Data Science Project

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Introduction

- We have a system that talks about a large group of movies consisting of 10,000 rows and 10 columns, for sure the data set contains missing values and duplicated and so on.

- The first thing we will do is prepossessing the data through a set of commands that will be clarified now in the next lines.

- The name of columns (id, title, release_date, genres, original_languag, vote_count, popularity, new_budget, production_companies, vote_average)

Preprocessing

Read the data

We will start with the first thing to do “import” for the libraries and start reading the data

In [237]:
```
#Import the library of pandas

import pandas as pd
import numpy as np
```

In [238]:
```
#Read the dataset of movies

ds = pd.read_csv("popular_10000_movies_tmdb.csv")
```

In [239]:
```
#Show the dataset

ds
```

Out[239]:

	id	title	release_date	genres	original_language	vote_average	vote_count	popularity	budget	production_companies
0	758323	The Pope's Exorcist	4/5/2023	['Horror', 'Mystery', 'Thriller']	English	7.4	619	5089.969	18000000	['Screen Gems', '2.0 Entertainment', 'Jesus & ...
1	640146	Ant-Man and the Wasp: Quantumania	2/15/2023	['Action', 'Adventure', 'Science Fiction']	English	6.6	2294	4665.438	200000000	['Marvel Studios', 'Kevin Feige Productions']
2	502356	The Super Mario Bros. Movie	4/5/2023	['Animation', 'Adventure', 'Family', 'Fantasy'...	English	7.5	1861	3935.550	100000000	['Universal Pictures', 'Illumination', 'Ninten...
3	868759	Ghosted	4/18/2023	['Action', 'Comedy', 'Romance']	English	7.2	652	2791.532	0	['Skydance Media', 'Apple Studios']
4	594767	Shazam! Fury of the Gods	3/15/2023	['Action', 'Comedy', 'Fantasy', 'Adventure']	English	6.8	1510	2702.593	125000000	['New Line Cinema', 'The Safran Company', 'DC ...
...	...	...	...	...	...	...	...	...	...	...
9995	374473	I, Daniel Blake	10/21/2016	['Drama']	English	7.7	1220	10.774	0	['Why Not Productions', 'Wild Bunch', 'Sixteen...
9996	16774	Hellboy Animated: Sword of Storms	10/28/2006	['TV Movie', 'Fantasy', 'Animation', 'Action',...	English	6.3	99	12.739	0	['IDT Entertainment', 'Film Roman']
9997	13564	Return to House on Haunted Hill	10/3/2007	['Horror', 'Thriller']	English	5.6	263	12.769	0	['Dark Castle Entertainment', 'Warner Premiere']
9998	482204	My Sister-in-law's Job	8/31/2017	['Drama', 'Romance']	Korean	5.0	5	10.425	0	[]
9999	444539	The Bookshop	11/10/2017	['Drama']	English	6.5	382	12.525	5400000	['Zephyr Films', 'A Contracorriente Films', 'D...

10000 rows × 10 columns

- In the line 240 we will use "info" for the data
- In line 241 we will convert the data type of date from “object” to “date time”

In [240]:
```
#Show the info about dataset

ds.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10000 entries, 0 to 9999
Data columns (total 10 columns):
 #   Column               Non-Null Count  Dtype  
---  ------               --------------  -----  
 0   id                   10000 non-null  int64  
 1   title                10000 non-null  object 
 2   release_date         9979 non-null   object 
 3   genres               10000 non-null  object 
 4   original_language    10000 non-null  object 
 5   vote_average         10000 non-null  float64
 6   vote_count           10000 non-null  int64  
 7   popularity           10000 non-null  float64
 8   budget               10000 non-null  int64  
 9   production_companies  10000 non-null  object 
dtypes: float64(2), int64(3), object(5)
memory usage: 781.4+ KB
```

In [241]:
```
ds['release_date'] = pd.to_datetime(ds['release_date'])
ds
```

Out[241]:

	id	title	release_date	genres	original_language	vote_average	vote_count	popularity	budget	production_companies
0	758323	The Pope's Exorcist	2023-04-05	['Horror', 'Mystery', 'Thriller']	English	7.4	619	5089.969	18000000	['Screen Gems', '2.0 Entertainment', 'Jesus & ...
1	640146	Ant-Man and the Wasp: Quantumania	2023-02-15	['Action', 'Adventure', 'Science Fiction']	English	6.6	2294	4665.438	200000000	['Marvel Studios', 'Kevin Feige Productions']
2	502356	The Super Mario Bros. Movie	2023-04-05	['Animation', 'Adventure', 'Family', 'Fantasy'...	English	7.5	1861	3935.550	100000000	['Universal Pictures', 'Illumination', 'Ninten...
3	868759	Ghosted	2023-04-18	['Action', 'Comedy', 'Romance']	English	7.2	652	2791.532	0	['Skydance Media', 'Apple Studios']
4	594767	Shazam! Fury of the Gods	2023-03-15	['Action', 'Comedy', 'Fantasy', 'Adventure']	English	6.8	1510	2702.593	125000000	['New Line Cinema', 'The Safran Company', 'DC ...
...	...	...	...	...	...	...	...	...	...	...
9995	374473	I, Daniel Blake	2016-10-21	['Drama']	English	7.7	1220	10.774	0	['Why Not Productions', 'Wild Bunch', 'Sixteen...
9996	16774	Hellboy Animated: Sword of Storms	2006-10-28	['TV Movie', 'Fantasy', 'Animation', 'Action',...	English	6.3	99	12.739	0	['IDT Entertainment', 'Film Roman']
9997	13564	Return to House on Haunted Hill	2007-10-03	['Horror', 'Thriller']	English	5.6	263	12.769	0	['Dark Castle Entertainment', 'Warner Premiere']
9998	482204	My Sister-in-law's Job	2017-08-31	['Drama', 'Romance']	Korean	5.0	5	10.425	0	[]
9999	444539	The Bookshop	2017-11-10	['Drama']	English	6.5	382	12.525	5400000	['Zephyr Films', 'A Contracorriente Films', 'D...

10000 rows × 10 columns

- In the line 242 we will use "info" for ensure the data type become "date time"
- In line 243, we used the “shape” command to show how many rows and how many columns we have, as shown in the pictures
- In line 244, we will use the command "isnull().sum()" to check if we have null value and calculate the sum of them
- In the line 245, we will drop the null values

10000 rows × 10 columns

```
In [242]: ds.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10000 entries, 0 to 9999
Data columns (total 10 columns):
 #   Column               Non-Null Count  Dtype         
---  ------               --------------  -----         
 0   id                   10000 non-null  int64         
 1   title                10000 non-null  object        
 2   release_date         9979 non-null   datetime64[ns]
 3   genres               10000 non-null  object        
 4   original_language    10000 non-null  object        
 5   vote_average         10000 non-null  float64       
 6   vote_count           10000 non-null  int64         
 7   popularity           10000 non-null  float64       
 8   budget               10000 non-null  int64         
 9   production_companies  10000 non-null  object        
dtypes: datetime64[ns](1), float64(2), int64(3), object(4)
memory usage: 781.4+ KB
```

```
In [243]: #Shape of dataset

          ds.shape
```

```
Out[243]: (10000, 10)
```

```
In [244]: #Check the null values

          ds.isnull().sum()
```

```
Out[244]: id                    0
          title                 0
          release_date         21
          genres                0
          original_language     0
          vote_average          0
          vote_count            0
          popularity            0
          budget                0
          production_companies  0
          dtype: int64
```

```
In [245]: #Drop the null values

          ds.dropna(inplace=True)
```

- In line 246, we will use the command "isna().any()" to check if we have null value
- In line 247, we will use the command "isnull().sum()" to check if we have null value and calculate the sum of them.
- On line 248, we used the “shape” command to show how many rows and how many columns we have, as shown in the pictures.

```
In [246]: #Check is there any null values

          ds.isna().any()

Out[246]: id                    False
          title                 False
          release_date          False
          genres                False
          original_language     False
          vote_average          False
          vote_count            False
          popularity            False
          budget                False
          production_companies  False
          dtype: bool

In [247]: #Check the null values

          ds.isnull().sum()

Out[247]: id                    0
          title                 0
          release_date          0
          genres                0
          original_language     0
          vote_average          0
          vote_count            0
          popularity            0
          budget                0
          production_companies  0
          dtype: int64

In [248]: #Show the shape of dataset

          ds.shape

Out[248]: (9979, 10)
```

- In line 249, we used "head (10)" to show first 10 rows

```
In [249]: #show the first 10 row

          ds.head(10)
```

Out[249]:

	id	title	release_date	genres	original_language	vote_average	vote_count	popularity	budget	production_companies
0	758323	The Pope's Exorcist	2023-04-05	['Horror', 'Mystery', 'Thriller']	English	7.4	619	5089.969	18000000	['Screen Gems', '2.0 Entertainment', 'Jesus & ...
1	640146	Ant-Man and the Wasp: Quantumania	2023-02-15	['Action', 'Adventure', 'Science Fiction']	English	6.6	2294	4665.438	200000000	['Marvel Studios', 'Kevin Feige Productions']
2	502356	The Super Mario Bros. Movie	2023-04-05	['Animation', 'Adventure', 'Family', 'Fantasy'...	English	7.5	1861	3935.550	100000000	['Universal Pictures', 'Illumination', 'Ninten...
3	868759	Ghosted	2023-04-18	['Action', 'Comedy', 'Romance']	English	7.2	652	2791.532	0	['Skydance Media', 'Apple Studios']
4	594767	Shazam! Fury of the Gods	2023-03-15	['Action', 'Comedy', 'Fantasy', 'Adventure']	English	6.8	1510	2702.593	125000000	['New Line Cinema', 'The Safran Company', 'DC ...
5	76600	Avatar: The Way of Water	2022-12-14	['Science Fiction', 'Adventure', 'Action']	English	7.7	7853	2280.912	460000000	['20th Century Studios', 'Lightstorm Entertain...
6	447365	Guardians of the Galaxy Volume 3	2023-05-03	['Science Fiction', 'Adventure', 'Action']	English	8.3	683	2520.308	250000000	['Marvel Studios', 'Kevin Feige Productions']
7	934433	Scream VI	2023-03-08	['Horror', 'Mystery', 'Thriller']	English	7.3	1029	1862.283	35000000	['Radio Silence', 'Project X Entertainment', '...
8	677179	Creed III	2023-03-01	['Drama', 'Action']	English	7.3	1298	1894.044	75000000	['Metro-Goldwyn-Mayer', 'Proximity Media', 'Ba...
9	493529	Dungeons & Dragons: Honor Among Thieves	2023-03-23	['Adventure', 'Fantasy', 'Comedy']	English	7.5	964	1655.052	151000000	['Entertainment One', 'Paramount', 'Allspark P...

