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Project 2:Investigate a Dataset (TMDb Movie Data)

In this project we are going to do general data analysis of data provided to us with the help of python libraries like numpy,pandas and matplotlib.

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1.Introduction

About Dataset:

In this project I have chosen TMDb movie data set for data analysis process. It has the details of around 10000 movies. I will analyse this data set on the basis of few questions.

Questions:

1. Find the movie name which has highest runtime?
2. How many movies have runtime less than 2hrs.(120 min) and greater than 2hrs ?
3. Year of highest and lowest number of movie release?
4. Get 5 directors with highest directed movies?
5. What is maximum and minimum vote average?
6. Name the movies with maximum and minimum vote average?
7. Movies having vote average less than or equal to 5 and greater than 5?
8. What is the vote average of most popular movie?
9. Find the revenue of highest budget movie?
10. Revenue of Most Popular movie?

In [1]:
```
#first of all import the required libraries before going on the next ph
ase of data analysis.
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
import numpy as np
```

2.Data Wrangling

In this section i will load in the data, check for cleanliness, and then trim and clean dataset for analysis.

General Properties

In [2]:
```
#loading data(CSV file) using pandas library
df_tmdb=pd.read_csv("tmdb-movies.csv")
```

In [3]:
```
#the sumerized information about dataset
df_tmdb.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10866 entries, 0 to 10865
Data columns (total 21 columns):
id                      10866 non-null int64
imdb_id                 10856 non-null object
popularity              10866 non-null float64
budget                  10866 non-null int64
revenue                 10866 non-null int64
original_title          10866 non-null object
cast                    10790 non-null object
homepage                2936 non-null object
director                10822 non-null object
tagline                 8042 non-null object
keywords                9373 non-null object
overview                10862 non-null object
runtime                 10866 non-null int64
genres                  10843 non-null object
production_companies    9836 non-null object
release_date            10866 non-null object
vote_count              10866 non-null int64
vote_average            10866 non-null float64
release_year            10866 non-null int64
budget_adj              10866 non-null float64
revenue_adj             10866 non-null float64
dtypes: float64(4), int64(6), object(11)
memory usage: 1.7+ MB
```

In [4]:
```
#First 3 rows of the dataset to take a glimpse of dataset.
df_tmdb.head(3)
```

Out[4]:

	id	imdb_id	popularity	budget	revenue	original_title	cast

	id	imdb_id	popularity	budget	revenue	original_title	cast	
0	135397	tt0369610	32.985763	150000000	1513528810	Jurassic World	Chris Pratt|Bryce Dallas Howard|Irrfan Khan|Vi...	
1	76341	tt1392190	28.419936	150000000	378436354	Mad Max: Fury Road	Tom Hardy|Charlize Theron|Hugh Keays-Byrne|Nic...	
2	262500	tt2908446	13.112507	110000000	295238201	Insurgent	Shailene Woodley|Theo James|Kate Winslet|Ansel...	http://www.t

3 rows × 21 columns

In [5]:

```
#last 3 rows of the dataset
df_tmdb.tail(3)
```

Out[5]:

	id	imdb_id	popularity	budget	revenue	original_title	cast	homepage
10863	39768	tt0060161	0.065141	0	0	Beregis Avtomobilya	Innokentiy Smoktunovskiy|Oleg Efremov|Georgi Z...	NaN
10864	21449	tt0061177	0.064317	0	0	What's Up, Tiger Lily?	Tatsuya Mihashi|Akiko Wakabayashi|Mie Hama|Joh...	NaN

	id	imdb_id	popularity	budget	revenue	original_title	cast	homepage
10865	22293	tt0060666	0.035919	19000	0	Manos: The Hands of Fate	Harold P. Warren|Tom Neyman|John Reynolds|Dian...	NaN

3 rows × 21 columns

In [6]:
```
#there are too many columns and some are hidden
#let's dig out each column.
df_tmdb.columns
```

Out[6]:
```
Index(['id', 'imdb_id', 'popularity', 'budget', 'revenue', 'original_ti
tle',
       'cast', 'homepage', 'director', 'tagline', 'keywords', 'overvie
w',
       'runtime', 'genres', 'production_companies', 'release_date',
       'vote_count', 'vote_average', 'release_year', 'budget_adj',
       'revenue_adj'],
      dtype='object')
```

