#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
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
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
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
	s1	s1 Movie s2 TV s2 Show	S2 TV Blood & Water	s1 Movie Johnson Is Dead Kirsten Johnson s2 TV Blood & NaN s3 TV Ganglands Julien	s1 Movie Johnson Is Dead Kirsten Johnson NaN Rama Qamata, Khosi Ngema, Gail Mabalane, Thaban Sami Bouajila, Tracy Show Show Ganglands Julien Leclercq Gotoas, Samuel Jouy,	s1 Movie Johnson Is Dead Kirsten Johnson NaN United States TV Blood & NaN Qamata, Khosi Ngema, Gail Mabalane, Thaban s3 TV Ganglands Julien Leclercq Gotoas, Samuel Jouy,	s1 Movie Johnson Is Dead Kirsten Johnson MaN United September 25, 2021 S2 TV Blood & NaN Qamata, Khosi Ngema, Gail Mabalane, Thaban S3 TV Show Ganglands Julien Leclercq States 25, 2021 S3 TV Ganglands Julien Leclercq Gotoas, Samuel Jouy, NaN September 24, 2021	s1 Movie Johnson Is Dead Johnson Sani Bouajila, Tracy Show Ganglands Julien Leclercq Show, Show Ganglands Johnson Johnson NaN United September 25, 2021 2020 Ama Qamata, Khosi Ngema, Gail Mabalane, Thaban Sami Bouajila, Tracy Gotoas, Samuel Jouy, September 24, 2021 2021	s1 Movie Johnson Is Dead States September States 25, 2021 2020 PG-13 S2 TV Blood & NaN Qamata, Khosi Ngema, Gail Mabalane, Thaban Sami Bouajila, Tracy Show Ganglands Show Ganglands Leclercq States 24, 2021 2021 TV-MA Sami Bouajila, Tracy Gotoas, Samuel Jouy, NaN September 24, 2021 2021 TV-MA	s1 Movie Johnson Is Dead Kirsten Johnson Is Dead Johnson Is Dead Johnson Is Dead Johnson Is Johnson Is Dead Johnson Is Dead Johnson Is Johnson Is Dead Johnson Is Joh	s1 Movie Johnson Is Dead Johnson Sami Bouajila, Tracy Show Show Show Show Show Show Show Show

Next steps: (Generate code with data)

View recommended plots

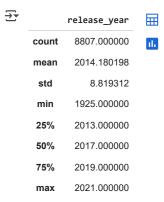
New interactive sheet

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	1 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
dtyp	es: int64(1),	object(11)	
memoi	ry 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

₹		0
	show_id	0.000000
	type	0.000000
	title	0.000000
	director	29.908028
	cast	9.367549
	country	9.435676
	date_added	0.113546
	release_year	0.000000
	rating	0.045418
	duration	0.034064
	listed_in	0.000000
	description	0.000000
	dtype: float64	

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

data.head()

	show_id	type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	descriptio
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 th 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 party, a Cap 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 hi family from powerfu drug lor.

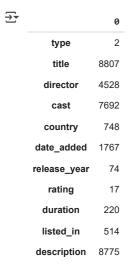
Data already has default serial no so no use of show_id

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

data.head()



