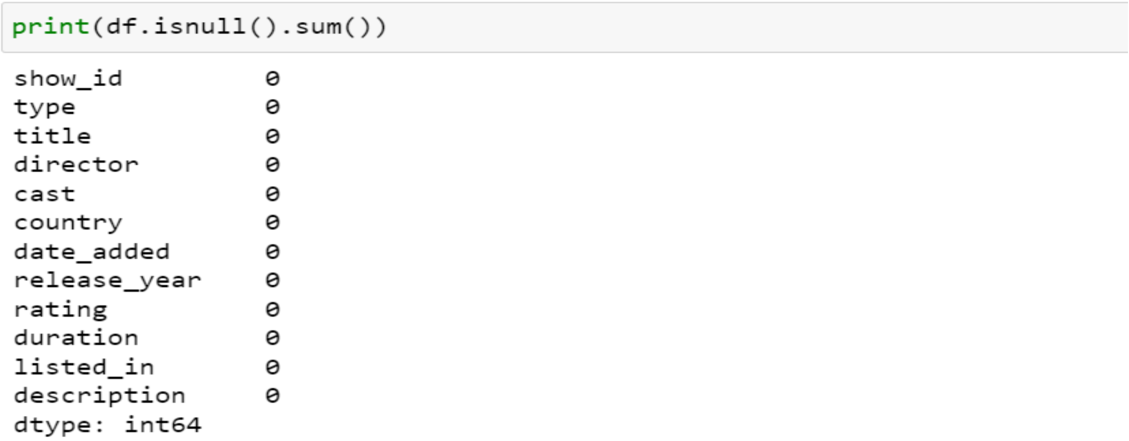


```
#Check for null values within each column

print(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
```



```
for attribute,count in df.isnull().sum().items():
    if count > 100:
        if(attribute=="director"):
            replacedValue="No Director"
        elif(attribute=="country"):
            replacedValue="Country Unavailable"
        elif(attribute=="cast"):
            replacedValue="No Cast"
        df[attribute].fillna(replacedValue, inplace=True)
    else:
        df.dropna(subset=[attribute], inplace=True)
```