In [7]:
```
#the statistical summary of the data
df_tmdb.describe()
```

Out[7]:

	id	popularity	budget	revenue	runtime	vote_count	vo
count	10866.000000	10866.000000	1.086600e+04	1.086600e+04	10866.000000	10866.000000	10
mean	66064.177434	0.646441	1.462570e+07	3.982332e+07	102.070863	217.389748	
std	92130.136561	1.000185	3.091321e+07	1.170035e+08	31.381405	575.619058	
min	5.000000	0.000065	0.000000e+00	0.000000e+00	0.000000	10.000000	
25%	10596.250000	0.207583	0.000000e+00	0.000000e+00	90.000000	17.000000	
50%	20669.000000	0.383856	0.000000e+00	0.000000e+00	99.000000	38.000000	

	id	popularity	budget	revenue	runtime	vote_count	vo
75%	75610.000000	0.713817	1.500000e+07	2.400000e+07	111.000000	145.750000	
max	417859.000000	32.985763	4.250000e+08	2.781506e+09	900.000000	9767.000000	

Data Cleaning(Removing Unwanted Data)

First we will look at the missing values in the data set

In [8]:
```
#to get the missing values in the columns.
df_tmdb.isna().sum()
```

Out[8]:
```
id                         0
imdb_id                   10
popularity                 0
budget                     0
revenue                    0
original_title             0
cast                      76
homepage                7930
director                  44
tagline                 2824
keywords                1493
overview                   4
runtime                    0
genres                    23
production_companies    1030
release_date               0
vote_count                 0
vote_average               0
release_year               0
budget_adj                 0
revenue_adj                0
dtype: int64
```

we can see that 'homepage ','tagline','overview','production_companies' has very large number of missing values.

Steps To Delete Or Modify The dataset

1.Remove the unused columns and rows(if necessary) with missing values.

2.Remove duplicate rows from the dataset.

3.Change format if necessary.

4.Treatment of outliers

1.Remove the unused columns with missing values.

Since few columns which are not usable in the data analysis process.columns are: imdb_id, keywords, homepage,tagline,overview and budget_adj,revenue_adj has huge number of 0 values so we can drop it. So these are the columns that are not involved in the analysis process.

In [9]:
```
#removing the unused columns using drop() function.
df_tmdb.drop(['overview','imdb_id','homepage','tagline','budget_adj','revenue_adj','keywords','production_companies'],axis =1,inplace = True)
```

In [10]:
```
#check rows and columns again
#we are left with 13 columns now.
df_tmdb.shape
```

Out[10]:
```
(10866, 13)
```

In [11]:
```
df_tmdb.head()
```

Out[11]:

	id	popularity	budget	revenue	original_title	cast	director	runtime

	id	popularity	budget	revenue	original_title	cast	director	runtime
0	135397	32.985763	150000000	1513528810	Jurassic World	Chris Pratt|Bryce Dallas Howard|Irrfan Khan|Vi...	Colin Trevorrow	124
1	76341	28.419936	150000000	378436354	Mad Max: Fury Road	Tom Hardy|Charlize Theron|Hugh Keays-Byrne|Nic...	George Miller	120
2	262500	13.112507	110000000	295238201	Insurgent	Shailene Woodley|Theo James|Kate Winslet|Ansel...	Robert Schwentke	119
3	140607	11.173104	200000000	2068178225	Star Wars: The Force Awakens	Harrison Ford|Mark Hamill|Carrie Fisher|Adam D...	J.J. Abrams	136
4	168259	9.335014	190000000	1506249360	Furious 7	Vin Diesel|Paul Walker|Jason Statham|Michelle ...	James Wan	137

2. Remove duplicate rows from dataset

In [12]:
```
#duplicated() function return the duplicate row as True and False
#To count the duplicate elements we use sum() function.
sum(df_tmdb.duplicated())
```

Out[12]: 1

In [13]:
```
# using drop_duplicates() function we can remove duplicate rows.
df_tmdb.drop_duplicates(inplace = True)
```

3. Change format if necessary

Due to the string fromat of 'release_date' column. we will have to change the format.

