```
#load all necessary libraries and data
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore') #to ignore warnings
```

 $! g down \ \ \, \underline{\text{https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/000/000/940/original/netflix.csv}} \\$

→ Downloading...

From: https://d2beiqkhq929f0.cloudfront.net/public_assets/000/000/940/original/netflix.csv

To: /content/netflix.csv

100% 3.40M/3.40M [00:00<00:00, 17.7MB/s]

data=pd.read_csv('netflix.csv') #read csv file data.head() # first 5 rows to check or inspect data

	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, Nahi	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

Next steps: Generate code with data

View recommended plots

New interactive sheet

data.info() #tells about data type and non-null values in each column/field

<class 'pandas.core.frame.DataFrame'> RangeIndex: 8807 entries, 0 to 8806

Data	columns (tota	al 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
dtvpe	es: int64(1).	obiect(11)	

dtypes: int64(1), object memory usage: 825.8+ KB

data.describe() #tells basic stats of about numeric columns



data.shape #tells no of rows and columns

→ (8807, 12)

data.isnull().sum()/len(data) *100#check percentage of missing values in each attribute



As per above data it shows there are 29% of missing/null values are in director column

data.head()

sho	w_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 fathe nears the end of hi 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	Afte crossin paths at a party, a Cape Town t
2	s3	TV Show	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nahi	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.

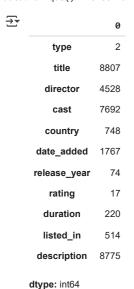
Data already has default serial no so no use of show_id

data.drop('show_id',axis=1,inplace=True) #remove show_id column from data

data.head()

→		type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description	
	0	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	11.
	1	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	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	
Next	ste	ps: Ge	enerate code	with data	View reco	ommended	plots New	interactive shee	t)				

data.nunique() #check unique values in each attribute/column



.....

 ${\tt data.duplicated().sum() \ \#duplicate \ values \ in \ data}$

→ 0

No duplicate value in data

Preprocessing of Data

data['date_added']=pd.to_datetime(data['date_added'],format='mixed') #convert to datetime dtype
data.info()

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8807 entries, 0 to 8806
Data columns (total 11 columns):
# Column
                 Non-Null Count Dtype
---
                  8807 non-null object
    type
    title
                 8807 non-null
    director
                  6173 non-null
                  7982 non-null
    cast
    country
                  7976 non-null
                                 object
    date_added
                  8797 non-null
                                datetime64[ns]
    release_year 8807 non-null
                                 int64
                  8803 non-null
    rating
                                 object
                 8804 non-null
    duration
                                 object
                  8807 non-null
    listed_in
                                 object
10 description
                 8807 non-null
dtypes: datetime64[ns](1), int64(1), object(9)
memory usage: 757.0+ KB
```

Handling missing values

```
data[['director','cast','country']]=data[['director','cast','country']].fillna('Unknown')
data['duration']=data['duration'].fillna(0)
rating_mode=data['rating'].mode()[0]
date_added_mode=data['date_added'].mode()[0]
data['rating'].fillna(rating_mode,inplace=True)
data['date_added'].fillna(date_added_mode,inplace=True)
data.info()
```

<</pre>
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8807 entries, 0 to 8806
Data columns (total 11 columns):

Data	columns (total	l 11 columns):	
#	Column	Non-Null Count	Dtype
0	type	8807 non-null	object
1	title	8807 non-null	object
2	director	8807 non-null	object
3	cast	8807 non-null	object
4	country	8807 non-null	object
5	date_added	8807 non-null	datetime64[ns]
6	release_year	8807 non-null	int64
7	rating	8807 non-null	object
8	duration	8807 non-null	object
9	listed_in	8807 non-null	object
10	description	8807 non-null	object
dtype	es: datetime64[[ns](1), int64(1)), object(9)
memor	ry usage: 757.0	9+ KB	

data.isnull().sum()



there is no missing value in data after this

In rating column ['74 min','84 min','66 min'] these are wrong ratings it seems like duration