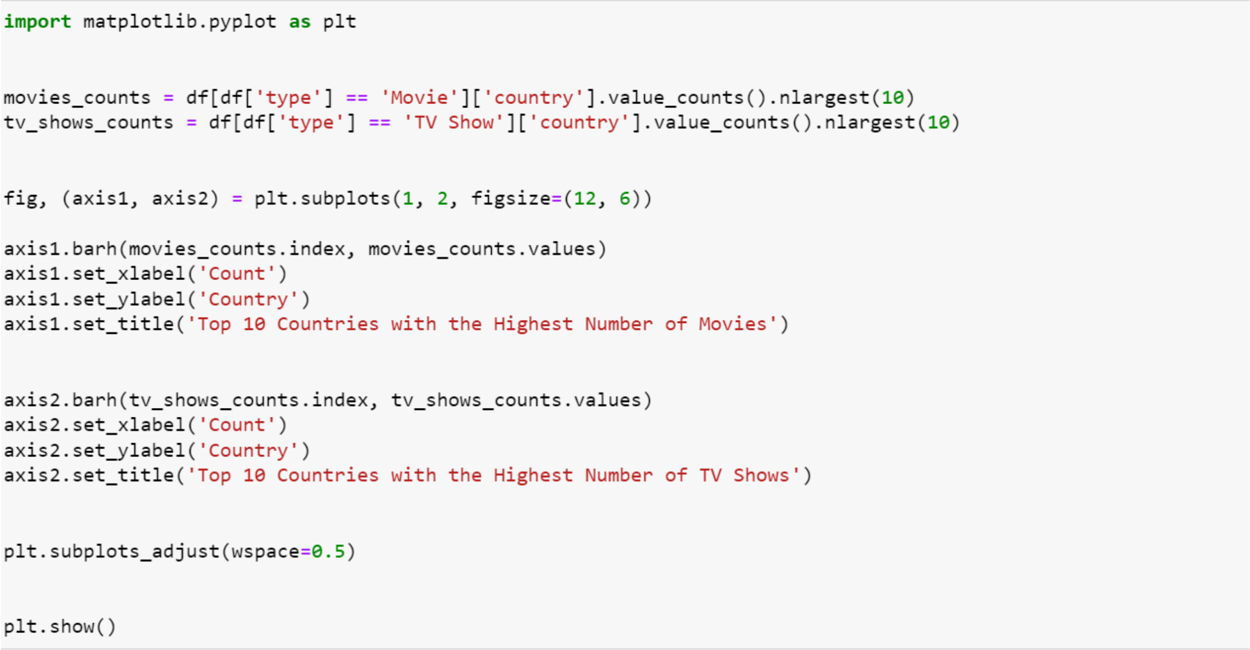


```
print(df.isnull().sum())
```

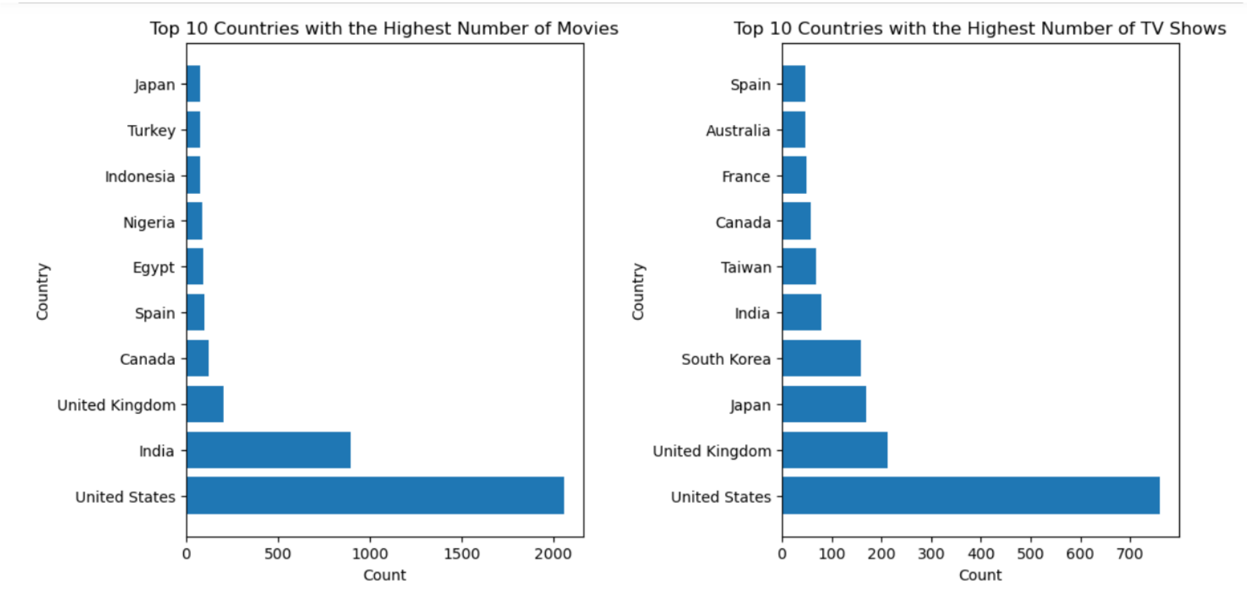
```
show_id         0
type            0
title           0
director        0
cast            0
country         0
date_added      0
release_year    0
rating          0
duration        0
listed_in       0
description     0
dtype: int64
```

Task 1C:

Display a two horizontal bar chart side by side for Top 10 countries with total number of movies and TV shows.

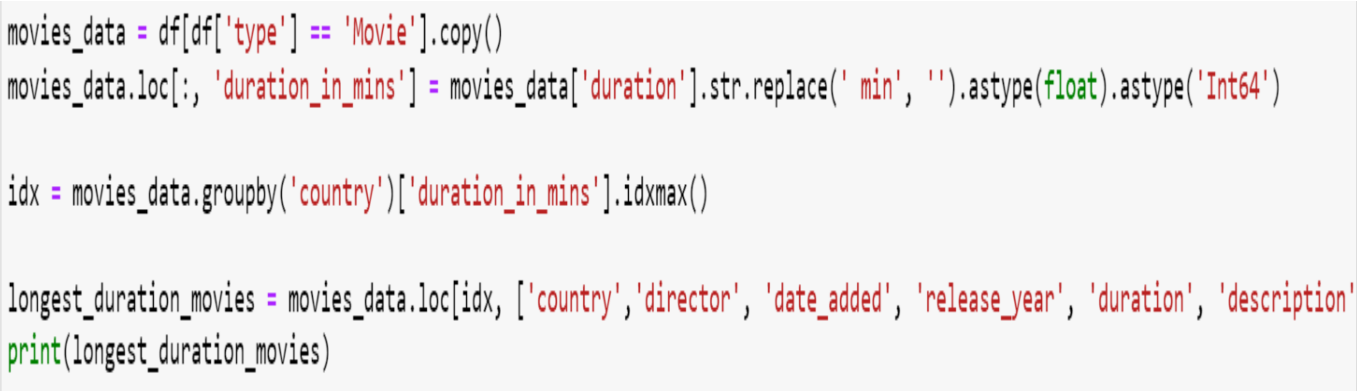


```
import matplotlib.pyplot as plt


movies_counts = df[df['type'] == 'Movie']['country'].value_counts().nlargest(10)
tv_shows_counts = df[df['type'] == 'TV Show']['country'].value_counts().nlargest(10)


fig, (axis1, axis2) = plt.subplots(1, 2, figsize=(12, 6))

axis1.barh(movies_counts.index, movies_counts.values)
axis1.set_xlabel('Count')
axis1.set_ylabel('Country')
axis1.set_title('Top 10 Countries with the Highest Number of Movies')


axis2.barh(tv_shows_counts.index, tv_shows_counts.values)
axis2.set_xlabel('Count')
axis2.set_ylabel('Country')
axis2.set_title('Top 10 Countries with the Highest Number of TV Shows')


plt.subplots_adjust(wspace=0.5)


plt.show()
```

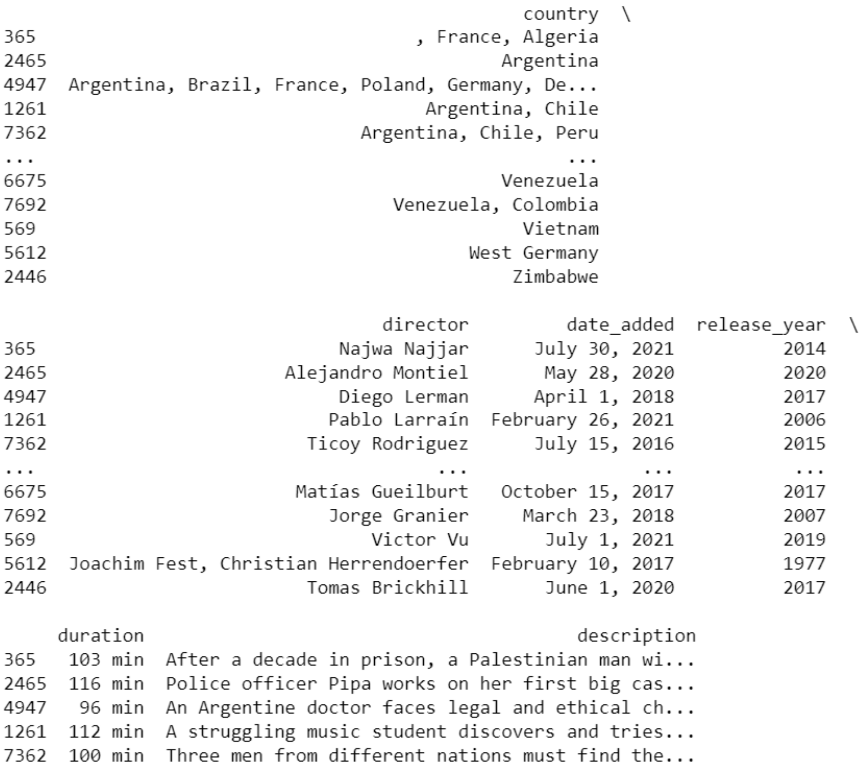


Task 1D:

Print the first row based on the longest duration time of a movie from each country column with its director, date_added, release_year, duration of the movie and its description.