In [14]:
```
#changing the format or datatype of column.
df_tmdb['release_date'] = pd.to_datetime(df_tmdb['release_date'])
```

In [15]:
```
#head to verify the apllied funcution.
df_tmdb['release_date'].head(2)
```

Out[15]:
```
0   2015-06-09
1   2015-05-13
Name: release_date, dtype: datetime64[ns]
```

4.Getting rid of missing values in rows

since cast, director,genre are important columns and have missing values we should remove the coresponding rows

In [16]:
```
#use dropna function to remove the missing vlaues
df_tmdb=df_tmdb.dropna()
```

In [17]:
```
#again recheck the missing values to varify.
df_tmdb.isna().sum()
```

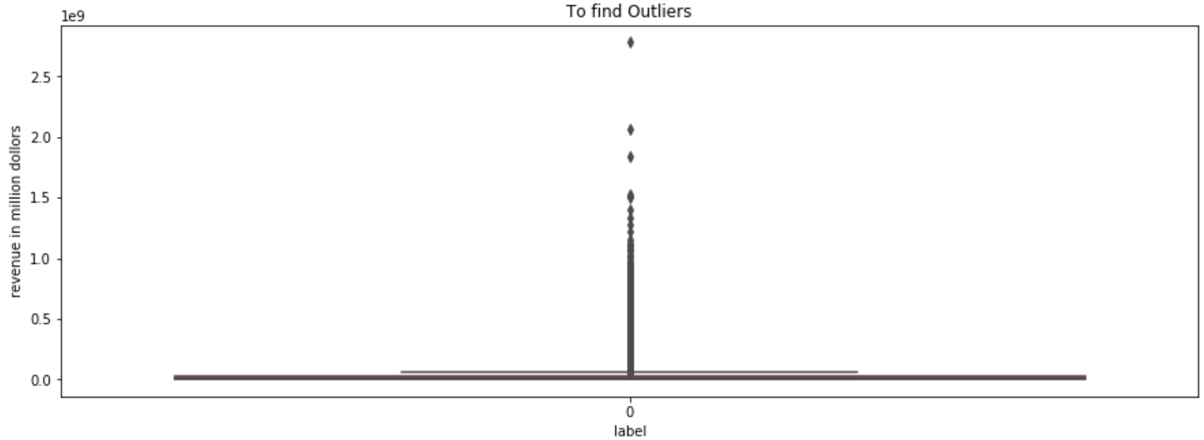
Out[17]:
```
id                0
popularity        0
budget            0
revenue           0
original_title    0
cast              0
director          0
runtime           0
genres            0
release_date      0
vote_count        0
vote_average      0
```

```
release_year      0
dtype: int64
```

4.Treatment of Outliers

Since the columns 'revenue','runtime' and 'budget' has outliers we need to treat them with mean, median, mode or if necessary delete the data

In [18]:
```
#plotting boxplot for revenue to see the frequency of outliers
plt.figure(figsize=(15,5))
sns.boxplot(
    data=df_tmdb['revenue'],
    color='red')
plt.ylabel('revenue in million dollors')
plt.xlabel('label')
plt.title('To find Outliers')
plt.show()
```



with boxplot we can analyse that there is significant number of outliers and droping all of them will reduce our scope of analysis. therfore we will try to sort this problem with statistical models

In [19]:
```
#calculating outlier i.e 0 in revenue column
```

```
df_tmdb[df_tmdb['revenue']==0].count()['id']
```

Out[19]: 5888

In [20]:
```
#replace function is used to make 0 to NAN value and further dealing wi
th nan values will be easy
df_tmdb=df_tmdb.replace(0,np.NaN)
```

In [21]:
```
#fill all the value of nan with mean()
df_tmdb.fillna(df_tmdb.mean())
```

Out[21]:

	id	popularity	budget	revenue	original_title	cast	
0	135397	32.985763	1.500000e+08	1.513529e+09	Jurassic World	Chris Pratt|Bryce Dallas Howard|Irrfan Khan|Vi...	Colin
1	76341	28.419936	1.500000e+08	3.784364e+08	Mad Max: Fury Road	Tom Hardy|Charlize Theron|Hugh Keays-Byrne|Nic...	Ge
2	262500	13.112507	1.100000e+08	2.952382e+08	Insurgent	Shailene Woodley|Theo James|Kate Winslet|Ansel...	
3	140607	11.173104	2.000000e+08	2.068178e+09	Star Wars: The Force Awakens	Harrison Ford|Mark Hamill|Carrie Fisher|Adam D...	J
4	168259	9.335014	1.900000e+08	1.506249e+09	Furious 7	Vin Diesel|Paul Walker|Jason Statham|Michelle ...	J
5	281957	9.110700	1.350000e+08	5.329505e+08	The Revenant	Leonardo DiCaprio|Tom Hardy|Will Poulter|Domhn...	
6	87101	8.654359	1.550000e+08	4.406035e+08	Terminator Genisys	Arnold Schwarzenegger|Jason Clarke|Emilia Clar...	