- on line 250, we used "tail (10)" to show the last 10 row
- On line 251, we used "dtypes"To check the data type

```
In [250]: #Show the last 10 row

          ds.tail(10)
```

Out[250]:

	id	title	release_date	genres	original_language	vote_average	vote_count	popularity	budget	production_companies
9990	10748	St. Trinian's	2007-12-21	['Comedy', 'Family', 'Science Fiction']	English	5.9	418	7.770	0	['Ealing Studios', 'Fragile Films', 'Entertain...
9991	917269	The Witcher Season One Recap: From the Beginning	2021-12-17	[]	English	5.6	8	9.045	0	[]
9992	914216	The Lost King	2022-10-07	['Drama', 'Comedy']	English	6.5	51	11.138	0	['Baby Cow Productions', 'BBC Film', 'Ingeniou...
9993	823461	Good on Paper	2021-06-23	['Comedy', 'Romance']	English	5.6	265	8.544	0	['Burn Later Productions', 'Meridian Content',...
9994	94503	Tsubasa RESERVoir CHRoNiCLE: Tokyo Revelations	2007-11-16	['Fantasy', 'Animation', 'Action', 'Adventure'...	Japanese	7.2	6	7.949	0	['Kodansha']
9995	374473	I, Daniel Blake	2016-10-21	['Drama']	English	7.7	1220	10.774	0	['Why Not Productions', 'Wild Bunch', 'Sixteen...
9996	16774	Hellboy Animated: Sword of Storms	2006-10-28	['TV Movie', 'Fantasy', 'Animation', 'Action',...	English	6.3	99	12.739	0	['IDT Entertainment', 'Film Roman']
9997	13564	Return to House on Haunted Hill	2007-10-03	['Horror', 'Thriller']	English	5.6	263	12.769	0	['Dark Castle Entertainment', 'Warner Premiere']
9998	482204	My Sister-in-law's Job	2017-08-31	['Drama', 'Romance']	Korean	5.0	5	10.425	0	[]
9999	444539	The Bookshop	2017-11-10	['Drama']	English	6.5	382	12.525	5400000	['Zephyr Films', 'A Contracorriente Films', 'D...

```
In [251]: #Check the datatype

          ds.dtypes
```

```
Out[251]: id                            int64
          title                        object
          release_date         datetime64[ns]
          genres                       object
          original_language            object
          vote_average                float64
          vote_count                    int64
          popularity                  float64
          budget                        int64
          production_companies         object
          dtype: object
```

- In line 252, show the name of all columns
- in the line 253, we used "describe "to description the dataset
- In the line 254we will use "info" for the data to show the information about the Dataset

In [252]:
```
#Show the name of all column

ds.columns
```

Out[252]:
```
Index(['id', 'title', 'release_date', 'genres', 'original_language',
       'vote_average', 'vote_count', 'popularity', 'budget',
       'production_companies'],
      dtype='object')
```

In [253]:
```
#Show the description of dataset

ds.describe()
```

Out[253]:

	id	vote_average	vote_count	popularity	budget
count	9.979000e+03	9979.000000	9979.000000	9979.000000	9.979000e+03
mean	3.143436e+05	6.338822	1530.054915	31.488106	1.954662e+07
std	3.331747e+05	1.388166	2870.875959	111.528200	3.890194e+07
min	5.000000e+00	0.000000	0.000000	7.219000	0.000000e+00
25%	1.220300e+04	5.900000	123.000000	13.531500	0.000000e+00
50%	1.925770e+05	6.500000	483.000000	17.616000	3.700000e+05
75%	5.604590e+05	7.100000	1561.000000	27.175500	2.200000e+07
max	1.119921e+06	10.000000	33633.000000	5089.969000	5.793304e+08

In [254]:
```
# In[90]:


ds.info
```

Out[254]:
```
<bound method DataFrame.info of          id                          title release_date  \
0     758323                The Pope's Exorcist   2023-04-05
1     640146  Ant-Man and the Wasp: Quantumania   2023-02-15
2     502356       The Super Mario Bros. Movie   2023-04-05
3     868759                           Ghosted   2023-04-18
4     594767          Shazam! Fury of the Gods   2023-03-15
...      ...                               ...          ...
9995  374473                 I, Daniel Blake   2016-10-21
9996   16774  Hellboy Animated: Sword of Storms   2006-10-28
9997   13564   Return to House on Haunted Hill   2007-10-03
9998  482204            My Sister-in-law's Job   2017-08-31
9999  444539                  The Bookshop   2017-11-10

                                       genres original_language  \
0                  ['Horror', 'Mystery', 'Thriller']          English
1          ['Action', 'Adventure', 'Science Fiction']          English
2     ['Animation', 'Adventure', 'Family', 'Fantasy'...          English
3                    ['Action', 'Comedy', 'Romance']          English
4         ['Action', 'Comedy', 'Fantasy', 'Adventure']          English
...                                              ...              ...
9995                                      ['Drama']          English
```

- on line 255, we will use the command "isnull().sum()" to check if we have null value and calculate the sum of them

```
1           ['Action', 'Adventure', 'Science Fiction']          English
2    ['Animation', 'Adventure', 'Family', 'Fantasy'...          English
3                     ['Action', 'Comedy', 'Romance']          English
4         ['Action', 'Comedy', 'Fantasy', 'Adventure']          English
...                                                ...              ...
9995                                       ['Drama']          English
9996  ['TV Movie', 'Fantasy', 'Animation', 'Action',...          English
9997                           ['Horror', 'Thriller']          English
9998                            ['Drama', 'Romance']           Korean
9999                                       ['Drama']          English

      vote_average  vote_count  popularity     budget  \
0              7.4         619    5089.969   18000000
1              6.6        2294    4665.438  200000000
2              7.5        1861    3935.550  100000000
3              7.2         652    2791.532          0
4              6.8        1510    2702.593  125000000
...            ...         ...         ...        ...
9995           7.7        1220      10.774          0
9996           6.3          99      12.739          0
9997           5.6         263      12.769          0
9998           5.0           5      10.425          0
9999           6.5         382      12.525    5400000

                                production_companies
0     ['Screen Gems', '2.0 Entertainment', 'Jesus & ...
1         ['Marvel Studios', 'Kevin Feige Productions']
2     ['Universal Pictures', 'Illumination', 'Ninten...
3                  ['Skydance Media', 'Apple Studios']
4     ['New Line Cinema', 'The Safran Company', 'DC ...
...                                                 ...
9995  ['Why Not Productions', 'Wild Bunch', 'Sixteen...
9996                  ['IDT Entertainment', 'Film Roman']
9997   ['Dark Castle Entertainment', 'Warner Premiere']
9998                                                 []
9999  ['Zephyr Films', 'A Contracorriente Films', 'D...

[9979 rows x 10 columns]>
```

In [255]:
```
#Check the null values

ds.isnull().sum()
```

Out[255]:
```
id                    0
title                 0
release_date          0
genres                0
original_language     0
vote_average          0
vote_count            0
popularity            0
budget                0
production_companies  0
dtype: int64
```

- In the line 256, drop the duplicated rows.
- In the line 257, To calculate the mean of vote average used ".mean ()"
- In the line 258, To calculate the standard deviation of vote average used ".Std ()"
- In the line 259 To calculate the variance of vote average used ".Var ()"

```
In [256]: ds.drop_duplicates()
```

Out[256]:

	id	title	release_date	genres	original_language	vote_average	vote_count	popularity	budget	production_companies
0	758323	The Pope's Exorcist	2023-04-05	['Horror', 'Mystery', 'Thriller']	English	7.4	619	5089.969	18000000	['Screen Gems', '2.0 Entertainment', 'Jesus & ...
1	640146	Ant-Man and the Wasp: Quantumania	2023-02-15	['Action', 'Adventure', 'Science Fiction']	English	6.6	2294	4665.438	200000000	['Marvel Studios', 'Kevin Feige Productions']
2	502356	The Super Mario Bros. Movie	2023-04-05	['Animation', 'Adventure', 'Family', 'Fantasy'...	English	7.5	1861	3935.550	100000000	['Universal Pictures', 'Illumination', 'Ninten...
3	868759	Ghosted	2023-04-18	['Action', 'Comedy', 'Romance']	English	7.2	652	2791.532	0	['Skydance Media', 'Apple Studios']
4	594767	Shazam! Fury of the Gods	2023-03-15	['Action', 'Comedy', 'Fantasy', 'Adventure']	English	6.8	1510	2702.593	125000000	['New Line Cinema', 'The Safran Company', 'DC ...
...	...	...	...	...	...	...	...	...	...	...
9995	374473	I, Daniel Blake	2016-10-21	['Drama']	English	7.7	1220	10.774	0	['Why Not Productions', 'Wild Bunch', 'Sixteen...
9996	16774	Hellboy Animated: Sword of Storms	2006-10-28	['TV Movie', 'Fantasy', 'Animation', 'Action',...	English	6.3	99	12.739	0	['IDT Entertainment', 'Film Roman']
9997	13584	Return to House on Haunted Hill	2007-10-03	['Horror', 'Thriller']	English	5.6	263	12.769	0	['Dark Castle Entertainment', 'Warner Premiere']
9998	482204	My Sister-in-law's Job	2017-08-31	['Drama', 'Romance']	Korean	5.0	5	10.425	0	[]
9999	444539	The Bookshop	2017-11-10	['Drama']	English	6.5	382	12.525	5400000	['Zephyr Films', 'A Contracorriente Films', 'D...

9979 rows × 10 columns

```
In [257]: mean_vote_average = ds['vote_average'].mean()
          print (mean_vote_average)
```

```
6.338821525202926
```

```
In [258]: standard_deviation = ds['vote_average'].std()
          standard_deviation
```

```
Out[258]: 1.3881662242465918
```

```
In [259]: var = ds['vote_average'].var()
          var
```

```
Out[259]: 1.927005466139039
```

- On line 260, To calculate the correlation between vote average, popularity used ". Corr()"
- On line 261, To show the row between 1:99 used ".iloc(1:100)"
- On line 262, we define a function for the vote average. If the value is greater than 6, it displays “good,” and if it is smaller, it displays “bad.