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



dtype: int64

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

<class 'pandas.core.frame.DataFrame'>

→ 0

No duplicate value in data

Preprocessing of Data

 $\label{lem:data} $$ data['date_added']$, format='mixed') $$ #convert to datetime dtype data.info() $$$

```
RangeIndex: 8807 entries, 0 to 8806
Data columns (total 11 columns):
#
    Column
                   Non-Null Count
                                   Dtype
 0
     type
                   8807 non-null
     title
                   8807 non-null
                                    object
                   6173 non-null
     director
                   7982 non-null
     cast
                                    object
 4
     country
                   7976 non-null
                                    obiect
     date_added
                   8797 non-null
                                    datetime64[ns]
     release_year
                   8807 non-null
                                    int64
                   8803 non-null
     rating
                                    object
                   8804 non-null
 8
     duration
                                    object
    listed_in
                   8807 non-null
                                    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
    RangeIndex: 8807 entries, 0 to 8806
    Data columns (total 11 columns):
                      Non-Null Count Dtype
     # Column
                      8807 non-null object
     0
         type
     1
         title
                      8807 non-null
                                     object
                      8807 non-null
     2
         director
                                     object
     3
         cast
                      8807 non-null
                                     object
     4
         country
                      8807 non-null
                                     object
         date_added
                      8807 non-null
                                     datetime64[ns]
         release_year
                      8807 non-null
                                     int64
                      8807 non-null
         rating
                                     object
         duration
                      8807 non-null
                                     object
        listed in
                      8807 non-null
                                     obiect
                      8807 non-null
     10 description
                                     object
    dtypes: datetime64[ns](1), int64(1), object(9)
    memory usage: 757.0+ 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)]
```

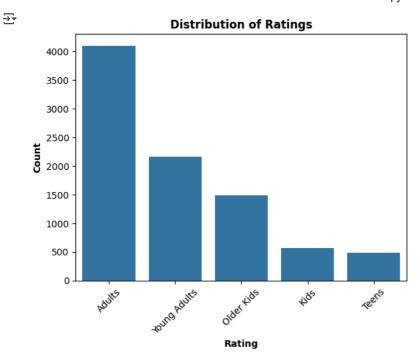
₹		type	title	director	cast	country	date_added	release_year	rating	duration	listed_in	description	
	5541	Movie	Louis C.K. 2017	Louis C.K.	Louis C.K.	United States	2017-04-04	2017	74 min	0	Movies	Louis C.K. muses on religion, eternal love, gi	11.
	5794	Movie	Louis C.K.: Hilarious	Louis C.K.	Louis C.K.	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['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()
→
                   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')
plt.ylabel('Count',fontweight='bold')
plt.title('Distribution of Ratings', fontweight='bold')
plt.show()
```

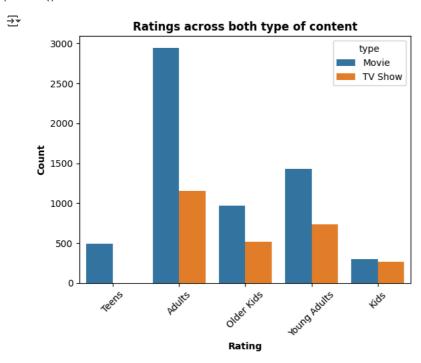


Netflix has more Adult content followed by Young Adult content

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()
```

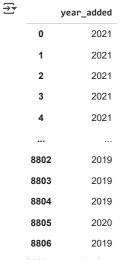


For Teenagers Netflix has least no of content

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']



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



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

In 2017 most movies are released

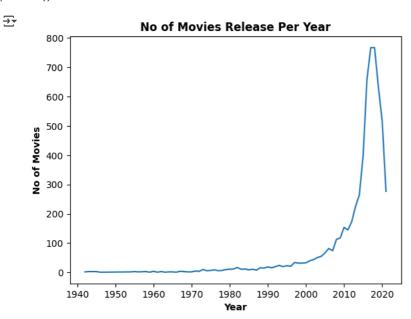
tv_shows_per_year

	release_year	count	
0	2020	436	11.
1	2019	397	10
2	2018	380	0
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	34	
13	2008	23	
14	2006	14	
15	2007	14	
16	2005	13	
17	2003	10	
18	2004	9	
19	1999	7	
20	2002	7	
21	2001	5	
22	1993	4	
23	2000	4	
24	1997		
25	1998		
26	1990	3	
27	1996	3	
28	1992		
29	1995		
30	1994		
31	1988		
32 33	1986 1989	2	
34	1969		
35	1985	1	
36	1946		
37	1981		
38	1972		
39	1979		
40	1977		
41	1991		
42	1974		
43	1925		
44	1945		
45	1963	1	