	id	popularity	budget	revenue	original_title	cast	
7	286217	7.667400	1.080000e+08	5.953803e+08	The Martian	Matt Damon|Jessica Chastain|Kristen Wiig|Jeff ...	F
8	211672	7.404165	7.400000e+07	1.156731e+09	Minions	Sandra Bullock|Jon Hamm|Michael Keaton|Allison...	B
9	150540	6.326804	1.750000e+08	8.537086e+08	Inside Out	Amy Poehler|Phyllis Smith|Richard Kind|Bill Ha...	F
10	206647	6.200282	2.450000e+08	8.806746e+08	Spectre	Daniel Craig|Christoph Waltz|LÃ©a Seydoux|Ralp...	Sa
11	76757	6.189369	1.760000e+08	1.839877e+08	Jupiter Ascending	Mila Kunis|Channing Tatum|Sean Bean|Eddie Redm...	Wach
12	264660	6.118847	1.500000e+07	3.686941e+07	Ex Machina	Domhnall Gleeson|Alicia Vikander|Oscar Isaac|S...	Al
13	257344	5.984995	8.800000e+07	2.436371e+08	Pixels	Adam Sandler|Michelle Monaghan|Peter Dinklage|...	
14	99861	5.944927	2.800000e+08	1.405036e+09	Avengers: Age of Ultron	Robert Downey Jr.|Chris Hemsworth|Mark Ruffalo...	Jos
15	273248	5.898400	4.400000e+07	1.557601e+08	The Hateful Eight	Samuel L. Jackson|Kurt Russell|Jennifer Jason ...	
16	260346	5.749758	4.800000e+07	3.257714e+08	Taken 3	Liam Neeson|Forest Whitaker|Maggie Grace|Famke...	Olivie
17	102899	5.573184	1.300000e+08	5.186022e+08	Ant-Man	Paul Rudd|Michael Douglas|Evangeline Lilly|Cor...	Pe

	id	popularity	budget	revenue	original_title	cast	
18	150689	5.556818	9.500000e+07	5.423514e+08	Cinderella	Lily James|Cate Blanchett|Richard Madden|Helen...	
19	131634	5.476958	1.600000e+08	6.505234e+08	The Hunger Games: Mockingjay - Part 2	Jennifer Lawrence|Josh Hutcherson|Liam Hemswor...	
20	158852	5.462138	1.900000e+08	2.090357e+08	Tomorrowland	Britt Robertson|George Clooney|Raffey Cassidy|...	
21	307081	5.337064	3.000000e+07	9.170983e+07	Southpaw	Jake Gyllenhaal|Rachel McAdams|Forest Whitaker...	Ant
22	254128	4.907832	1.100000e+08	4.704908e+08	San Andreas	Dwayne Johnson|Alexandra Daddario|Carla Gugino...	B
23	216015	4.710402	4.000000e+07	5.696515e+08	Fifty Shades of Grey	Dakota Johnson|Jamie Dornan|Jennifer Ehle|Eloi...	S
24	318846	4.648046	2.800000e+07	1.333465e+08	The Big Short	Christian Bale|Steve Carell|Ryan Gosling|Brad ...	Ad
25	177677	4.566713	1.500000e+08	6.823301e+08	Mission: Impossible - Rogue Nation	Tom Cruise|Jeremy Renner|Simon Pegg|Rebecca Fe...	(
26	214756	4.564549	6.800000e+07	2.158636e+08	Ted 2	Mark Wahlberg|Seth MacFarlane|Amanda Seyfried|...	M
27	207703	4.503789	8.100000e+07	4.038021e+08	Kingsman: The Secret Service	Taron Egerton|Colin Firth|Samuel L. Jackson|Mi...	
28	314365	4.062293	2.000000e+07	8.834647e+07	Spotlight	Mark Ruffalo|Michael Keaton|Rachel McAdams|Lie...	Tom