```
wrong_ratings=['74 min','84 min','66 min']
data.loc[data['rating'].isin(wrong_ratings)]
```

→		type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description	
	5541	Movie	Louis C.K. 2017	Louis C.K.	Louis C.K.	United States	2017-04-04	2017	74 min	0	Movies	Louis C.K. muses on religion, eternal love, gi	11.
	5794	Movie	Louis C.K.: Hilarious	Louis C.K.	Louis C.K.	United States	2016-09-16	2010	84 min	0	Movies	Emmy-winning comedy writer Louis C.K. brings h	
			Louis C.K.:									The comic nuts his	

duration has null values which has wrong ratings

```
mask=data['rating'].isin(wrong_ratings)
data.loc[mask,'duration']=data.loc[mask,'rating'] #replace values of duration which has wrong ratings
data.loc[data['rating'].isin(wrong_ratings),'rating']=data['rating'].mode()[0] #replace wrong ratings with NR(No Rating)
data['rating'].unique()
#Replace ratings with actual meaning of these ratings
new_rating = {'TV-MA':'Adults',
             'R':'Adults',
            'PG-13': 'Teens'
             'TV-14':'Young Adults',
             'TV-PG':'Older Kids',
             'NR':'Adults',
             'TV-G':'Kids',
             'TV-Y':'Kids',
             'TV-Y7':'Older Kids',
             'PG':'Older Kids',
             'G':'Kids',
             'NC-17': 'Adults',
             'TV-Y7-FV':'Older Kids',
             'UR':'Adults'}
data['rating'].replace(new_rating, inplace = True)
data['rating'].unique()
⇒ array(['Teens', 'Adults', 'Older Kids', 'Young Adults', 'Kids'],
          dtype=object)
```

Which type of rating content has netflix most?

data['rating'].value_counts()

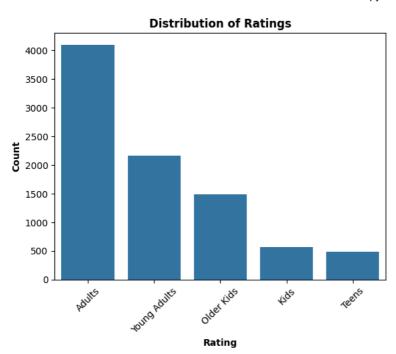
plt.ylabel('Count',fontweight='bold')

plt.show()

plt.title('Distribution of Ratings', fontweight='bold')

```
→
                    count
           rating
         Adults
                    4099
      Young Adults
                    2160
       Older Kids
                     1490
          Kids
                     568
         Teens
                     490
     dtype: int64
sns.barplot(x='rating',y='count',data=data['rating'].value_counts().reset_index())
plt.xticks(rotation=45)
plt.xlabel('Rating',fontweight='bold')
```

→

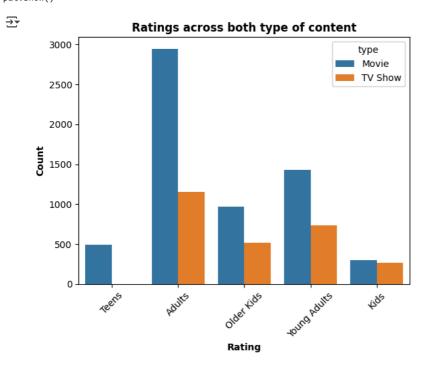


Netflix has more Adult content followed by Young Adult content

Netflix has least content for Teens

Compare Ratings for both type of Content

```
sns.countplot(x='rating',hue='type',data=data)
plt.xticks(rotation=45)
plt.xlabel('Rating',fontweight='bold')
plt.ylabel('Count',fontweight='bold')
plt.title('Ratings across both type of content',fontweight='bold')
plt.show()
```



For Teenagers Netflix has least no of content

Netflix has more content for adult audience

How has the number of movies released per year changed over the last 20-30 years?

data['year_added']=data['date_added'].dt.year #create new column in which year content added to netflix
data['year_added']