In [260]:
```
correlation = ds['vote_average'].corr(ds['popularity'])
print (correlation)
```

```
0.04108095753021450 6
```

In [261]:
```
id = ds.iloc[1:100]
id
```

Out[261]:

	id	title	release_date	genres	original_language	vote_average	vote_count	popularity	budget	production_companies
1	640146	Ant-Man and the Wasp: Quantumania	2023-02-15	['Action', 'Adventure', 'Science Fiction']	English	6.6	2294	4665.438	200000000	['Marvel Studios', 'Kevin Feige Productions']
2	502356	The Super Mario Bros. Movie	2023-04-05	['Animation', 'Adventure', 'Family', 'Fantasy'...	English	7.5	1861	3935.550	100000000	['Universal Pictures', 'Illumination', 'Ninten...
3	868759	Ghosted	2023-04-18	['Action', 'Comedy', 'Romance']	English	7.2	652	2791.532	0	['Skydance Media', 'Apple Studios']
4	594767	Shazam! Fury of the Gods	2023-03-15	['Action', 'Comedy', 'Fantasy', 'Adventure']	English	6.8	1510	2702.593	125000000	['New Line Cinema', 'The Safran Company', 'DC ...
5	76600	Avatar: The Way of Water	2022-12-14	['Science Fiction', 'Adventure', 'Action']	English	7.7	7853	2280.912	460000000	['20th Century Studios', 'Lightstorm Entertain...
...	...	...	...	...	...	...	...	...	...	...
96	1013860	R.I.P.D. 2: Rise of the Damned	2022-11-15	['Action', 'Comedy', 'Fantasy', 'Crime']	English	6.6	462	206.501	0	['Universal 1440 Entertainment']
97	829410	Sick	2022-09-11	['Horror', 'Thriller']	English	6.3	132	206.397	0	['Miramax', 'Outerbanks Entertainment', 'Blumh...
98	1058732	The Simpsons Meet the Bocellis in Feliz Navidad	2022-12-15	['Animation', 'Family', 'Comedy']	English	5.2	36	194.059	0	['Gracie Films', '20th Television', '20th Tele...
99	1101799	Queens on the Run	2023-04-14	['Comedy', 'Action']	Spanish	7.0	83	204.485	0	['Perro Azul', 'Selva Pictures']
100	873256	Kiss, Kiss!	2023-04-26	['Romance', 'Comedy']	Polish	6.9	15	361.900	0	['Lightcraft']

99 rows × 10 columns

In [262]:
```
def vote_average(i):
    if i > 6:
        return ("good")

    else:
        return ("bad")
```

- On line 263, we apply this function with ". apply()".
- On line 264, we print the dataset

```
In [263]: ds['vote_category'] = ds['vote_average'].apply(vote_average)

In [264]: print(ds)
```

```
         id                            title release_date  \
0     758323              The Pope's Exorcist   2023-04-05
1     640146  Ant-Man and the Wasp: Quantumania   2023-02-15
2     502356       The Super Mario Bros. Movie   2023-04-05
3     868759                          Ghosted   2023-04-18
4     594767          Shazam! Fury of the Gods   2023-03-15
...      ...                               ...          ...
9995  374473                 I, Daniel Blake   2016-10-21
9996   16774  Hellboy Animated: Sword of Storms   2006-10-28
9997   13564    Return to House on Haunted Hill   2007-10-03
9998  482204            My Sister-in-law's Job   2017-08-31
9999  444539                      The Bookshop   2017-11-10

                                       genres original_language  \
0                  ['Horror', 'Mystery', 'Thriller']           English
1          ['Action', 'Adventure', 'Science Fiction']           English
2     ['Animation', 'Adventure', 'Family', 'Fantasy'...           English
3                    ['Action', 'Comedy', 'Romance']           English
4         ['Action', 'Comedy', 'Fantasy', 'Adventure']           English
...                                              ...              ...
9995                                      ['Drama']           English
9996  ['TV Movie', 'Fantasy', 'Animation', 'Action',...           English
9997                          ['Horror', 'Thriller']           English
9998                            ['Drama', 'Romance']            Korean
9999                                      ['Drama']           English

      vote_average  vote_count  popularity     budget  \
0              7.4         619    5089.969   18000000
1              6.6        2294    4665.438  200000000
2              7.5        1861    3935.550  100000000
3              7.2         652    2791.532          0
4              6.8        1510    2702.593  125000000
...            ...         ...         ...        ...
9995           7.7        1220      10.774          0
9996           6.3          99      12.739          0
9997           5.6         263      12.769          0
9998           5.0           5      10.425          0
9999           6.5         382      12.525    5400000

                                production_companies vote_category
0     ['Screen Gems', '2.0 Entertainment', 'Jesus & ...          good
1         ['Marvel Studios', 'Kevin Feige Productions']          good
2     ['Universal Pictures', 'Illumination', 'Ninten...          good
3                  ['Skydance Media', 'Apple Studios']          good
4     ['New Line Cinema', 'The Safran Company', 'DC ...          good
...                                              ...           ...
9995  ['Why Not Productions', 'Wild Bunch', 'Sixteen...          good
9996               ['IDT Entertainment', 'Film Roman']          good
9997   ['Dark Castle Entertainment', 'Warner Premiere']           bad
9998                                              []           bad
```

- On line 265, we used the “shape” command to show how many rows and how many columns we have
- On line 266, To calculate the median that command is “.median ()"
- On line 267, that column name is "budget"=0 that replace 0 and put median value.

```
[9979 rows x 11 columns]

In [265]: ds.shape

Out[265]: (9979, 11)

In [266]: budget_median = ds['budget'].median()

In [267]: ds['budget'] = np.where(ds['budget'] == 0, budget_median, ds['budget'])
          ds
```

Out[267]:

	id	title	release_date	genres	original_language	vote_average	vote_count	popularity	budget	production_companies	vote_category
0	758323	The Pope's Exorcist	2023-04-05	['Horror', 'Mystery', 'Thriller']	English	7.4	619	5089.969	18000000.0	['Screen Gems', '2.0 Entertainment', 'Jesus & ...	good
1	640146	Ant-Man and the Wasp: Quantumania	2023-02-15	['Action', 'Adventure', 'Science Fiction']	English	6.6	2294	4665.438	200000000.0	['Marvel Studios', 'Kevin Feige Productions']	good
2	502356	The Super Mario Bros. Movie	2023-04-05	['Animation', 'Adventure', 'Family', 'Fantasy'...	English	7.5	1861	3935.550	100000000.0	['Universal Pictures', 'Illumination', 'Ninten...	good
3	868759	Ghosted	2023-04-18	['Action', 'Comedy', 'Romance']	English	7.2	652	2791.532	370000.0	['Skydance Media', 'Apple Studios']	good
4	594767	Shazam! Fury of the Gods	2023-03-15	['Action', 'Comedy', 'Fantasy', 'Adventure']	English	6.8	1510	2702.593	125000000.0	['New Line Cinema', 'The Safran Company', 'DC ...	good
...	...	...	...	...	...	...	...	...	...	...	...
9995	374473	I, Daniel Blake	2016-10-21	['Drama']	English	7.7	1220	10.774	370000.0	['Why Not Productions', 'Wild Bunch', 'Sixteen...	good
9996	16774	Hellboy Animated: Sword of Storms	2006-10-28	['TV Movie', 'Fantasy', 'Animation', 'Action',...	English	6.3	99	12.739	370000.0	['IDT Entertainment', 'Film Roman']	good
9997	13564	Return to House on Haunted Hill	2007-10-03	['Horror', 'Thriller']	English	5.6	263	12.769	370000.0	['Dark Castle Entertainment', 'Warner Premiere']	bad
9998	482204	My Sister-in-law's Job	2017-08-31	['Drama', 'Romance']	Korean	5.0	5	10.425	370000.0	[]	bad
9999	444539	The Bookshop	2017-11-10	['Drama']	English	6.5	382	12.525	5400000.0	['Zephyr Films', 'A Contracorriente Films', 'D...	good

9979 rows × 11 columns

- On line 268, we used the “shape” command to show how many rows and how many columns we have.
- On line 269, we used the “ds” command to print all dataset.

```
In [268]: ds.shape
```

```
Out[268]: (9979, 11)
```

```
In [269]: ds
```

Out[269]:

	id	title	release_date	genres	original_language	vote_average	vote_count	popularity	budget	production_companies	vote_category
0	758323	The Pope's Exorcist	2023-04-05	['Horror', 'Mystery', 'Thriller']	English	7.4	619	5089.969	18000000.0	['Screen Gems', '2.0 Entertainment', 'Jesus & ...	good
1	640146	Ant-Man and the Wasp: Quantumania	2023-02-15	['Action', 'Adventure', 'Science Fiction']	English	6.6	2294	4665.438	200000000.0	['Marvel Studios', 'Kevin Feige Productions']	good
2	502356	The Super Mario Bros. Movie	2023-04-05	['Animation', 'Adventure', 'Family', 'Fantasy'...	English	7.5	1861	3935.550	100000000.0	['Universal Pictures', 'Illumination', 'Ninten...	good
3	868759	Ghosted	2023-04-18	['Action', 'Comedy', 'Romance']	English	7.2	652	2791.532	370000.0	['Skydance Media', 'Apple Studios']	good
4	594767	Shazam! Fury of the Gods	2023-03-15	['Action', 'Comedy', 'Fantasy', 'Adventure']	English	6.8	1510	2702.593	125000000.0	['New Line Cinema', 'The Safran Company', 'DC ...	good
...	...	...	...	...	...	...	...	...	...	...	...
9995	374473	I, Daniel Blake	2016-10-21	['Drama']	English	7.7	1220	10.774	370000.0	['Why Not Productions', 'Wild Bunch', 'Sixteen...	good
9996	16774	Hellboy Animated: Sword of Storms	2006-10-28	['TV Movie', 'Fantasy', 'Animation', 'Action',...	English	6.3	99	12.739	370000.0	['IDT Entertainment', 'Film Roman']	good
9997	13564	Return to House on Haunted Hill	2007-10-03	['Horror', 'Thriller']	English	5.6	263	12.769	370000.0	['Dark Castle Entertainment', 'Warner Premiere']	bad
9998	482204	My Sister-in-law's Job	2017-08-31	['Drama', 'Romance']	Korean	5.0	5	10.425	370000.0	[]	bad
9999	444539	The Bookshop	2017-11-10	['Drama']	English	6.5	382	12.525	5400000.0	['Zephyr Films', 'A Contracorriente Films', 'D...	good

979 rows × 11 columns

- On line 270, we used the “shape” command to show how many rows and how many columns we have.

```
In [270]: ds.shape
          ds
```