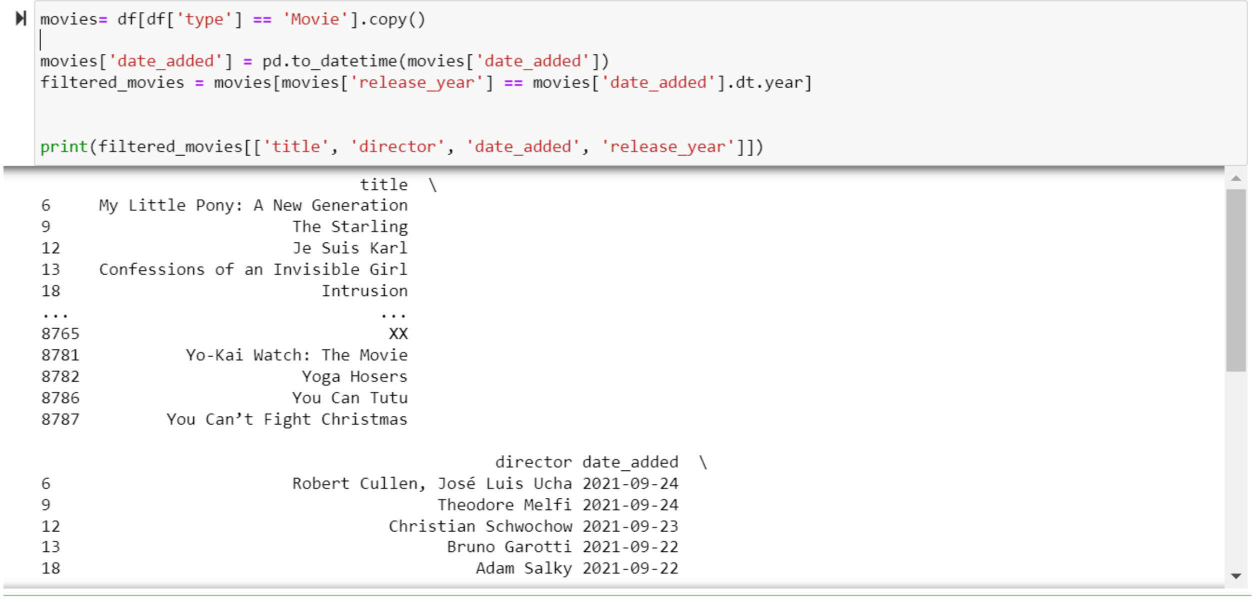
```
movies_data = df[df['type'] == 'Movie'].copy()
movies_data.loc[:, 'duration_in_mins'] = movies_data['duration'].str.replace(' min', '').astype(float).astype('Int64')

idx = movies_data.groupby('country')['duration_in_mins'].idxmax()

longest_duration_movies = movies_data.loc[idx, ['country','director', 'date_added', 'release_year', 'duration', 'description'
print(longest_duration_movies)
```



```
                                              country  \
365                                 , France, Algeria
2465                                        Argentina
4947  Argentina, Brazil, France, Poland, Germany, De...
1261                                 Argentina, Chile
7362                           Argentina, Chile, Peru
...                                               ...
6675                                        Venezuela
7692                              Venezuela, Colombia
569                                           Vietnam
5612                                     West Germany
2446                                         Zimbabwe

                                    director         date_added  release_year  \
365                             Najwa Najjar      July 30, 2021          2014
2465                        Alejandro Montiel      May 28, 2020          2020
4947                             Diego Lerman      April 1, 2018          2017
1261                            Pablo Larraín  February 26, 2021          2006
7362                          Ticoy Rodriguez      July 15, 2016          2015
...                                      ...                ...           ...
6675                         Matías Gueilburt   October 15, 2017          2017
7692                            Jorge Granier     March 23, 2018          2007
569                                Victor Vu       July 1, 2021          2019
5612  Joachim Fest, Christian Herrendoerfer  February 10, 2017          1977
2446                          Tomas Brickhill       June 1, 2020          2017

     duration                                        description
365   103 min  After a decade in prison, a Palestinian man wi...
2465  116 min  Police officer Pipa works on her first big cas...
4947   96 min  An Argentine doctor faces legal and ethical ch...
1261  112 min  A struggling music student discovers and tries...
7362  100 min  Three men from different nations must find the...
```

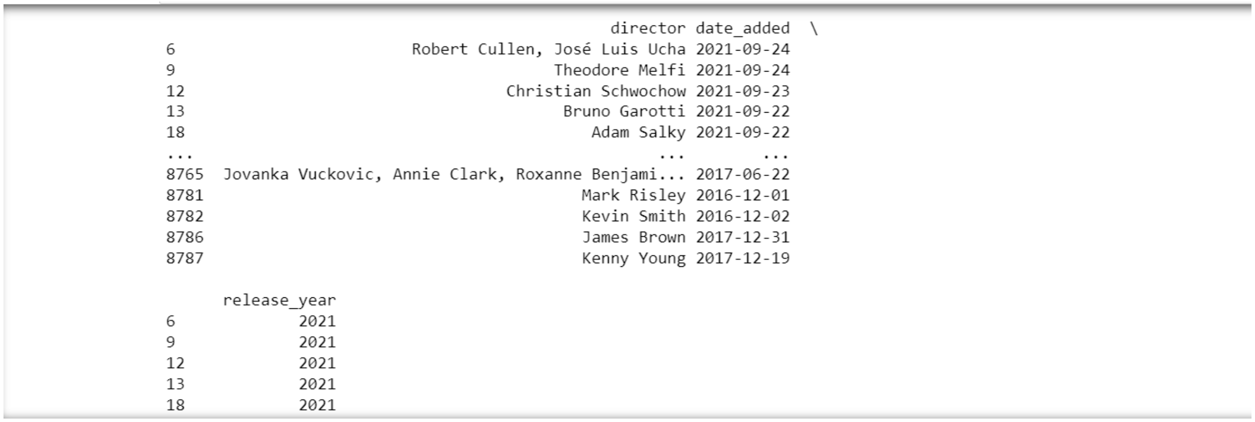
Task 1E:

Display the title of the movie, its director, the date it was added to the platform and the date it was officially released where the official release date and the date it was added to the plafform has same year.



```
movies= df[df['type'] == 'Movie'].copy()

movies['date_added'] = pd.to_datetime(movies['date_added'])
filtered_movies = movies[movies['release_year'] == movies['date_added'].dt.year]


print(filtered_movies[['title', 'director', 'date_added', 'release_year']])
```

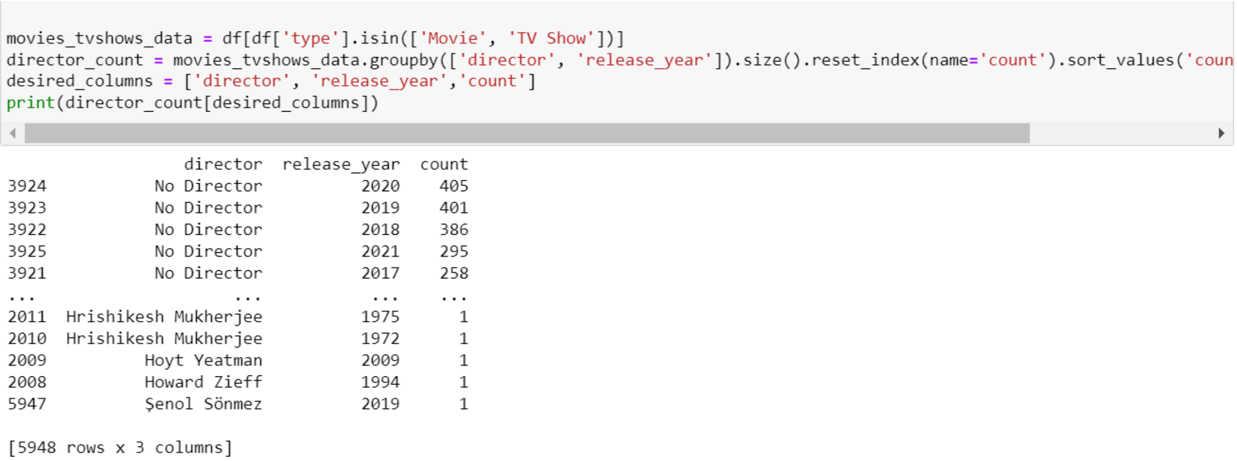
```
                                 title  \
6     My Little Pony: A New Generation
9                         The Starling
12                        Je Suis Karl
13    Confessions of an Invisible Girl
18                           Intrusion
...                                ...
8765                                XX
8781           Yo-Kai Watch: The Movie
8782                       Yoga Hosers
8786                      You Can Tutu
8787         You Can’t Fight Christmas

                                               director date_added  \
6                         Robert Cullen, José Luis Ucha 2021-09-24
9                                        Theodore Melfi 2021-09-24
12                                  Christian Schwochow 2021-09-23
13                                        Bruno Garotti 2021-09-22
18                                           Adam Salky 2021-09-22
```



```
                                              director date_added  \
6                        Robert Cullen, José Luis Ucha 2021-09-24
9                                       Theodore Melfi 2021-09-24
12                                 Christian Schwochow 2021-09-23
13                                       Bruno Garotti 2021-09-22
18                                          Adam Salky 2021-09-22
...                                                ...        ...
8765  Jovanka Vuckovic, Annie Clark, Roxanne Benjami... 2017-06-22
8781                                       Mark Risley 2016-12-01
8782                                       Kevin Smith 2016-12-02
8786                                       James Brown 2017-12-31
8787                                       Kenny Young 2017-12-19

      release_year
6             2021
9             2021
12            2021
13            2021
18            2021
```

Task 1F:

Display Director, the release year and number of movies and TV Shows directed by that director within a year and sort the results from highest.

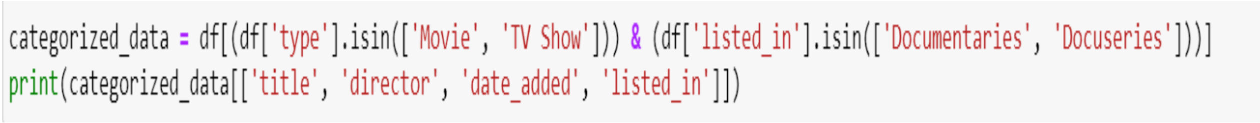


```
movies_tvshows_data = df[df['type'].isin(['Movie', 'TV Show'])]
director_count = movies_tvshows_data.groupby(['director', 'release_year']).size().reset_index(name='count').sort_values('coun
desired_columns = ['director', 'release_year','count']
print(director_count[desired_columns])
```