```
₹
           year_added
       0
                 2021
                 2021
       1
       2
                 2021
       3
                 2021
       4
                  2021
     8802
                 2019
     8803
                 2019
     8804
                 2019
     8805
                  2020
     8806
                 2019
```

8807 rows × 1 columns

dtype: int32

movies=data[data['type']=='Movie']
tv_shows=data[data['type']=='TV Show']

movies_per_year=movies['release_year'].value_counts().reset_index()
tv_shows_per_year=tv_shows['release_year'].value_counts().reset_index()
movies_per_year

_		release_year	count	=
	0	2017	767	ılı
	1	2018	767	+/
	2	2016	658	
	3	2019	633	
	4	2020	517	
	68	1966	1	
	69	1961	1	
	70	1946	1	
	71	1963	1	
	72	1947	1	

73 rows × 2 columns

Next steps: (Generate code with movies_per_year) (View recommended plots) (New interactive sheet)

In 2017 most movies are released

tv_shows_per_year

→	release_	year	count	
0		2020		
1		2019	397	
2		2018	380	
3		2021	315	
4		2017	265	
5		2016	244	
6		2015	162	
7		2014	88	
8		2012	64	
9		2013	63	
10		2010	40	
11		2011	40	
12		2009		
13		2008		
14		2006		
15		2007		
16		2005		
17		2003		
18		2004		
19		1999		
20		2002		
21		2001	5	
22		1993		
23 24		20001997	4	
25		1997		
26		1990	3	
27		1996	3	
28		1992		
29		1995	2	
30		1994	2	
31		1988	2	
32		1986	2	
33		1989	1	
34		1967	1	
35		1985	1	
36		1946	1	
37		1981	1	
38		1972	1	
39		1979	1	
40		1977	1	
41		1991	1	
42		1974	1	
43		1925	1	
44		1945	1	
45		1963	1	

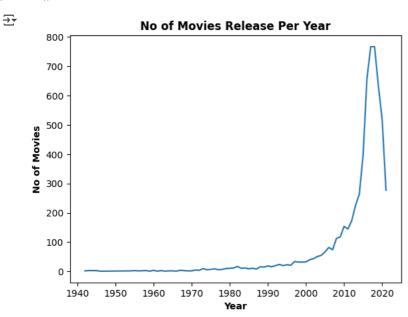
Next steps: Generate code with tv_shows_per_year

• View recommended plots

New interactive sheet

In 2020 most TV Shows are released

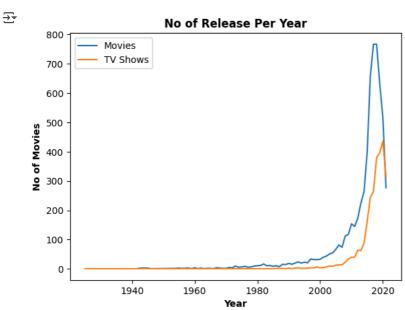
```
sns.lineplot(x='release_year',y='count',data=movies_per_year)
plt.xlabel('Year',fontweight='bold')
plt.ylabel('No of Movies',fontweight='bold')
plt.title('No of Movies Release Per Year',fontweight='bold')
plt.show()
```



From year 2000 there is gradually increase in movie release and in year 2017 and 2018 most no of movies released followed by 2016 and 2019 after that there is decline in movie release

Comparison of Movies and TV Shows Release Year