Out[270]:

	id	title	release_date	genres	original_language	vote_average	vote_count	popularity	budget	production_companies	vote_category
0	758323	The Pope's Exorcist	2023-04-05	['Horror', 'Mystery', 'Thriller']	English	7.4	619	5089.969	18000000.0	['Screen Gems', '2.0 Entertainment', 'Jesus & ...	good
1	640146	Ant-Man and the Wasp: Quantumania	2023-02-15	['Action', 'Adventure', 'Science Fiction']	English	6.6	2294	4665.438	200000000.0	['Marvel Studios', 'Kevin Feige Productions']	good
2	502356	The Super Mario Bros. Movie	2023-04-05	['Animation', 'Adventure', 'Family', 'Fantasy'...	English	7.5	1861	3935.550	100000000.0	['Universal Pictures', 'Illumination', 'Ninten...	good
3	868759	Ghosted	2023-04-18	['Action', 'Comedy', 'Romance']	English	7.2	652	2791.532	370000.0	['Skydance Media', 'Apple Studios']	good
4	594767	Shazam! Fury of the Gods	2023-03-15	['Action', 'Comedy', 'Fantasy', 'Adventure']	English	6.8	1510	2702.593	125000000.0	['New Line Cinema', 'The Safran Company', 'DC ...	good
...	...	...	...	...	...	...	...	...	...	...	...
9995	374473	I, Daniel Blake	2016-10-21	['Drama']	English	7.7	1220	10.774	370000.0	['Why Not Productions', 'Wild Bunch', 'Sixteen...	good
9996	16774	Hellboy Animated: Sword of Storms	2006-10-28	['TV Movie', 'Fantasy', 'Animation', 'Action',...	English	6.3	99	12.739	370000.0	['IDT Entertainment', 'Film Roman']	good
9997	13564	Return to House on Haunted Hill	2007-10-03	['Horror', 'Thriller']	English	5.6	263	12.769	370000.0	['Dark Castle Entertainment', 'Warner Premiere']	bad
9998	482204	My Sister-in-law's Job	2017-08-31	['Drama', 'Romance']	Korean	5.0	5	10.425	370000.0	[]	bad
9999	444539	The Bookshop	2017-11-10	['Drama']	English	6.5	382	12.525	5400000.0	['Zephyr Films', 'A Contracorriente Films', 'D...	good

979 rows × 11 columns

- On line 345 we use command ". replace" to replace "[]" to "company x" and print the data set

```
In [345]: ds.replace('[]', 'Company X', inplace=True)
```

```
In [346]: ds
```

Out[346]:

	id	title	release_date	genres	original_language	vote_average	vote_count	popularity	budget	production_companies	vote_catego
0	758323	The Pope's Exorcist	2023-04-05	['Horror', 'Mystery', 'Thriller']	English	7.4	619	5089.969	18000000.0	['Screen Gems', '2.0 Entertainment', 'Jesus & ...	go
1	640146	Ant-Man and the Wasp: Quantumania	2023-02-15	['Action', 'Adventure', 'Science Fiction']	English	6.6	2294	4665.438	200000000.0	['Marvel Studios', 'Kevin Feige Productions']	go
2	502356	The Super Mario Bros. Movie	2023-04-05	['Animation', 'Adventure', 'Family', 'Fantasy'...	English	7.5	1861	3935.550	100000000.0	['Universal Pictures', 'Illumination', 'Ninten...	go
3	868759	Ghosted	2023-04-18	['Action', 'Comedy', 'Romance']	English	7.2	652	2791.532	370000.0	['Skydance Media', 'Apple Studios']	go
4	594767	Shazam! Fury of the Gods	2023-03-15	['Action', 'Comedy', 'Fantasy', 'Adventure']	English	6.8	1510	2702.593	125000000.0	['New Line Cinema', 'The Safran Company', 'DC ...	go
...	...	...	...	...	...	...	...	...	...	...	
9995	374473	I, Daniel Blake	2016-10-21	['Drama']	English	7.7	1220	10.774	370000.0	['Why Not Productions', 'Wild Bunch', 'Sixteen...	go
9996	16774	Hellboy Animated: Sword of Storms	2006-10-28	['TV Movie', 'Fantasy', 'Animation', 'Action',...	English	6.3	99	12.739	370000.0	['IDT Entertainment', 'Film Roman']	go
9997	13564	Return to House on Haunted Hill	2007-10-03	['Horror', 'Thriller']	English	5.6	263	12.769	370000.0	['Dark Castle Entertainment', 'Warner Premiere']	b
9998	482204	My Sister-in-law's Job	2017-08-31	['Drama', 'Romance']	Korean	5.0	5	10.425	370000.0	Company X	b
9999	444539	The Bookshop	2017-11-10	['Drama']	English	6.5	382	12.525	5400000.0	['Zephyr Films', 'A Contracorriente Films', 'D...	go

9979 rows × 11 columns

- On line 346, so save the changes in new excel

```
In [795]: ds.to_csv('C:\\Users\\El-Wattaneya\\Desktop\\popular_10000_movies_tmdb.csv', index=False)
```

Respond the questions

1) Number of movies after 2020
2) Number of movies before 2020
3) The first 15 movies with vote greater than 7

```
In [ ]: ############### Q ####################

In [271]: #Q1
movies_after2020 = ds.loc[ds['release_date'] > '1/1/2020', 'title']
movies_after2020

Out[271]: 0                                The Pope's Exorcist
1                     Ant-Man and the Wasp: Quantumania
2                           The Super Mario Bros. Movie
3                                                Ghosted
4                             Shazam! Fury of the Gods
                                ...
9974                                       Silver Skates
9975                                          Heart Shot
9991    The Witcher Season One Recap: From the Beginning
9992                                       The Lost King
9993                                       Good on Paper
Name: title, Length: 2497, dtype: object

In [272]: #Q2
movies_before2020 = ds.loc[ds['release_date'] < '1/1/2020', 'title']
movies_before2020

Out[272]: 37                    Guardians of the Galaxy Vol. 2
78      Demon Slayer: Kimetsu no Yaiba Sibling's Bond
82                  John Wick: Chapter 3 - Parabellum
83                            Guardians of the Galaxy
89          The Forbidden Legend: Sex & Chopsticks 2
                              ...
9995                                  I, Daniel Blake
9996               Hellboy Animated: Sword of Storms
9997                 Return to House on Haunted Hill
9998                          My Sister-in-law's Job
9999                                     The Bookshop
Name: title, Length: 7479, dtype: object

In [273]: #Q3
vote_gt7 = ds.loc[ds['vote_average'] > 7, 'title'].head(15)
vote_gt7

Out[273]: 0                                The Pope's Exorcist
2                       The Super Mario Bros. Movie
3                                            Ghosted
5                          Avatar: The Way of Water
6                 Guardians of the Galaxy Volume 3
7                                        Scream VI
8                                        Creed III
9             Dungeons & Dragons: Honor Among Thieves
10             The Last Kingdom: Seven Kings Must Die
12                                  John Wick: Chapter 4
15                       Puss in Boots: The Last Wish
22    Justice League x RWBY: Super Heroes & Huntsmen...
24                     Black Panther: Wakanda Forever
25                                           Mummies
33                                         Black Adam
Name: title, dtype: object
```

4) The first 15 movies with vote less than 4

5) Is there a correlation between budget, popularity and vote average.

In [277]:
```
#Q4
vote_lt4 = ds.loc[ds['vote_average'] < 4, 'title'].head(15)
vote_lt4
```

Out[277]:
```
23                                 Fast X
75          Yuku et la fleur de l'Himalaya
101                    The Little Mermaid
128       Transformers: Rise of the Beasts
150            Ryoma! The Prince of Tennis
184                               The Flash
209     Shabash Feluda: Gangtokey Gondogol
217                                 Strays
287           Cocaine Bear: The True Story
339    Spider-Man: Across the Spider-Verse
408                               The Rape
471                     No Hard Feelings
610                         Snake Beauty
641     Soltera, casada, viuda, divorciada
766                                 Barbie
Name: title, dtype: object
```

In [281]:
```
#Q5
correlation = ds[['budget', 'popularity', 'vote_average']].corr()
correlation
```

Out[281]:

	budget	popularity	vote_average
budget	1.000000	0.143559	0.071361
popularity	0.143559	1.000000	0.041081
vote_average	0.071361	0.041081	1.000000

6) The biggest rating for a movie

7) What is the correlation between popularity and original language

```
In [282]: #Q6
average_popularity_by_language = ds.groupby('original_language')['popularity'].mean()
average_popularity_by_language
```

```
Out[282]: original_language
Arabic                43.169000
Basque                55.991333
Bengali               57.061500
Catalan               23.054000
Chinese               21.217533
Czech                 13.226000
Danish                19.516133
Dutch                 52.384250
Dzongkha              11.366000
English               32.870146
Estonian             197.218000
Finnish               94.556000
French                25.468060
Galician              48.490000
German                20.252476
Greek                 14.642750
Hebrew                15.617000
Hindi                 15.083750
Hungarian             14.230667
Icelandic             77.614500
Indonesian            24.875706
Irish                 12.405000
Italian               23.938014
Japanese              28.910547
Kannada               12.449000
Khmer                 10.081000
Korean                26.199825
Macedonian            62.567000
Malayalam             15.762667
Norwegian             34.792969
Norwegian Bokmal      16.935000
Panjabi               10.082000
Persian               27.867333
Polish                43.287036
Portuguese            18.492545
Romanian              54.136000
Russian               24.687174
Serbian               21.419000
Spanish               36.218121
Sundanese              9.660000
Swedish               24.620478
Tagalog               25.523043
Tamil                 28.539300
Telugu                27.553111
Thai                  28.855077
Turkish               34.906778
Ukrainian             79.999750
Vietnamese            21.236667
cn                    22.407372
sh                    13.323000
xx                     9.991500
Name: popularity, dtype: float64
```

```
In [288]: #Q7
max_value = ds['vote_average'].max()
max_film = ds.loc[ds['vote_average'].idxmax(), 'title']
max_film
```

```
Out[288]: 'Orgasm Lecture 2'
```

8) The biggest budget for a movie

9) The smallest budget for a movie

10) Number of English,Spanish and frensh movies

11) The most language movies were made in

12) number of films with production_companies

13) What is the lowest company produced films?

14) What is the name of the company that produced Evil Dead Rise?

15) The largest number in the rate count column

16) The lowest number in the rate count column

17) What is the vote for “Avatar”?