○ View recommended plots New interactive sheet

Next steps: Generate code with tv_shows_per_year

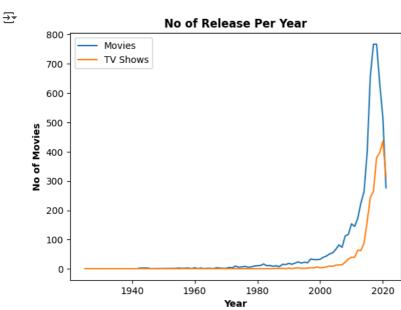
```
sns.lineplot(x='release_year',y='count',data=movies_per_year)
plt.xlabel('Year',fontweight='bold')
plt.ylabel('No of Movies',fontweight='bold')
plt.title('No of Movies Release Per Year',fontweight='bold')
plt.show()
```



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
												Feuds,	
	4 ■												· · · · · · · · · · · · · · · · · · ·
Next	Next steps: Generate code with data View recommended plots New interactive sheet												

Comparison of Movies VS TV Shows

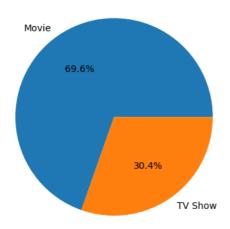
data['type'].value_counts()



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



country **United States** 2818 India 972 Unknown 831 **United Kingdom** 419 Japan 245 Romania, Bulgaria, Hungary 1 Uruguay, Guatemala France, Senegal, Belgium 1 Mexico, United States, Spain, Colombia 1

count

1

749 rows × 1 columns

dtype: int64

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



count

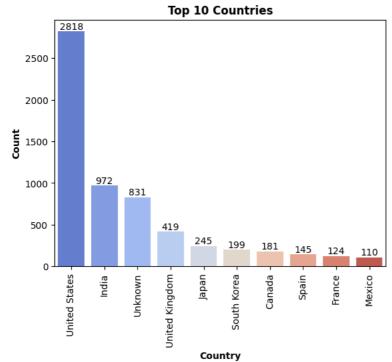
United Arab Emirates, Jordan

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

dtype: int64

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

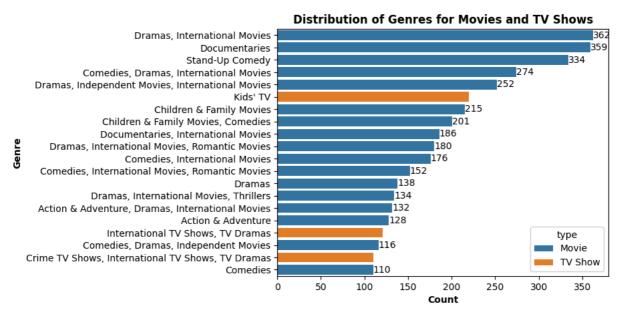


	count
listed_in	
Dramas, International Movies	362
Documentaries	359
Stand-Up Comedy	334
Comedies, Dramas, International Movies	274
Dramas, Independent Movies, International Movies	252
Kids' TV	220
Children & Family Movies	215
Children & Family Movies, Comedies	201
Documentaries, International Movies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

dtype: int64

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

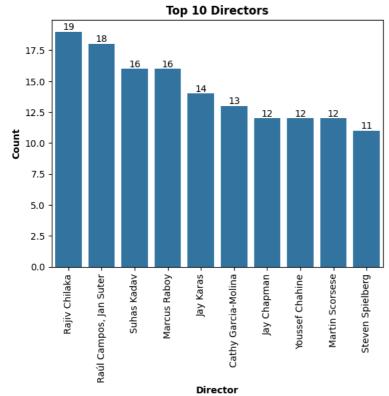
dir=data['director'].explode().value_counts() dir=dir[~(dir.index=='Unknown')]



director	
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

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



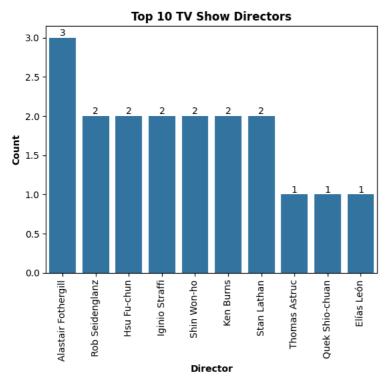
	count
director	
Alastair Fothergill	3
Rob Seidenglanz	2
Hsu Fu-chun	2
Iginio Straffi	2
Shin Won-ho	2