```
movies_per_year['release_year']=pd.to_numeric(movies_per_year['release_year'],errors='coerce')
tv_shows_per_year['release_year']=pd.to_numeric(tv_shows_per_year['release_year'],errors='coerce')
sns.lineplot(x='release_year',y='count',data=movies_per_year,label='Movies')
sns.lineplot(x='release_year',y='count',data=tv_shows_per_year,label='TV Shows')
plt.xlabel('Year',fontweight='bold')
plt.ylabel('No of Movies',fontweight='bold')
plt.title('No of Release Per Year',fontweight='bold')
plt.legend()
plt.show()
```



Netflix has most no of movies than tv shows

For TV Shows:

- Gradually there is increase in relase from 2006 onwards
- In year 2020 most no of TV Shows are released after that there is some decline same in movies also.

data.head()

		type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description	year_added
	0	Movie	Dick Johnson Is Dead	Kirsten Johnson	Unknown	United States	2021-09-25	2020	Teens	90 min	Documentaries	As her father nears the end of his life, filmm	2021
	1	TV Show	Blood & Water	Unknown	Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban	South Africa	2021-09-24	2021	Adults	2 Seasons	International TV Shows, TV Dramas, TV Mysteries	After crossing paths at a party, a Cape Town t	2021
	2	TV Show	Ganglands	Julien Leclercq	Sami Bouajila, Tracy Gotoas, Samuel Jouy, Nabi	Unknown	2021-09-24	2021	Adults	1 Season	Crime TV Shows, International TV Shows, TV Act	To protect his family from a powerful drug lor	2021
	4											Feuds,	,
Next	-	ps: G	enerate code	with data	View	recommend	led plots N	lew interactive sh	neet				

Comparison of Movies VS TV Shows

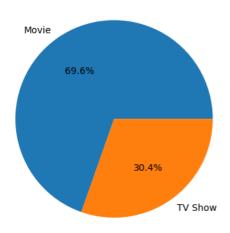
data['type'].value_counts()



plt.pie(data['type'].value_counts(),labels=data['type'].value_counts().index,autopct='%1.1f%%')
plt.title('Movie VS TV Show',fontweight='bold')
plt.show()

₹

Movie VS TV Show



Netflix has more movies content than tv shows

Top 10 Countries

data['country'].value_counts()



count

country	
United States	2818
India	972
Unknown	831
United Kingdom	419
Japan	245
Romania, Bulgaria, Hungary	1
Uruguay, Guatemala	1
France, Senegal, Belgium	1
Mexico, United States, Spain, Colombia	1
United Arab Emirates, Jordan	1
749 rows × 1 columns	

dtype: int64

top10_country=data['country'].value_counts().head(10)
top10_country

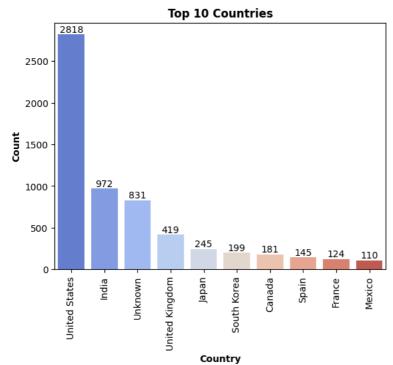


count

country	
United States	2818
India	972
Unknown	831
United Kingdom	419
Japan	245
South Korea	199
Canada	181
Spain	145
France	124
Mexico	110

```
ax=sns.barplot(x=top10_country.index,y=top10_country.values,palette='coolwarm')
plt.xlabel('Country',fontweight='bold')
plt.ylabel('Count',fontweight='bold')
plt.xticks(rotation=90)
plt.title('Top 10 Countries',fontweight='bold')
for container in ax.containers:
    ax.bar_label(container)
plt.show()
```





Netflix has more United States Content followed by India

→ Top 10 Genre

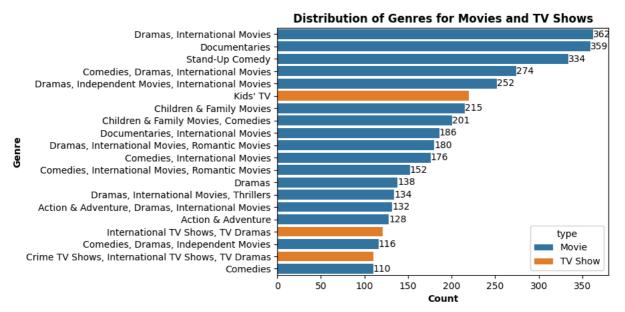
top10_genre=data['listed_in'].value_counts().head(10)
top10_genre



	count
listed_in	
Dramas, International Movies	362
Documentaries	359
Stand-Up Comedy	334
Comedies, Dramas, International Movies	274
Dramas, Independent Movies, International Movies	252
Kids' TV	220
Children & Family Movies	215
Children & Family Movies, Comedies	201
Documentaries, International Movies	186
Dramas, International Movies, Romantic Movies	180