In [290]:
```
#Q8
max_value = ds['budget'].max()
max_film = ds.loc[ds['budget'].idxmax(), 'title']
max_film
```

Out[290]: 'Operation Red Sea'

In [291]:
```
#Q9
min_value = ds['budget'].min()
min_film = ds.loc[ds['budget'].idxmin(), 'title']
min_film
```

Out[291]: 'Down'

In [ ]:
```

```

In [292]:
```
#Q10
languages = ['English', 'Spanish', 'French']
num_movies = ds[ds['original_language'].isin(languages)].shape[0]
num_movies
```

Out[292]: 7869

In [294]:
```
#Q11
most_common_language = ds['original_language'].value_counts().idxmax()
most_common_language
```

Out[294]: 'English'

In [305]:
```
#Q12
num_movies = sum(ds['production_companies'] == 'Marvel Studios')
num_movies
```

Out[305]: 0

In [302]:
```
#Q13
less_common_company = ds['production_companies'].value_counts().idxmin()
less_common_company
```

Out[302]: "['Levins-Henenlotter', 'Shapiro-Glickenhaus Entertainment']"

In [306]:
```
#Q14
movie_title = "Evil Dead Rise"
production_companies = ds[ds['title'] == movie_title]['production_companies']
movie_title
```

Out[306]: 'Evil Dead Rise'

In [309]:
```
#Q15
max_vote_count = ds['vote_count'].max()
max_vote_count
```

Out[309]: 33633

In [310]:
```
#Q16

min_vote_count = ds['vote_count'].min()
min_vote_count
```

Out[310]: 0

In [312]:
```
#Q17
movie_title = "Avatar"
vote_count = ds[ds['title'] == movie_title]['vote_count'].values[0]
vote_count
```

Out[312]: 29040

18) Which movie won popularity = 1107.559

19) What is the original language of “just Retired 2”?

20) What is the number of action movies in the dataset

19) What is the original language of Just Retired 2?

20) What is the number of action movies in the dataset?

21) The number of films that received a zero rating

22) Which is the largest category of films with a high rating.

23) Number of films produced in recent years (eg in the last five years)

In [313]:
```
#Q18
popularity_value = 1107.559
movie_title = ds[ds['popularity'] == popularity_value]['title'].values[0]
movie_title
```

Out[313]: 'Evil Dead Rise'

In [315]:
```
#Q19
movie_title = "Just Retired 2"
original_language = ds[ds['title'] == movie_title]['original_language'].values[0]
original_language
```

Out[315]: 'French'

In [316]:
```
#Q20
num_action_movies = ds[ds['genres'].str.contains('action', case=False)].shape[0]
num_action_movies
```

Out[316]: 2687

In [318]:
```
#Q21
num_movies_with_zero_vote_count = ds[ds['vote_count'] == 0].shape[0]
num_movies_with_zero_vote_count
```

Out[318]: 229

In [319]:
```
#Q22
highest_voted_genre = ds.groupby('genres')['vote_average'].mean().idxmax()
highest_voted_genre
```

Out[319]: "['Fantasy', 'Drama', 'Crime']"

In [322]:
```
#Q23

from datetime import datetime

current_year = datetime.now().year
five_years_ago = current_year - 5

num_movies_last_five_years = ds[ds['release_date'].dt.year >= five_years_ago].shape[0]
num_movies_last_five_years
```

Out[322]: 3435

24) What are the names of all the production companies?

25) what is the sorting for IDs

In [326]:
```
#24

# استخراج أسماء شركات الإنتاج المميزة
production_companies = ds['production_companies'].unique()

# عرض أسماء شركات الإنتاج
for company in production_companies:
    print(company)
```

```
['Screen Gems', '2.0 Entertainment', 'Jesus & Mary', 'Worldwide Katz', 'Loyola Productions', 'FFILME.RO']
['Marvel Studios', 'Kevin Feige Productions']
['Universal Pictures', 'Illumination', 'Nintendo']
['Skydance Media', 'Apple Studios']
['New Line Cinema', 'The Safran Company', 'DC Films', 'Warner Bros. Pictures']
['20th Century Studios', 'Lightstorm Entertainment']
['Radio Silence', 'Project X Entertainment', 'Spyglass Media Group', 'Paramount']
['Metro-Goldwyn-Mayer', 'Proximity Media', 'Balboa Productions', 'Outlier Society Productions', 'Chartoff-Winkler Productio
ns']
['Entertainment One', 'Paramount', 'Allspark Pictures', 'Sierra/Affinity']
['Carnival Films']
['Walt Disney Pictures', 'Whitaker Entertainment']
['Thunder Road', '87Eleven', 'Summit Entertainment', 'Studio Babelsberg', 'Lionsgate']
['New Line Cinema', 'Ghost House Pictures', 'Renaissance Pictures', 'Pacific Renaissance Pictures', 'Wild Atlantic Picture
s']
['Universal Pictures', 'Brownstone Productions', 'Lord Miller Productions']
['DreamWorks Animation', 'Universal Pictures']
['Happy Madison Productions', 'Echo Films', 'Vinson Films', 'Endgame Entertainment']
['Inoxy Films', 'Nolita']
```

In [328]:
```
#Q25

# Sort the IDs in ascending order
sorted_data = ds.sort_values('id')

# Display the sorted IDs
sorted_ids = sorted_data['id'].tolist()
print(sorted_ids)
```

```
[5, 11, 12, 13, 14, 15, 16, 18, 19, 22, 24, 25, 27, 28, 33, 35, 38, 55, 58, 59, 62, 63, 64, 65, 66, 68, 69, 70, 71, 73, 74,
75, 76, 77, 78, 79, 80, 81, 82, 83, 85, 87, 88, 89, 90, 93, 95, 96, 97, 98, 101, 103, 104, 105, 106, 107, 108, 109, 110, 11
1, 114, 115, 116, 117, 118, 120, 121, 122, 123, 128, 129, 134, 136, 137, 138, 141, 142, 143, 144, 145, 146, 147, 149, 150,
152, 153, 154, 155, 157, 158, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 172, 173, 174, 175, 176, 178, 179, 180, 18
4, 185, 186, 187, 189, 192, 194, 196, 197, 199, 200, 201, 203, 205, 207, 213, 214, 215, 217, 218, 219, 221, 223, 226, 227,
229, 231, 233, 234, 235, 236, 238, 239, 240, 241, 242, 243, 244, 247, 251, 252, 253, 254, 257, 262, 268, 269, 272, 275, 27
7, 278, 279, 280, 284, 285, 287, 288, 289, 290, 293, 296, 297, 298, 301, 306, 310, 311, 314, 319, 320, 322, 326, 329, 332,
334, 335, 336, 338, 345, 346, 348, 350, 363, 364, 377, 378, 379, 380, 387, 388, 389, 391, 392, 393, 395, 396, 401, 402, 40
3, 404, 405, 406, 408, 409, 411, 414, 415, 421, 422, 423, 424, 425, 426, 429, 431, 433, 435, 437, 439, 440, 451, 452, 453,
454, 455, 458, 462, 468, 470, 475, 479, 482, 483, 488, 489, 490, 492, 496, 497, 500, 503, 504, 506, 508, 509, 510, 521, 52
4, 525, 526, 530, 531, 533, 534, 535, 539, 540, 542, 544, 547, 550, 551, 553, 557, 558, 559, 561, 562, 563, 564, 565, 567,
568, 571, 573, 576, 578, 579, 580, 581, 582, 583, 585, 586, 587, 588, 591, 593, 594, 595, 597, 598, 599, 600, 601, 602, 60
3, 604, 605, 606, 607, 608, 609, 612, 613, 615, 616, 617, 619, 620, 621, 622, 623, 624, 627, 628, 629, 630, 634, 635, 637,
638, 639, 640, 641, 642, 644, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 657, 658, 659, 660, 663, 664, 665, 667, 66
8, 670, 671, 672, 673, 674, 675, 676, 679, 680, 681, 682, 686, 687, 688, 691, 692, 693, 694, 698, 699, 700, 702, 703, 705,
707, 708, 709, 710, 711, 712, 713, 714, 744, 745, 746, 747, 752, 754, 755, 756, 759, 762, 763, 764, 765, 766, 767, 768, 76
9, 770, 772, 773, 775, 780, 782, 783, 786, 787, 788, 790, 791, 792, 793, 794, 795, 796, 797, 801, 802, 804, 805, 806, 807,
808, 809, 810, 812, 813, 814, 816, 817, 818, 819, 820, 821, 823, 824, 826, 829, 830, 832, 834, 837, 838, 839, 840, 841, 84
3, 844, 845, 846, 847, 849, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 869, 871, 872, 873,
```

26) What are the high budget low rate movies?

In [331]:
```
#Q26
high_budget_low_rate = ds.query('budget > 100000000 and vote_average < 5')
high_budget_low_rate
```

Out[331]:

	id	title	release_date	genres	original_language	vote_average	vote_count	popularity	budget	production_companies	vote_category
23	385687	Fast X	2023-05-17	['Action', 'Crime', 'Thriller']	English	0.0	0	732.647	340000000.0	['Universal Pictures', 'Original Film', 'One R...	bad
128	667538	Transformers: Rise of the Beasts	2023-06-07	['Action', 'Adventure', 'Science Fiction']	English	0.0	0	222.430	200000000.0	['Skydance Media', 'Paramount', 'di Bonaventur...	bad
184	298618	The Flash	2023-06-14	['Science Fiction', 'Action', 'Adventure']	English	0.0	0	123.659	220000000.0	['Warner Bros. Pictures', 'Double Dream', 'The...	bad
1142	10196	The Last Airbender	2010-06-30	['Action', 'Adventure', 'Fantasy']	English	4.7	3585	36.621	150000000.0	['Paramount', 'Nickelodeon Movies', 'Blinding ...	bad
1266	335977	Indiana Jones and the Dial of Destiny	2023-06-28	['Adventure', 'Action']	English	0.0	0	42.876	294700000.0	['Lucasfilm Ltd.', 'Walt Disney Pictures', 'Pa...	bad
1849	166424	Fantastic Four	2015-08-05	['Action', 'Adventure', 'Science Fiction']	English	4.4	5525	32.330	120000000.0	['Moving Picture Company', 'Marvel Entertainme...	bad
2408	575264	Mission: Impossible - Dead Reckoning Part One	2023-07-10	['Action', 'Adventure', 'Thriller']	English	0.0	0	30.128	290000000.0	['Paramount', 'Skydance Media', 'New Republic ...	bad
3476	565770	Blue Beetle	2023-08-16	['Action', 'Science Fiction']	English	0.0	0	22.946	120000000.0	['Warner Bros. Pictures', 'The Safran Company'...	bad
3483	415	Batman & Robin	1997-06-20	['Action', 'Science Fiction', 'Adventure', 'Co...	English	4.3	4485	24.492	125000000.0	['DC Comics', 'PolyGram Filmed Entertainment',...	bad
4798	1639	Speed 2: Cruise Control	1997-06-13	['Action', 'Adventure', 'Thriller']	English	4.6	1429	20.277	160000000.0	['Blue Tulip Productions', '20th Century Fox']	bad
4953	393209	Avatar 5	2028-12-20	['Action', 'Adventure', 'Science Fiction']	English	0.0	0	16.033	250000000.0	['Lightstorm Entertainment', '20th Century Stu...	bad
5586	787699	Wonka	2023-12-13	['Adventure', 'Comedy', 'Family']	English	0.0	0	14.106	125000000.0	['Warner Bros. Pictures', 'Heyday Films']	bad
5587	466420	Killers of the Flower Moon	2023-10-06	['Crime', 'Drama', 'Thriller']	English	0.0	0	14.445	200000000.0	['Appian Way', 'Imperative Entertainment', 'Si...	bad
5939	83533	Avatar 3	2024-12-18	['Action', 'Science Fiction', 'Adventure']	English	0.0	0	11.996	250000000.0	['Lightstorm Entertainment', '20th Century Stu...	bad

27) What are the high rate low budget movies?