	id	popularity	budget	revenue	original_title	cast	
29	294254	3.968891	6.100000e+07	3.112569e+08	Maze Runner: The Scorch Trials	Dylan O'Brien|Kaya Scodelario|Thomas Brodie-Sa...	
...	...	...	...	...	...	...	
10836	38720	0.239435	3.082824e+07	8.933981e+07	Walk Don't Run	Cary Grant|Samantha Eggar|Jim Hutton|John Stan...	Charl
10837	19728	0.291704	3.082824e+07	8.933981e+07	The Blue Max	George Peppard|James Mason|Ursula Andress|Jere...	John
10838	22383	0.151845	3.082824e+07	8.933981e+07	The Professionals	Burt Lancaster|Lee Marvin|Robert Ryan|Woody St...	Rich
10839	13353	0.276133	3.082824e+07	8.933981e+07	It's the Great Pumpkin, Charlie Brown	Christopher Shea|Sally Dryer|Kathy Steinberg|A...	Bil
10840	34388	0.102530	3.082824e+07	8.933981e+07	Funeral in Berlin	Michael Caine|Paul Hubschmid|Oskar Homolka|Eva...	Gu
10841	42701	0.264925	7.500000e+04	8.933981e+07	The Shooting	Will Hutchins|Millie Perkins|Jack Nicholson|Wa...	Mon
10842	36540	0.253437	3.082824e+07	8.933981e+07	Winnie the Pooh and the Honey Tree	Sterling Holloway|Junius Matthews|Sebastian Ca...	F
10843	29710	0.252399	3.082824e+07	8.933981e+07	Khartoum	Charlton Heston|Laurence Olivier|Richard Johns...	De
10844	23728	0.236098	3.082824e+07	8.933981e+07	Our Man Flint	James Coburn|Lee J. Cobb|Gila Golan|Edward Mul...	D.
10845	5065	0.230873	3.082824e+07	8.933981e+07	Carry On Cowboy	Sid James|Jim Dale|Angela Douglas|Kenneth Will...	Gera

	id	popularity	budget	revenue	original_title	cast	
10846	17102	0.212716	3.082824e+07	8.933981e+07	Dracula: Prince of Darkness	Christopher Lee|Barbara Shelley|Andrew Keir|Fr...	Tere
10847	28763	0.034555	3.082824e+07	8.933981e+07	Island of Terror	Peter Cushing|Edward Judd|Carole Gray|Eddie By...	Tere
10848	2161	0.207257	5.115000e+06	1.200000e+07	Fantastic Voyage	Stephen Boyd|Raquel Welch|Edmond O'Brien|Donal...	
10849	28270	0.206537	3.082824e+07	8.933981e+07	Gambit	Michael Caine|Shirley MacLaine|Herbert Lom|Joh...	Ron
10850	26268	0.202473	3.082824e+07	8.933981e+07	Harper	Paul Newman|Lauren Bacall|Julie Harris|Arthur ...	Ja
10851	15347	0.342791	3.082824e+07	8.933981e+07	Born Free	Virginia McKenna|Bill Travers|Geoffrey Keen|Pe...	
10852	37301	0.227220	3.082824e+07	8.933981e+07	A Big Hand for the Little Lady	Henry Fonda|Joanne Woodward|Jason Robards|Paul...	Fi
10853	15598	0.163592	3.082824e+07	8.933981e+07	Alfie	Michael Caine|Shelley Winters|Millicent Martin...	Le
10854	31602	0.146402	3.082824e+07	8.933981e+07	The Chase	Marlon Brando|Jane Fonda|Robert Redford|E.G. M...	A
10855	13343	0.141026	7.000000e+05	8.933981e+07	The Ghost & Mr. Chicken	Don Knotts|Joan Staley|Liam Redmond|Dick Sarge...	A
10856	20277	0.140934	3.082824e+07	8.933981e+07	The Ugly Dachshund	Dean Jones|Suzanne Pleshette|Charles Ruggles|K...	Nor