```
ax=sns.countplot(y='listed_in',data=data,order=data['listed_in'].value_counts().index[:20],hue='type')
plt.title('Distribution of Genres for Movies and TV Shows',fontweight='bold')
plt.xlabel('Count',fontweight='bold')
plt.ylabel('Genre',fontweight='bold')
ax.bar_label(ax.containers[0])
plt.show()
```





As per above graph it shows Netflix has more focus on movies

- In top 10 Genres there is only one genre of tv shows
- In top 20 Genres there is only three genre of tv shows

count

Top 10 Directors

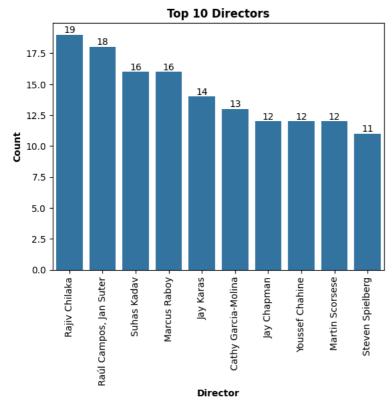
dir=data['director'].explode().value_counts()
dir=dir[~(dir.index=='Unknown')]



director	rector	
Rajiv Chilaka	19	
Raúl Campos, Jan Suter	18	
Suhas Kadav	16	
Marcus Raboy	16	
Jay Karas	14	
Raymie Muzquiz, Stu Livingston	1	
Joe Menendez	1	
Eric Bross	1	
Will Eisenberg	1	
Mozez Singh	1	
4528 rows × 1 columns		

ax=sns.barplot(x=dir.index[:10],y=dir.values[:10])
plt.xticks(rotation=90)
plt.xlabel('Director',fontweight='bold')
plt.ylabel('Count',fontweight='bold')
plt.title('Top 10 Directors',fontweight='bold')
ax.bar_label(ax.containers[0])
plt.show()





Most Content(19) has been directed by Rajiv Chilaka followed by Raul Campus and Jan Suter

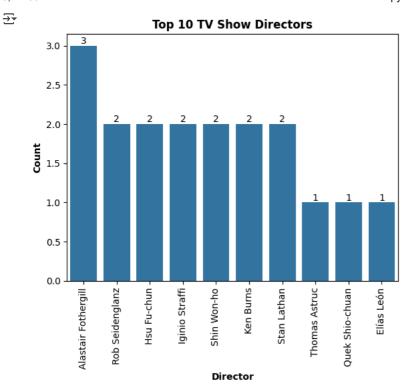
 $\label{tvshow_dir} $$\operatorname{director'}=='\operatorname{Unknown'} \& (\operatorname{data['type']}=='\operatorname{TV Show'})]. $$\operatorname{director.value_counts()}$$ $\operatorname{tvshow_dir}$$$



	count
director	
Alastair Fothergill	3
Rob Seidenglanz	2
Hsu Fu-chun	2
Iginio Straffi	2
Shin Won-ho	2
Juliana Vicente	1
Chang Chin-jung, Chen Rong-hui	1
Thierry Demaizière, Alban Teurlai	1
Manolo Caro	1
Michael Cumming	1
222 rows × 1 columns	
dtype: int64	

▼ Top 10 TV Show Director

```
ax=sns.barplot(x=tvshow_dir.index[:10],y=tvshow_dir.values[:10])
plt.xticks(rotation=90)
ax.bar_label(ax.containers[0])
plt.xlabel('Director',fontweight='bold')
plt.ylabel('Count',fontweight='bold')
plt.title('Top 10 TV Show Directors',fontweight='bold')
plt.show()
```



Alastair Fothergill has directed most tv shows