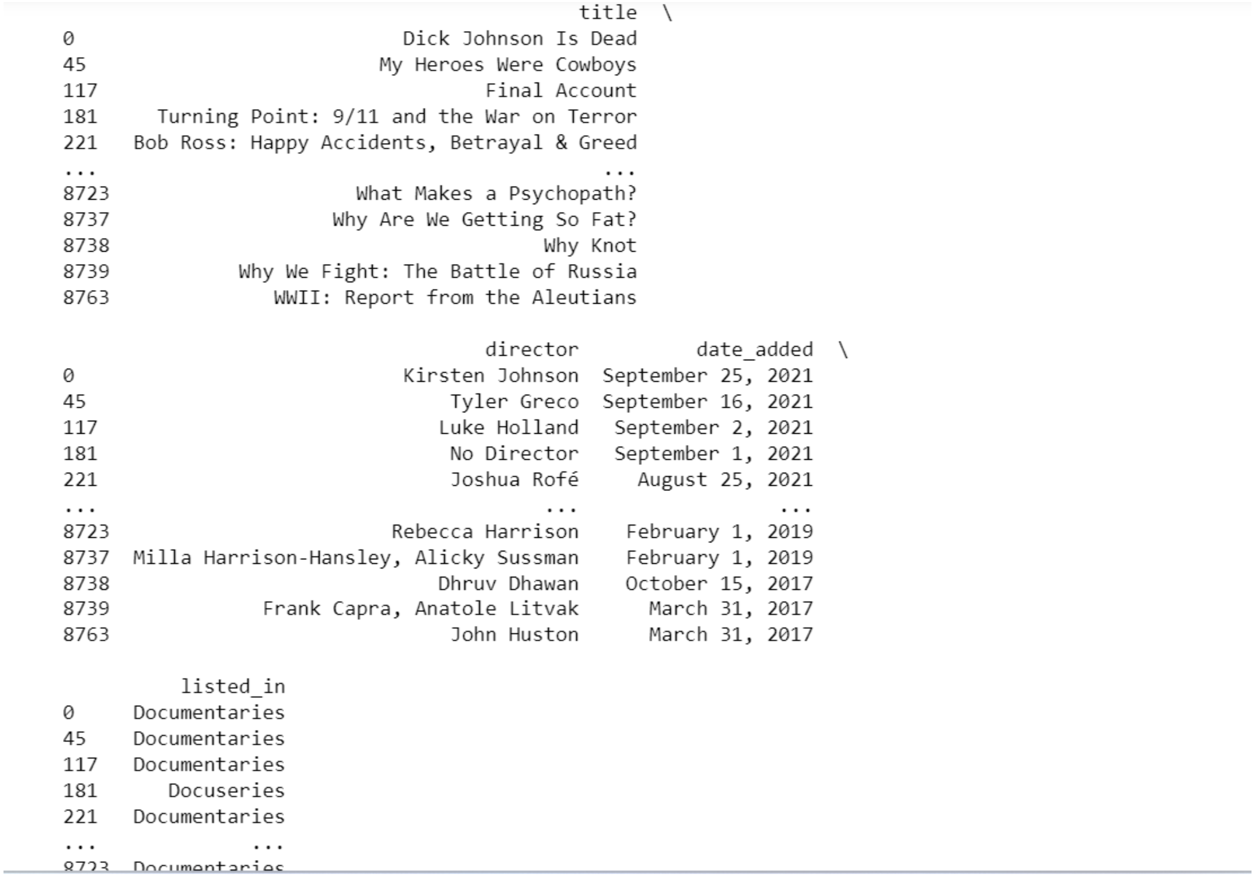
```
                  director  release_year  count
3924           No Director          2020    405
3923           No Director          2019    401
3922           No Director          2018    386
3925           No Director          2021    295
3921           No Director          2017    258
...                    ...           ...    ...
2011  Hrishikesh Mukherjee          1975      1
2010  Hrishikesh Mukherjee          1972      1
2009          Hoyt Yeatman          2009      1
2008          Howard Zieff          1994      1
5947          Şenol Sönmez          2019      1

[5948 rows x 3 columns]
```

Task 1G:

Display the title of the movie/TV shows, the Director, the date it was added to netflix and the category it was listed in from the data which belongs to Documentary/Docuseries category.



```
categorized_data = df[(df['type'].isin(['Movie', 'TV Show'])) & (df['listed_in'].isin(['Documentaries', 'Docuseries']))]
print(categorized_data[['title', 'director', 'date_added', 'listed_in']])
```

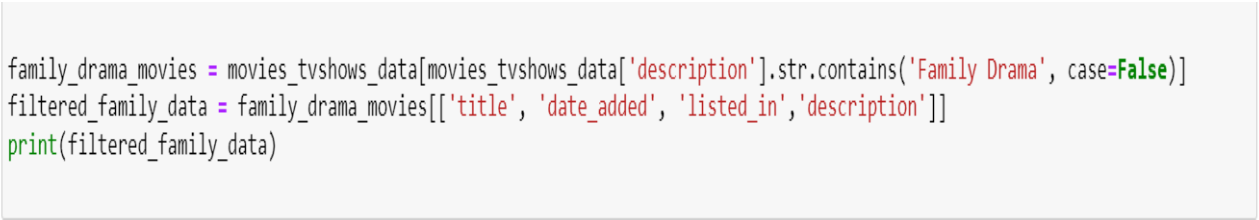


```
                                            title  \
0                            Dick Johnson Is Dead
45                         My Heroes Were Cowboys
117                                 Final Account
181     Turning Point: 9/11 and the War on Terror
221   Bob Ross: Happy Accidents, Betrayal & Greed
...                                           ...
8723                      What Makes a Psychopath?
8737                     Why Are We Getting So Fat?
8738                                     Why Knot
8739              Why We Fight: The Battle of Russia
8763                WWII: Report from the Aleutians

                                     director          date_added  \
0                            Kirsten Johnson  September 25, 2021
45                               Tyler Greco  September 16, 2021
117                             Luke Holland   September 2, 2021
181                              No Director   September 1, 2021
221                              Joshua Rofé     August 25, 2021
...                                      ...                 ...
8723                        Rebecca Harrison    February 1, 2019
8737  Milla Harrison-Hansley, Alicky Sussman    February 1, 2019
8738                            Dhruv Dhawan    October 15, 2017
8739            Frank Capra, Anatole Litvak       March 31, 2017
8763                             John Huston      March 31, 2017

          listed_in
0     Documentaries
45    Documentaries
117   Documentaries
181      Docuseries
221   Documentaries
...             ...
8723  Documentaries
```