	id	popularity	budget	revenue	original_title	cast	
10857	5921	0.131378	3.082824e+07	8.933981e+07	Nevada Smith	Steve McQueen|Karl Malden|Brian Keith|Arthur K...	
10858	31918	0.317824	3.082824e+07	8.933981e+07	The Russians Are Coming, The Russians Are Coming	Carl Reiner|Eva Marie Saint|Alan Arkin|Brian K...	
10859	20620	0.089072	3.082824e+07	8.933981e+07	Seconds	Rock Hudson|Salome Jens|John Randolph|Will Gee...	Fran
10860	5060	0.087034	3.082824e+07	8.933981e+07	Carry On Screaming!	Kenneth Williams|Jim Dale|Harry H. Corbett|Joa...	Gera
10861	21	0.080598	3.082824e+07	8.933981e+07	The Endless Summer	Michael Hynson|Robert August|Lord 'Tally Ho' B...	Br
10862	20379	0.065543	3.082824e+07	8.933981e+07	Grand Prix	James Garner|Eva Marie Saint|Yves Montand|Tosh...	Fran
10863	39768	0.065141	3.082824e+07	8.933981e+07	Beregis Avtomobilya	Innokentiy Smoktunovskiy|Oleg Efremov|Georgi Z...	Eldar
10864	21449	0.064317	3.082824e+07	8.933981e+07	What's Up, Tiger Lily?	Tatsuya Mihashi|Akiko Wakabayashi|Mie Hama|Joh...	W
10865	22293	0.035919	1.900000e+04	8.933981e+07	Manos: The Hands of Fate	Harold P. Warren|Tom Neyman|John Reynolds|Dian...	

10731 rows × 13 columns

So we are done with all the introduction and data wrangling process the next step is Exploratory Data Analysis(EDA).In this section we will try to analyse our clean data with few questions.

3.Exploratory Data Analysis

Research Question 1:Find the movie name which has highest runtime?

In [58]:
```
#using function to DRY:Do not repeat
def max_function(column_name):
    return df_tmdb[column_name].max()
```

In [59]:
```
#using function for 'runtime'
max_function('runtime')
```

Out[59]:
```
900.0
```

In [23]:
```
#now find out the movie name  coresposnding to maximum runtime value
df_tmdb[df_tmdb['runtime']==max_runtime]['original_title']
```

Out[23]:
```
3894    The Story of Film: An Odyssey
Name: original_title, dtype: object
```

Research Question 2: How many movies have runtime less than 2hrs.(120 min) and greater than 2hrs ?

In [84]:
```
#greater_function is used to calculate greater values while comparing w
ith other data
def greater_function(column_name,value):
    return df_tmdb[df_tmdb[column_name]>value].count()['id']
```

In [85]:
```
#apply on rruntime column
greater_function('runtime',120)
```

Out[85]:
```
1569
```

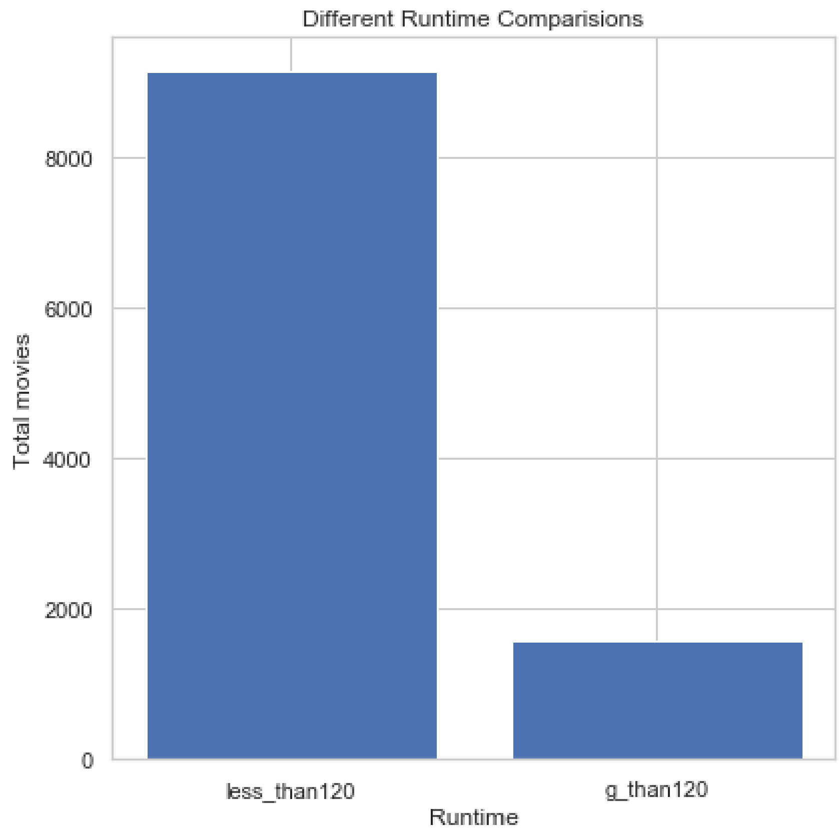
In [86]:
```
#lessfunction is used to calculate lesser or equal to given values whil
```

```
e comparing with other data
def less_function(column_name,value):
    return df_tmdb[df_tmdb[column_name]<=value].count()['id']
```