```
cast_act=data['cast'].apply(lambda x : x.split(','))
cast_act = cast_act[cast_act.apply(lambda x: x != ['Unknown'])]
cast_act=cast_act.explode()
cast_act=cast_act.value_counts()
cast_act
```

→		count
	cast	
Anupan	n Kher	39
Rupa Bl	nimani	31
Takahiro	Sakurai	30

 $\overline{\mathbf{T}}$

Julie Tejwani 28 Om Puri 27

Vedika

Maryam Zaree Melanie Straub

Chittaranjan Tripathy

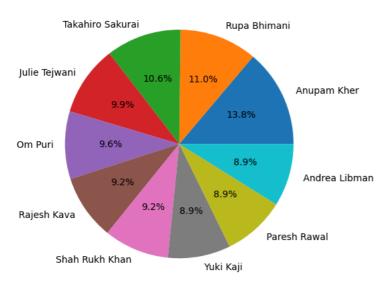
39296 rows × 1 columns

Tedros Teclebrhan

```
top10_actors=cast_act[:10]
\verb|plt.pie(top10_actors,labels=cast_act.index[:10],autopct='%1.1f%'')|
plt.title('Top 10 Actors',fontweight='bold')
plt.tight_layout()
plt.show()
```



Top 10 Actors



Anupam Kher has appeared as actor in most no of content followed by Rupa Bhamani and Takahiro Sakurai

What duration has highest no of movies

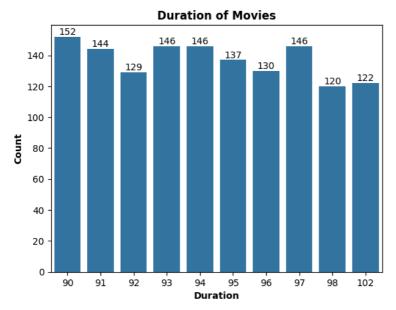
dur_movies=data[data['type'] == 'Movie'].duration.str.replace(' min', '').astype(int).value_counts()
dur_movies

₹		count
	duration	
	90	152
	94	146
	97	146
	93	146
	91	144
	208	1
	5	1
	16	1
	186	1
	191	1

205 rows × 1 columns

```
ax=sns.barplot(x=dur_movies.index[:10],y=dur_movies.values[:10])
plt.xlabel('Duration',fontweight='bold')
plt.ylabel('Count',fontweight='bold')
plt.title('Duration of Movies',fontweight='bold')
ax.bar_label(ax.containers[0])
plt.show()
```





Most no of movies has duration 90 min followed by 93,94 and 97 min

data[data['type'] == 'Movie'].duration.str.replace(' min', '').astype(int).mean()

→ 99.56499755341706

Average duration of movies is 99 min

→

count

1 1793

0

- **2** 425
- **3** 199
- 4 95
- **5** 65
- **6** 33
- 7 23
- **8** 17
- 9 9
- **10** 7
- **13** 3
- 11 2
- **12** 2
- **15** 2
- **17** 1

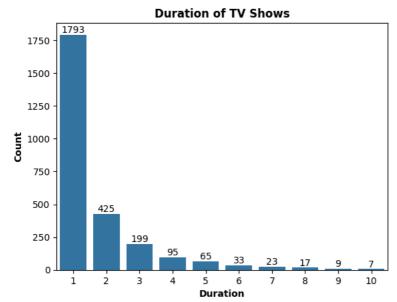
dtype: int64