28) What are the films that took a rating = 8 ?

In [332]:
```
#Q27
high_rate_low_budget = ds.query('vote_average > 8 and budget < 10000000')
high_rate_low_budget
```

Out[332]:

	id	title	release_date	genres	original_language	vote_average	vote_count	popularity	budget	production_companies	vote_category
56	820067	The Quintessential Quintuplets Movie	2022-05-20	['Animation', 'Comedy', 'Romance']	Japanese	8.6	235	287.143	370000.0	['DAX Production', 'Pony Canyon', 'Nichion', '...	good
164	637920	Miracle in Cell No. 7	2019-10-10	['Drama']	Turkish	8.3	4125	128.270	370000.0	['Lanistar Media', 'Motion Content Group', 'CJ...	good
192	372058	Your Name.	2016-08-26	['Romance', 'Animation', 'Drama']	Japanese	8.5	9777	139.896	370000.0	['CoMix Wave Films', 'TOHO', 'KADOKAWA', 'East...	good
207	851644	20th Century Girl	2022-10-06	['Romance', 'Drama']	Korean	8.4	448	138.051	119.0	['Yong Film']	good
237	400928	Gifted	2017-04-12	['Drama', 'Comedy']	English	8.1	4788	96.766	7000000.0	['Grade A Entertainment', 'Dayday Films', 'Fil...	good
...	...	...	...	...	...	...	...	...	...	...	...
9814	15804	A Brighter Summer Day	1991-07-27	['Crime', 'Drama', 'Romance']	Chinese	8.3	245	11.905	370000.0	['Yang & His Gang Filmmakers']	good
9817	823754	Bo Burnham: Inside	2021-07-22	['Comedy', 'Drama']	English	8.2	353	10.014	370000.0	[]	good
9847	612304	Divaldo: O Mensageiro da Paz	2019-09-12	['Drama']	Portuguese	8.3	59	16.640	370000.0	['20th Century Fox Brazil', 'CINE Cinematográf...	good
9861	654299	Out of the Clear Blue Sky	2019-12-24	['Comedy', 'Drama', 'Music']	Spanish	8.2	314	11.296	370000.0	['Esparza Caldera', 'La Victoria Films']	good
9883	532753	Dying to Survive	2018-07-06	['Drama', 'Comedy']	Chinese	8.1	117	10.290	370000.0	['Huanxi Media Group', 'Wanda Pictures', 'Alib...	good

208 rows × 11 columns

In [339]:
```
#Q28
movies_with_rating_8 = ds[ds['vote_average'] == 8]['title']
movies_with_rating_8
```

Out[339]:
```
22      Justice League x RWBY: Super Heroes & Huntsmen...
68                              Spider-Man: No Way Home
78          Demon Slayer: Kimetsu no Yaiba Sibling's Bond
103                                            Suzume
133           Swapping: A Divorce Trip Between Two Couples
                              ...
9207                                        La Strada
9283                                    Autumn Sonata
9380                          Date A Live: Mayuri Judgment
9437                Inazuma Eleven Go vs. Danball Senki W
9809                          La leyenda del Charro Negro
Name: title, Length: 113, dtype: object
```

29) The most recently released movie in the RELASE_DATA column

30) Oldest released movie in the RELASE_DATA column

In [340]:
```
#Q29
min_release_date = ds['release_date'].min()
movie_with_min_release_date = ds[ds['release_date'] == min_release_date]['title']
movie_with_min_release_date
```

Out[340]:
```
5527    A Trip to the Moon
Name: title, dtype: object
```

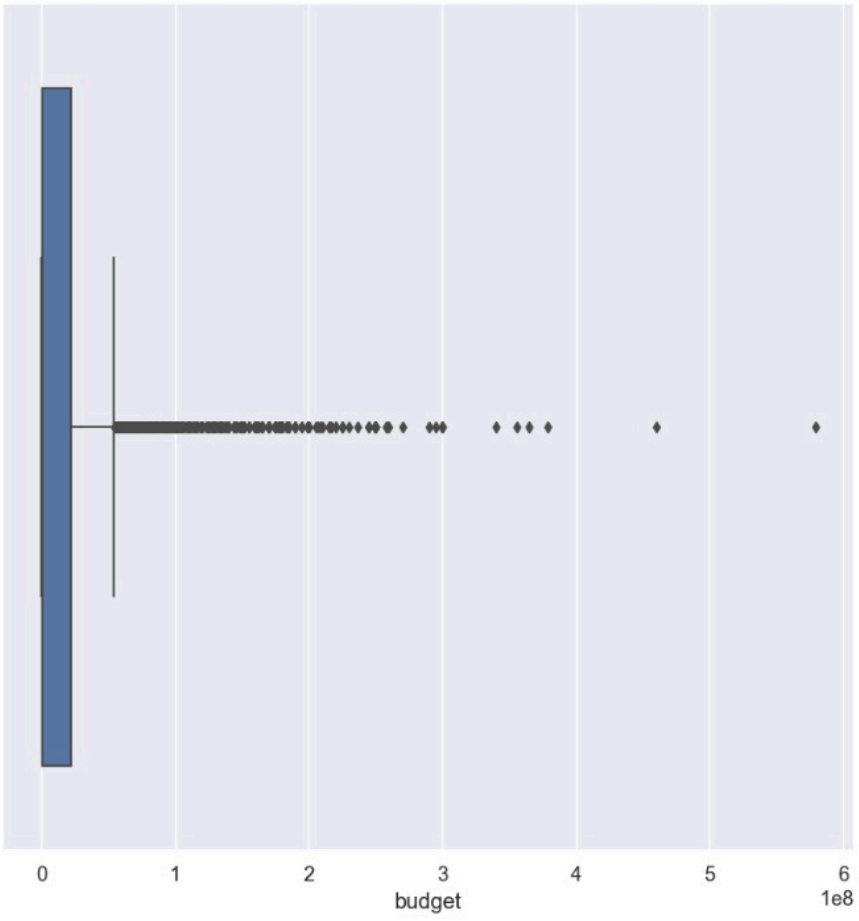
In [341]:
```
#Q30
max_release_date = ds['release_date'].max()
movie_with_max_release_date = ds[ds['release_date'] == max_release_date]['title']
movie_with_max_release_date
```

Out[341]:
```
4953    Avatar 5
Name: title, dtype: object
```

Visualization

1) Before handling the outlier

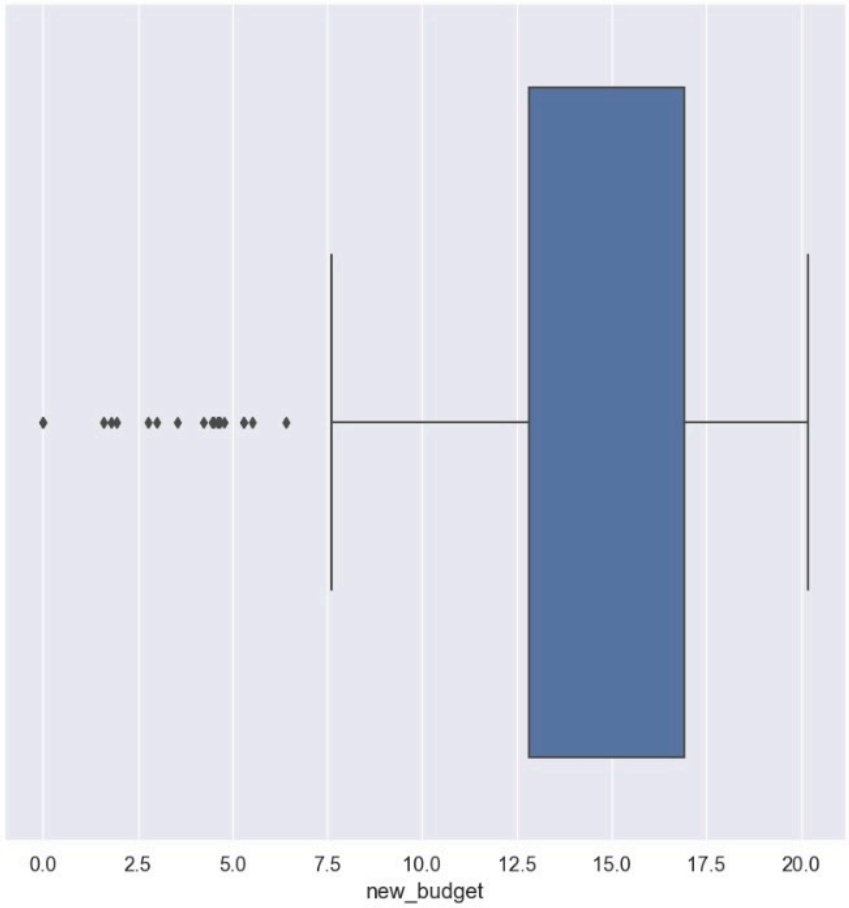
```
In [786]: import seaborn as sns
          sns.boxplot (x="budget", data=ds)

Out[786]: <Axes: xlabel='budget'>
```