In [87]:
```
#applied on runtime column
less_function('runtime',120)
```

Out[87]: 9134

In [88]:
```
#visualizing and comparing the length of the movie using bar graph
fig = plt.figure()
ax = fig.add_axes([0,0,0.5,1])
length = ['less_than120', 'g_than120']
counts = [less_function('runtime',120),greater_function('runtime',120)]
ax.bar(length,counts)
plt.title('Different Runtime Comparisions')
plt.xlabel('Runtime')
plt.ylabel('Total movies')
plt.show()
```



we can observe that the movies having less than or equal to 120 min is the standard movie runtime

Research Question 3: Year of highest and lowest number of movie release?

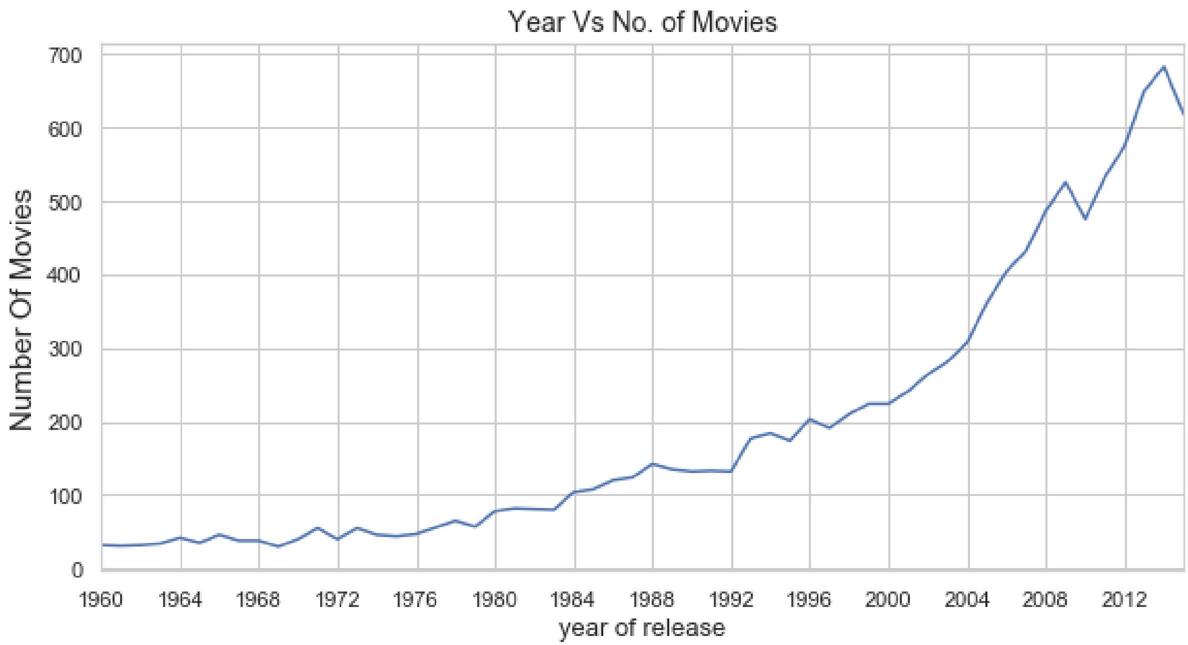
In [27]:
```
#Groupby fucntion is used to get yearwise movie release
highest=df_tmdb.groupby('release_year').count()['id']
print(highest.head())
```

```
release_year
```

```
1960    32
1961    31
1962    32
1963    34
1964    42
Name: id, dtype: int64
```