```
dur_tvshow=dur_tvshow.reset_index()
dur_tvshow.columns=['duration','count']
ax=sns.barplot(x='duration',y='count',data=dur_tvshow[:10])
plt.xlabel('Duration',fontweight='bold')
plt.ylabel('Count',fontweight='bold')
plt.title('Duration of TV Shows',fontweight='bold')
```

ax.bar_label(ax.containers[0])

plt.show()





data[data['type'] == 'TV Show'].duration.str.extract('(\d+)').astype(int).mean()



dtype: float64

Average duration of TV Show is 1.76 ~ 2 seasons

In which day highest no of content added

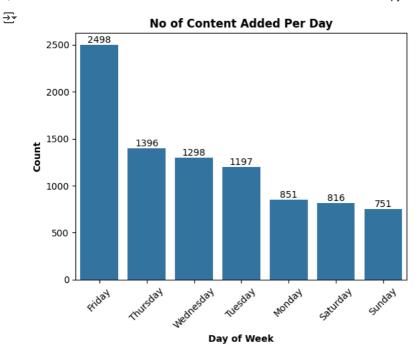
```
data['day_of_week']=data['date_added'].dt.day_name()
data['day_of_week'].value_counts()
```



count

day_of_week	
Friday	2498
Thursday	1396
Wednesday	1298
Tuesday	1197
Monday	851
Saturday	816
Sunday	751

```
ax=sns.barplot(x=data['day_of_week'].value_counts().index,y=data['day_of_week'].value_counts().values)
plt.xlabel('Day of Week',fontweight='bold')
plt.ylabel('Count',fontweight='bold')
plt.xticks(rotation=45)
ax.bar_label(ax.containers[0])
plt.title('No of Content Added Per Day',fontweight='bold')
plt.show()
```



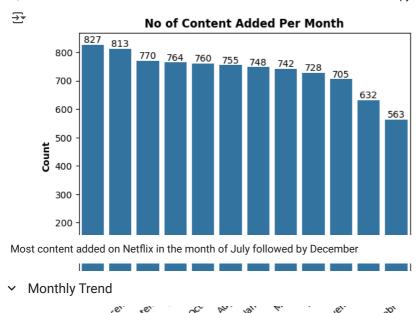
Most content has been added on Friday

In which month most content added on Netflix

```
data['month_added']=data['date_added'].dt.month_name()
data['month_added'].value_counts()
```

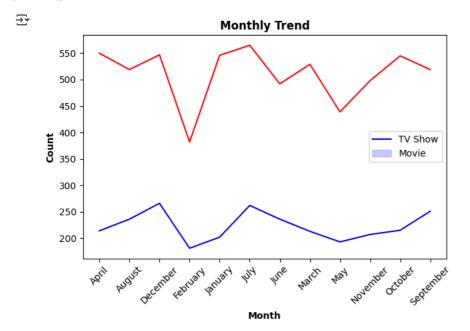
_	
<u>→</u> *	count
month_added	
July	827
December	813
September	770
April	764
October	760
August	755
January	748
March	742
June	728
November	705
May	632
February	563
dtype: int64	

```
ax=sns.barplot(x=data['month_added'].value_counts().index,y=data['month_added'].value_counts().values)
plt.xlabel('Month',fontweight='bold')
plt.ylabel('Count',fontweight='bold')
plt.xticks(rotation=45)
ax.bar_label(ax.containers[0])
plt.title('No of Content Added Per Month',fontweight='bold')
plt.show()
```



month_movie_count=data[data['type']=='Movie'].groupby('month_added').size()
month_tvshow_count=data[data['type']=='TV Show'].groupby('month_added').size()

```
sns.lineplot(x=month_tvshow_count.index,y=month_tvshow_count.values,color='blue')
sns.lineplot(x=month_movie_count.index,y=month_movie_count.values,color='red')
plt.xlabel('Month',fontweight='bold')
plt.ylabel('Count',fontweight='bold')
plt.title('Monthly Trend',fontweight='bold')
plt.xticks(rotation=45)
plt.legend(['TV Show','Movie'])
plt.tight_layout()
plt.show()
```



Correlation between release year nad year_added

corr_data=data[['release_year','year_added']].corr()
corr_data



Mayt stance Canarata and with corn data View recommended plate Maw interactive cheet