2) After handling the outlier

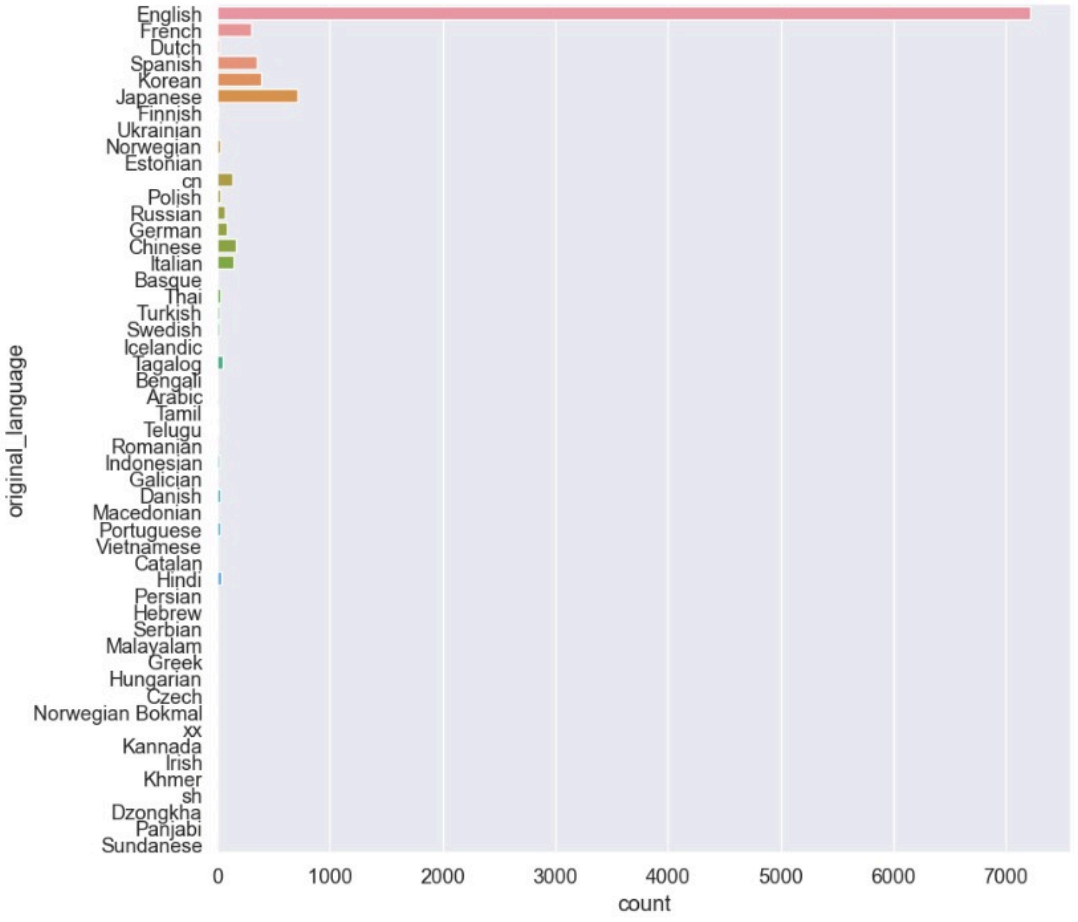
```
In [788]: import seaborn as sns
          sns.boxplot (x="new_budget", data=ds)
```

```
Out[788]: <Axes: xlabel='new_budget'>
```



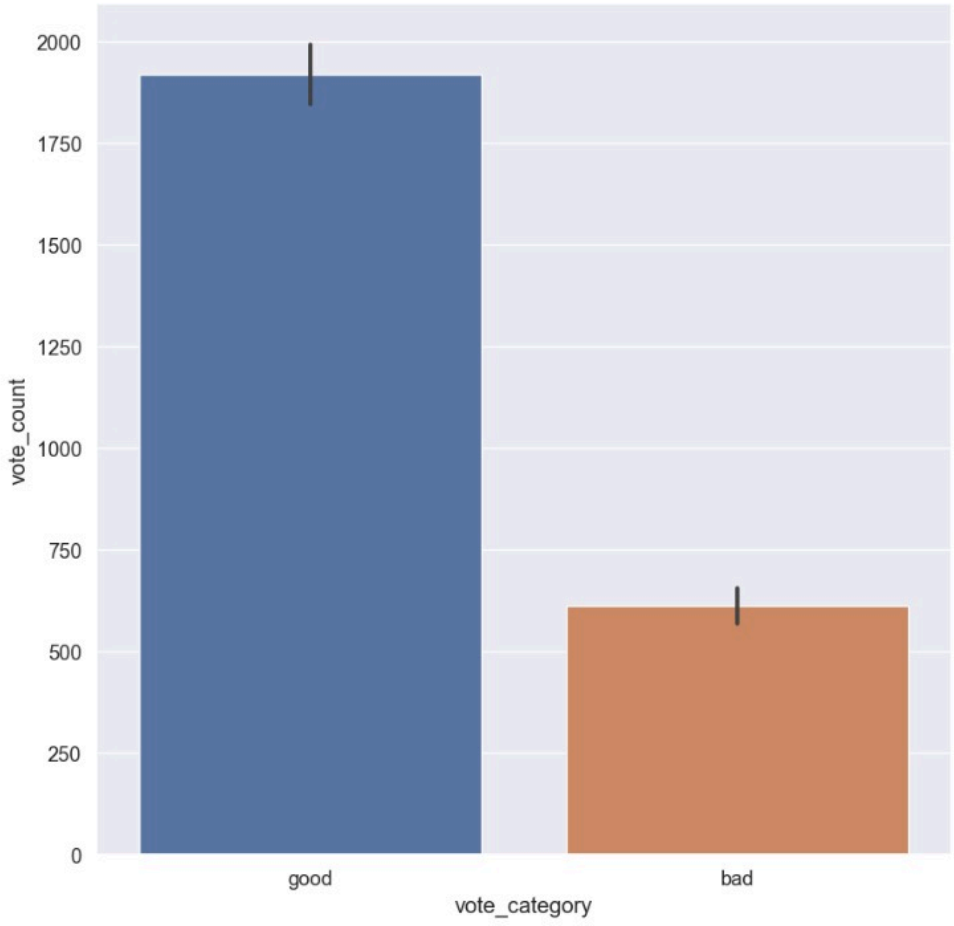
3)Show the most used language

```
In [797]: sns.set(rc={'figure.figsize':[10,10]},font_scale=1.2)

          sns.countplot(y='original_language',data=ds)

Out[797]: <Axes: xlabel='count', ylabel='original_language'>
```



4) Show relation between vote_category & vote_count

```
In [793]: sns.barplot(x='vote_category',y='vote_count',data=ds,estimator=np.mean)
Out[793]: <Axes: xlabel='vote_category', ylabel='vote_count'>
```

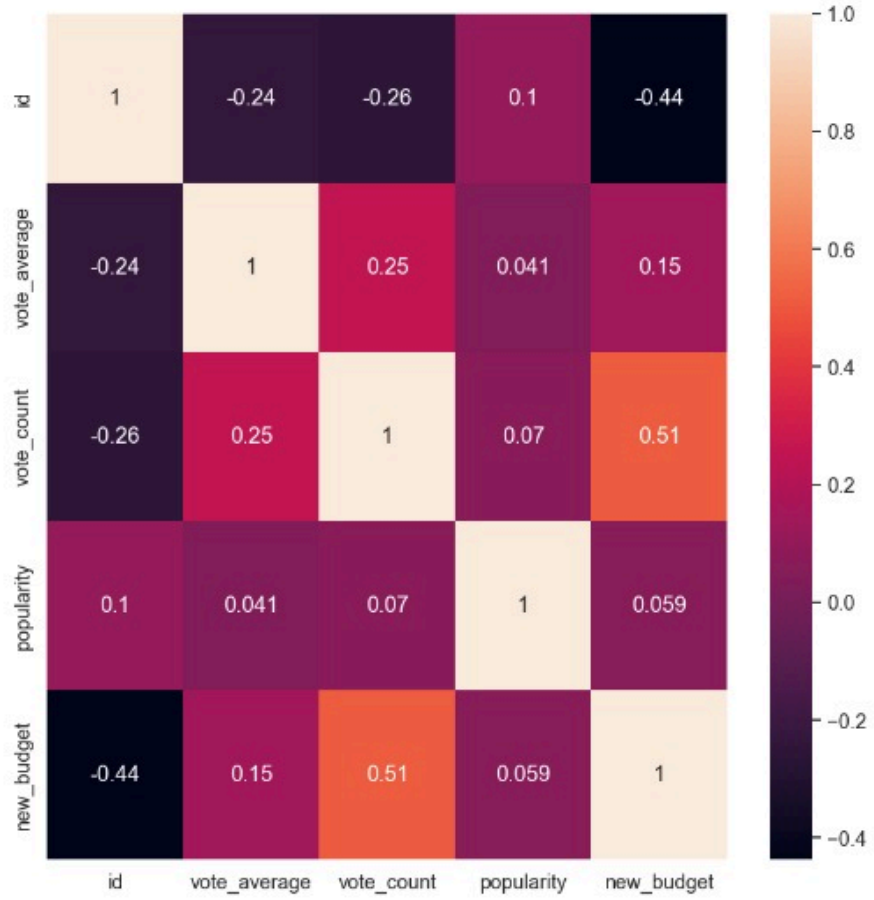


5) show the heatmap correlation

```
In [794]: sns.heatmap(ds.corr(),annot=True)
```

```
C:\Users\Public\Documents\Wondershare\CreatorTemp\ipykernel_18480\1221165314.py:1: FutureWarning: The default value of numeric_
only in DataFrame.corr is deprecated. In a future version, it will default to False. Select only valid columns or specify the v
alue of numeric_only to silence this warning.
  sns.heatmap(ds.corr(),annot=True)
```

```
Out[794]: <Axes: >
```