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
```

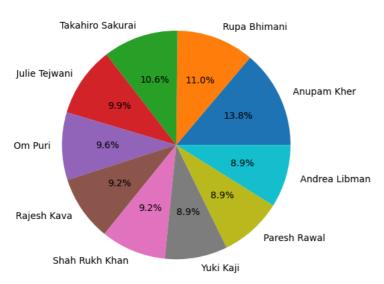
count



cast	
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
39296 rows × 1 columns	

```
top10_actors=cast_act[:10]
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

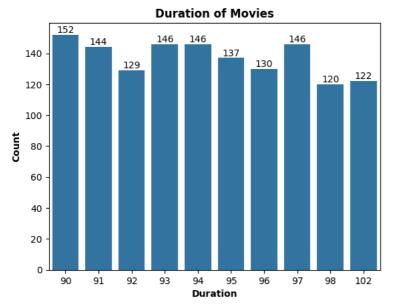
₹		count
	duration	
	90	152
	94	146
	97	146
	93	146
	91	144
	208	1
	5	1
	16	1
	186	1
	191	1

205 rows × 1 columns

dtype: int64

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

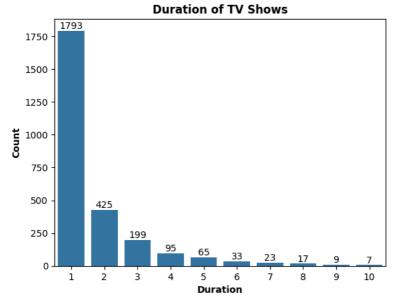
Average duration of movies is 99 min

count 0 1 1793 2 425

- **3** 199
- 4 95
- **5** 65
- **6** 33
- **7** 23
- 8 179 9
- 9107
- **13** 3
- **11** 2
- **12** 2
- **15** 2
- **17** 1

```
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()
```

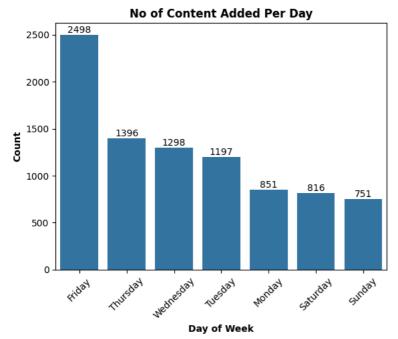


count

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()
```





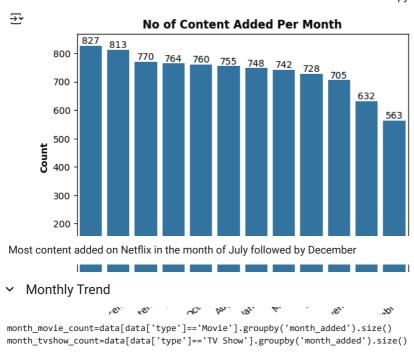
Most content has been added on Friday

In which month most content added on Netflix

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

} ▼		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

```
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()
```



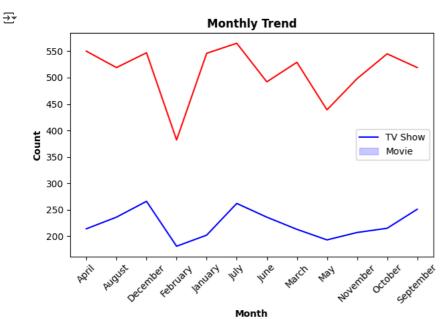
sns.lineplot(x=month_tvshow_count.index,y=month_tvshow_count.values,color='blue')
sns.lineplot(x=month_movie_count.index,y=month_movie_count.values,color='red')
plt.xlabel('Month',fontweight='bold')
plt.ylabel('Count',fontweight='bold')
plt.title('Monthly Trend',fontweight='bold')

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



Next stane: Generate code with conn. data View recommended plate New interactive sheet