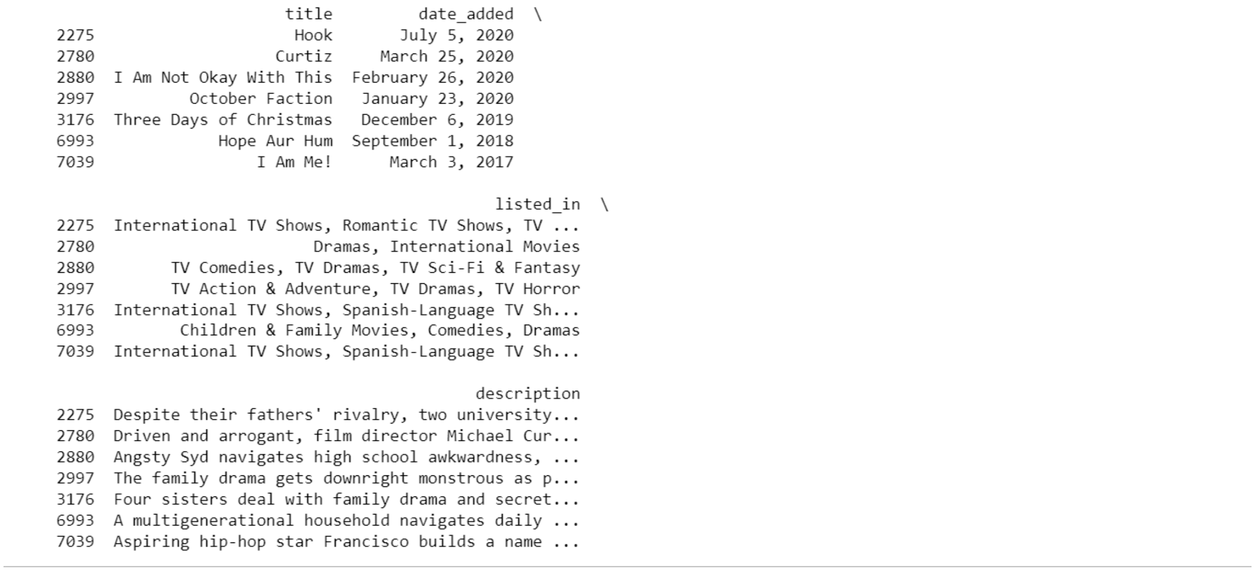
Task 1H:

Display title, the date it was added to the plaform, type of category it was listed in and its description for Family Dramas.

Hint: Use Description to look for type of Drama.



```python
family_drama_movies = movies_tvshows_data[movies_tvshows_data['description'].str.contains('Family Drama', case=False)]
filtered_family_data = family_drama_movies[['title', 'date_added', 'listed_in','description']]
print(filtered_family_data)
```

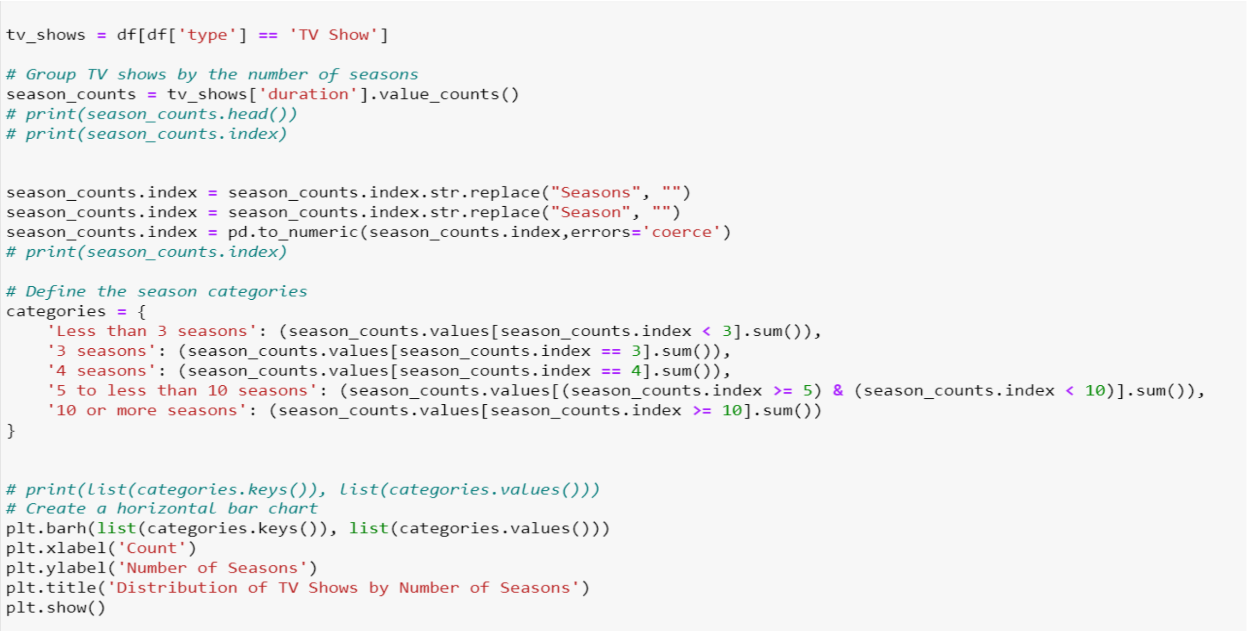


```
                        title         date_added  \
2275                     Hook       July 5, 2020   
2780                   Curtiz     March 25, 2020   
2880  I Am Not Okay With This  February 26, 2020   
2997          October Faction   January 23, 2020   
3176  Three Days of Christmas   December 6, 2019   
6993             Hope Aur Hum  September 1, 2018   
7039                 I Am Me!      March 3, 2017   

                                              listed_in  \
2275  International TV Shows, Romantic TV Shows, TV ...   
2780                       Dramas, International Movies   
2880        TV Comedies, TV Dramas, TV Sci-Fi & Fantasy   
2997        TV Action & Adventure, TV Dramas, TV Horror   
3176  International TV Shows, Spanish-Language TV Sh...   
6993         Children & Family Movies, Comedies, Dramas   
7039  International TV Shows, Spanish-Language TV Sh...   

                                            description  
2275  Despite their fathers' rivalry, two university...  
2780  Driven and arrogant, film director Michael Cur...  
2880  Angsty Syd navigates high school awkwardness, ...  
2997  The family drama gets downright monstrous as p...  
3176  Four sisters deal with family drama and secret...  
6993  A multigenerational household navigates daily ...  
7039  Aspiring hip-hop star Francisco builds a name ...  
```