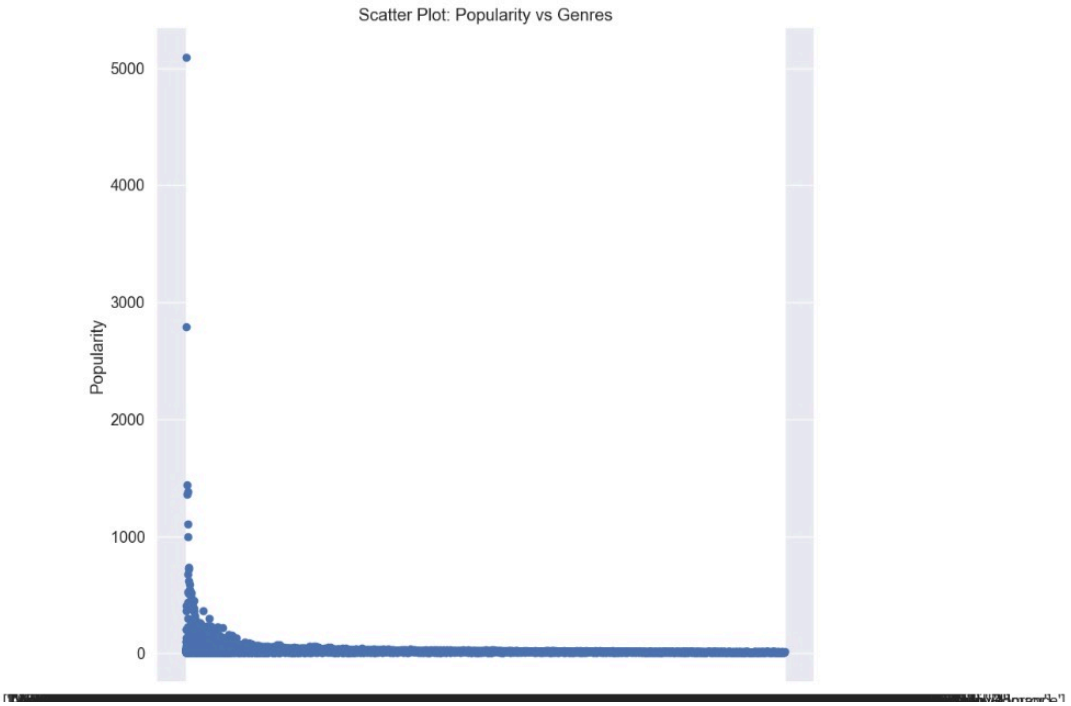



```
In [801]: ds['vote_category'].value_counts()
```

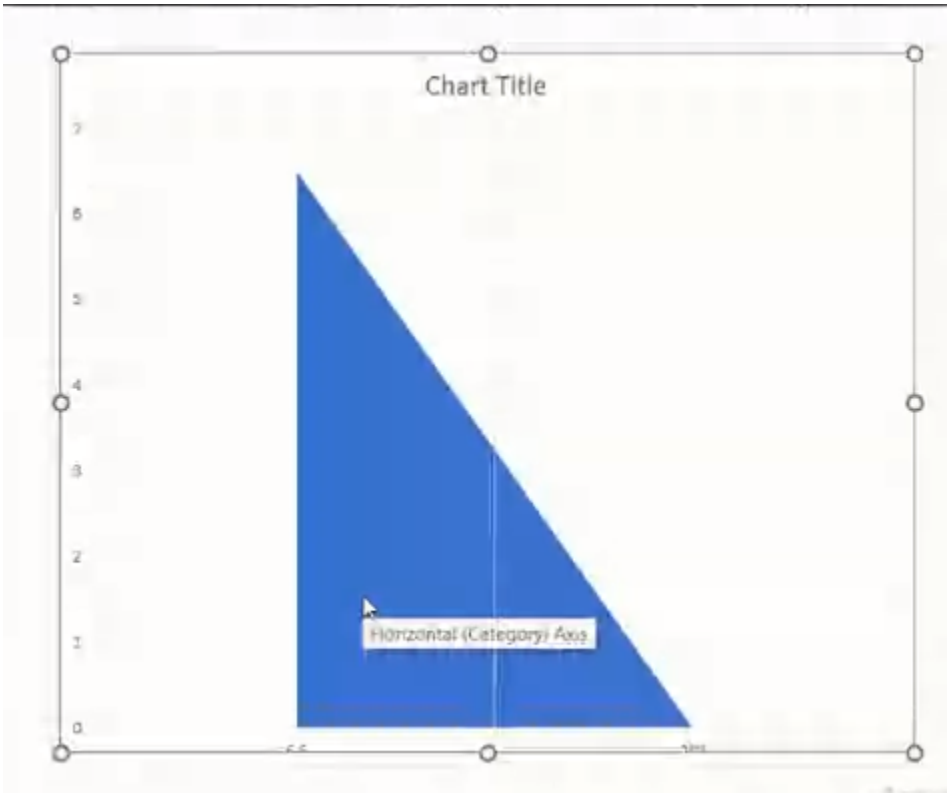
```
Out[801]: good    7010
          bad     2969
          Name: vote_category, dtype: int64
```

6) Show the scatter ploting between popularity & geners

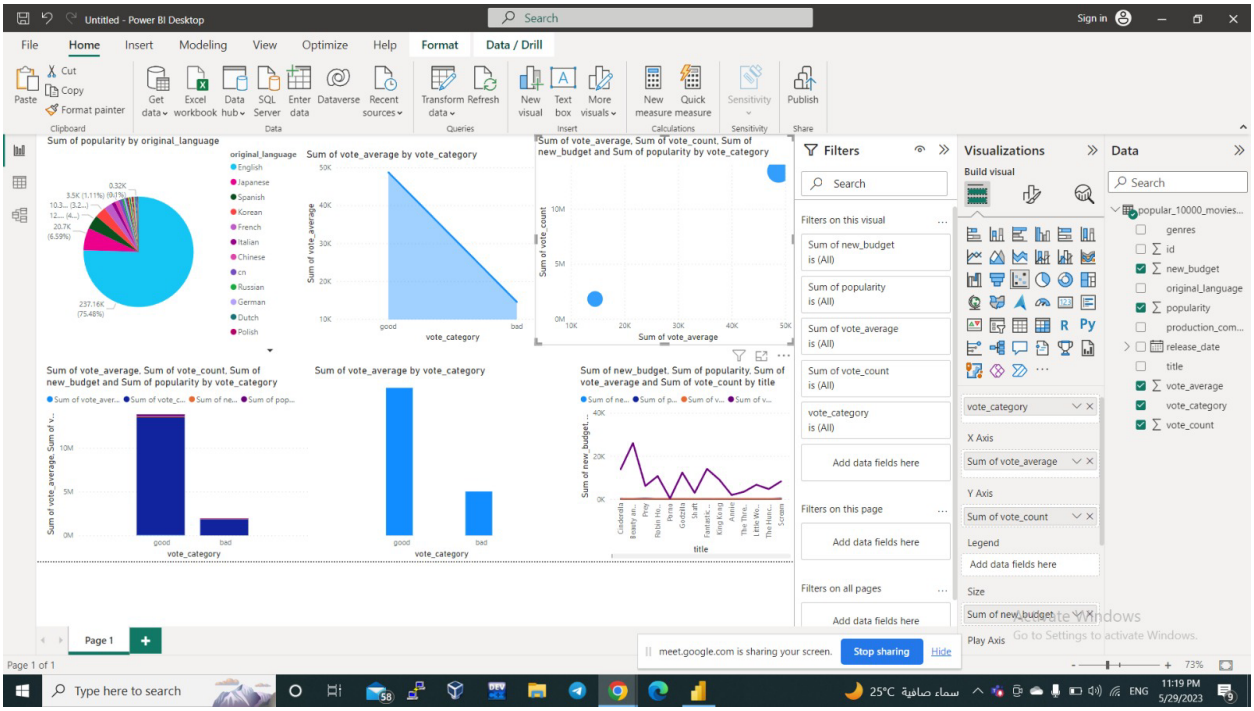
```
plt.scatter(df['genres'], df['popularity'])
plt.xlabel('Genres')
plt.ylabel('Popularity')
plt.title('Scatter Plot: Popularity vs Genres')
plt.show()
```



7) correlation between vote average & vote category



Power BI


Untitled - Power BI Desktop
Search
Sign in
File
Home
Insert
Modeling
View
Optimize
Help
Format
Data / Drill
Paste
Cut
Copy
Format painter
Clipboard
Get data
Excel workbook
Data hub
SQL Server
Enter data
Dataverse
Recent sources
Data
Transform data
Refresh
Queries
New visual
Text box
More visuals
Insert
New measure
Quick measure
Calculations
Sensitivity
Sensitivity
Publish
Share
Sum of popularity by original_language
original_language
English
Japanese
Spanish
Korean
French
Italian
Chinese
cn
Russian
German
Dutch
Polish
Sum of vote_average by vote_category
Sum of vote_average
vote_category
good
bad
Sum of vote_average, Sum of vote_count, Sum of new_budget and Sum of popularity by vote_category
Sum of vote_count
Sum of vote_average
Sum of vote_average, Sum of vote_count, Sum of new_budget and Sum of popularity by vote_category
Sum of vote_average by vote_category
Sum of new_budget, Sum of popularity, Sum of vote_average and Sum of vote_count by title
Sum of new_budget
title
Filters
Search
Filters on this visual
Sum of new_budget is (All)
Sum of popularity is (All)
Sum of vote_average is (All)
Sum of vote_count is (All)
vote_category is (All)
Add data fields here
Filters on this page
Add data fields here
Filters on all pages
Add data fields here
Visualizations
Build visual
vote_category
X Axis
Sum of vote_average
Y Axis
Sum of vote_count
Legend
Add data fields here
Size
Sum of new_budget
Play Axis
Data
Search
popular_10000_movies...
genres
id
new_budget
original_language
popularity
production_com...
release_date
title
vote_average
vote_category
vote_count
Page 1
Page 1 of 1
meet.google.com is sharing your screen.
Stop sharing
Hide
73%
Type here to search
25°C
ENG
11:19 PM
5/29/2023

Machine Learning

In [1]:
```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score
from sklearn.preprocessing import LabelEncoder

ds = pd.read_csv("popular_10000_movies_tmdb.csv")


# Step 1: Prepare the Data

# Extract the feature (X) and target variable (y)
X = ds["vote_average"]
y = ds["vote_category"]

# Step 2: Split the Data into Training and Test Sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=42)

# Step 3: Encode the Target Variable
label_encoder = LabelEncoder()
y_train_encoded = label_encoder.fit_transform(y_train)
y_test_encoded = label_encoder.transform(y_test)

# Reshape the input data from 1D to 2D
X_train = X_train.values.reshape(-1, 1)
X_test = X_test.values.reshape(-1, 1)

# Step 4: Initialize the Classifier
classifier = LogisticRegression()

# Step 5: Train the Model
classifier.fit(X_train, y_train_encoded)

# Step 6: Predict and Evaluate
y_pred = classifier.predict(X_test)

# Step 7: Calculate Accuracy
accuracy = accuracy_score(y_test_encoded, y_pred)
print("Accuracy:", accuracy)
```

```
Accuracy: 1.0
```