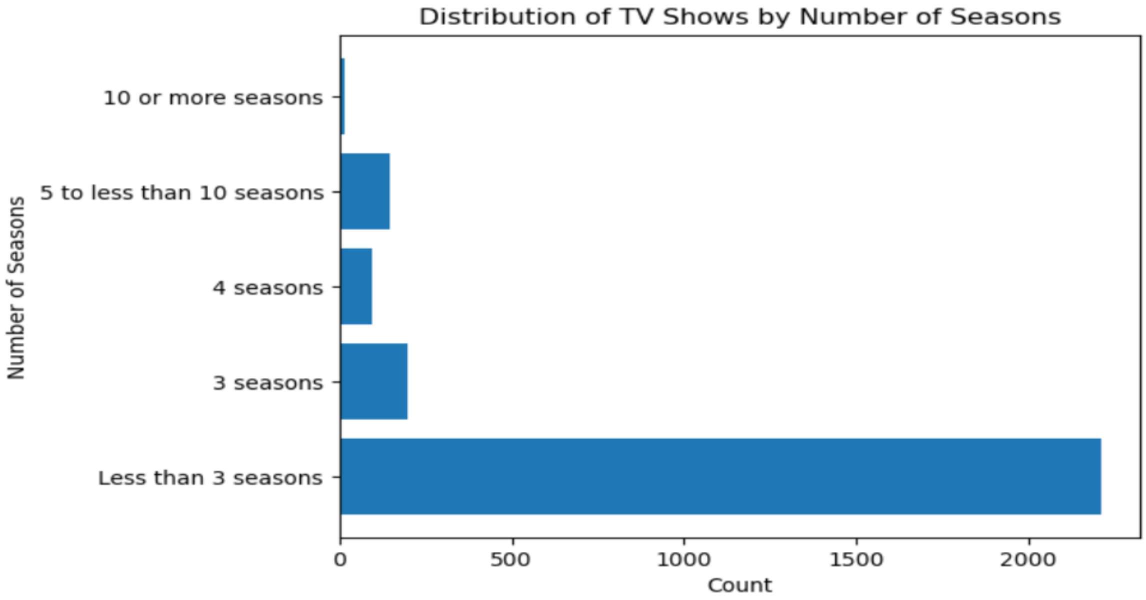
Task 1I:

Plot the Distribution of TV shows based on their number of seasons. (horizontal bar chart)

1. Less than 3 seasons
2. 3 Seasons
3. 4 Seasons
4. 5 to less than 10 seasons.
5. 10 or more seasons.



```
tv_shows = df[df['type'] == 'TV Show']

# Group TV shows by the number of seasons
season_counts = tv_shows['duration'].value_counts()
# print(season_counts.head())
# print(season_counts.index)


season_counts.index = season_counts.index.str.replace("Seasons", "")
season_counts.index = season_counts.index.str.replace("Season", "")
season_counts.index = pd.to_numeric(season_counts.index,errors='coerce')
# print(season_counts.index)

# Define the season categories
categories = {
    'Less than 3 seasons': (season_counts.values[season_counts.index < 3].sum()),
    '3 seasons': (season_counts.values[season_counts.index == 3].sum()),
    '4 seasons': (season_counts.values[season_counts.index == 4].sum()),
    '5 to less than 10 seasons': (season_counts.values[(season_counts.index >= 5) & (season_counts.index < 10)].sum()),
    '10 or more seasons': (season_counts.values[season_counts.index >= 10].sum())
}


# print(list(categories.keys()), list(categories.values()))
# Create a horizontal bar chart
plt.barh(list(categories.keys()), list(categories.values()))
plt.xlabel('Count')
plt.ylabel('Number of Seasons')
plt.title('Distribution of TV Shows by Number of Seasons')
plt.show()
```



Task J:

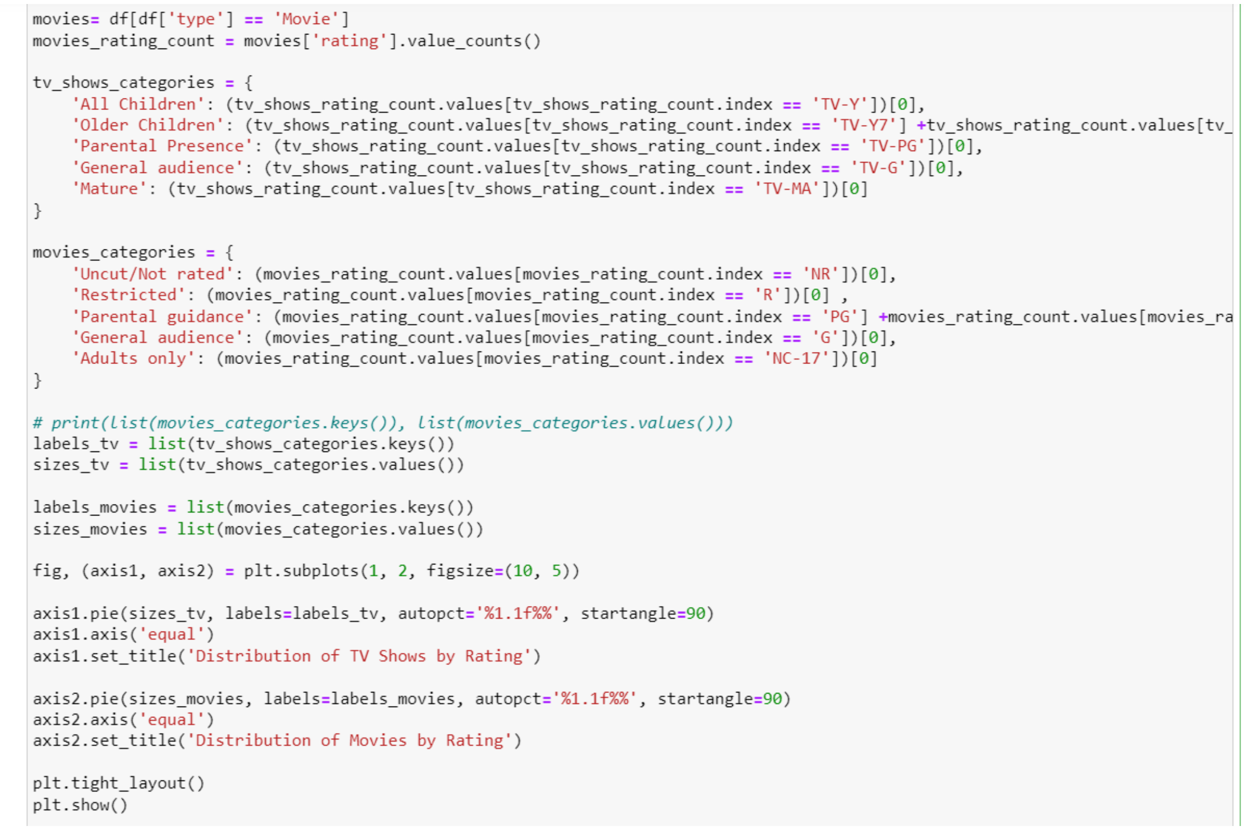
Display a side by side pie chart where it shows different rating a movie and a TV show belongs to.

Movie:

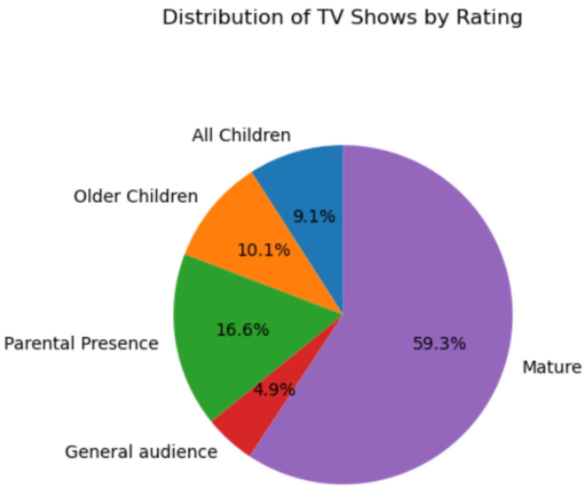
1. Uncut/Not rated
2. Restricted
3. Parentel guidance
4. General audience
5. Adults only

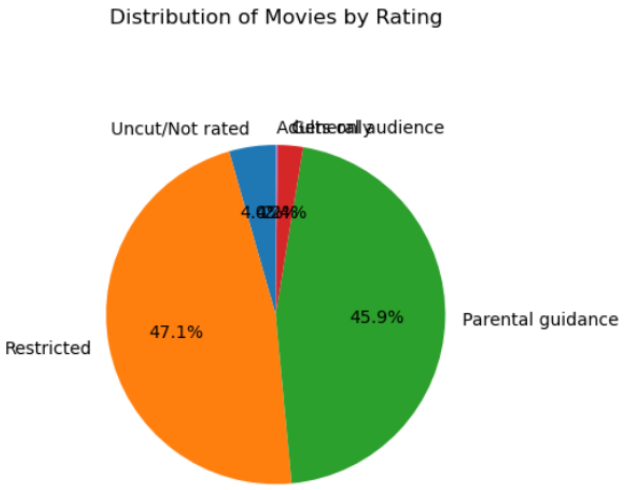
TV Show:

1. All Children
2. Older Children
3. Parentel Presence
4. General audience
5. Mature



```
movies= df[df['type'] == 'Movie']
movies_rating_count = movies['rating'].value_counts()

tv_shows_categories = {
    'All Children': (tv_shows_rating_count.values[tv_shows_rating_count.index == 'TV-Y'])[0],
    'Older Children': (tv_shows_rating_count.values[tv_shows_rating_count.index == 'TV-Y7'] +tv_shows_rating_count.values[tv_
    'Parental Presence': (tv_shows_rating_count.values[tv_shows_rating_count.index == 'TV-PG'])[0],
    'General audience': (tv_shows_rating_count.values[tv_shows_rating_count.index == 'TV-G'])[0],
    'Mature': (tv_shows_rating_count.values[tv_shows_rating_count.index == 'TV-MA'])[0]
}

movies_categories = {
    'Uncut/Not rated': (movies_rating_count.values[movies_rating_count.index == 'NR'])[0],
    'Restricted': (movies_rating_count.values[movies_rating_count.index == 'R'])[0] ,
    'Parental guidance': (movies_rating_count.values[movies_rating_count.index == 'PG'] +movies_rating_count.values[movies_ra
    'General audience': (movies_rating_count.values[movies_rating_count.index == 'G'])[0],
    'Adults only': (movies_rating_count.values[movies_rating_count.index == 'NC-17'])[0]
}

# print(list(movies_categories.keys()), list(movies_categories.values()))
labels_tv = list(tv_shows_categories.keys())
sizes_tv = list(tv_shows_categories.values())

labels_movies = list(movies_categories.keys())
sizes_movies = list(movies_categories.values())

fig, (axis1, axis2) = plt.subplots(1, 2, figsize=(10, 5))

axis1.pie(sizes_tv, labels=labels_tv, autopct='%1.1f%%', startangle=90)
axis1.axis('equal')
axis1.set_title('Distribution of TV Shows by Rating')

axis2.pie(sizes_movies, labels=labels_movies, autopct='%1.1f%%', startangle=90)
axis2.axis('equal')
axis2.set_title('Distribution of Movies by Rating')

plt.tight_layout()
plt.show()
```


Distribution of TV Shows by Rating
All Children
9.1%
Older Children
10.1%
Parental Presence
16.6%
4.9%
General audience
59.3%
Mature


Distribution of Movies by Rating
Uncut/Not rated
Adults only
General audience
Restricted
47.1%
45.9%
Parental guidance

References:

https://pandas.pydata.org/docs/user_guide/index.html#user-guide

Pandas groupby() and count() with Examples - Spark By {Examples} (sparkbyexamples.com)

Using pandas and Python to Explore Your Dataset – Real Python