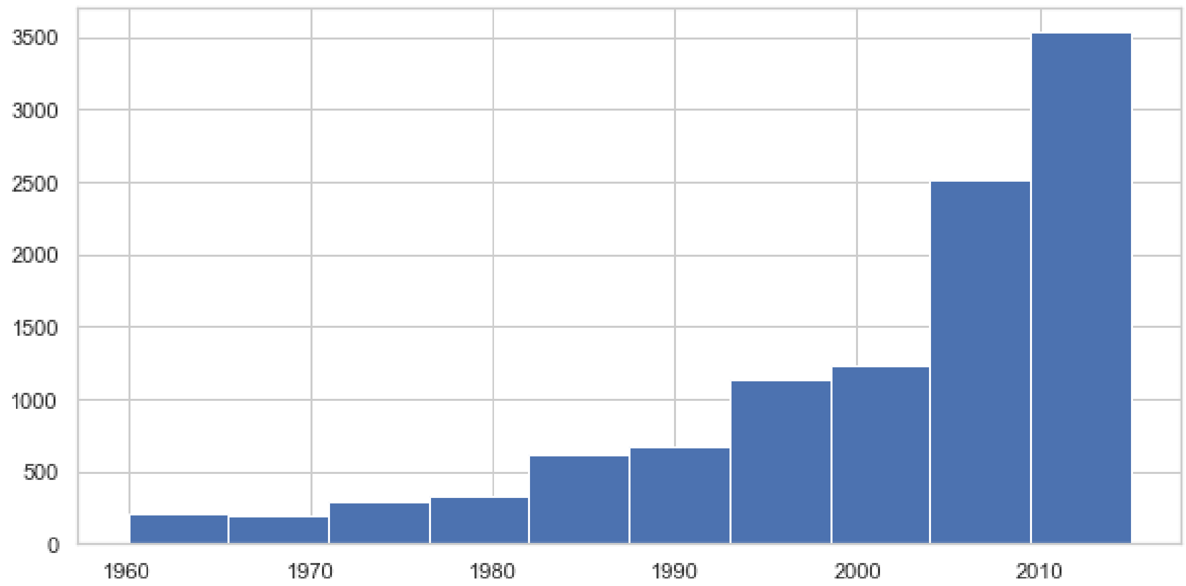
In [71]:

```
#visualizing the comparision
highest.plot(xticks = np.arange(1960,2016,4))
sns.set(rc={'figure.figsize':(10,5)})
plt.title("Year Vs No. of Movies",fontsize = 14)
plt.xlabel('year of release',fontsize = 13)
plt.ylabel('Number Of Movies',fontsize = 15)
sns.set_style("whitegrid")
```



In [72]:

```
#analysis of release year using histogram
df_tmdb['release_year'].hist()
plt.show()
```



Year 1961 has 31(lowest) and 2014 has 700(highest) numbers of movie released.

The trend shows that the release of movies every year is inceasing.

Research Question 4: Get 5 directors with highest directed movies?

In [29]:
```
#using groupby fucntion to count the total number of movies directed by
 each director
#using sort_values fucntion to sort in descending order
director_name=df_tmdb.groupby('director')['id'].count().sort_values(asc
ending=False).iloc[:5]
```

In [30]:
```
#getting top 5 directors with directed movies
print(director_name)
```

```
director
Woody Allen         45
```

```
Clint Eastwood       34
Steven Spielberg     29
Martin Scorsese      28
Ridley Scott         23
Name: id, dtype: int64
```

Research Question 5: What is maximum and minimum vote average?

In [60]:
```
#max_funtion is used to calculate the maximum of vote average
print("maximum vote average:",max_function('vote_average'))
```

```
maximum vote average: 9.2
```

In [61]:
```
#a min_func function is made to calculate the minimum value
def min_function(column_name):
    return df_tmdb[column_name].min()
```

In [62]:
```
print("minimum vote average:",min_function('vote_average'))
```

```
minimum vote average: 1.5
```

Research Question 6: Name the movies with maximum and minimum vote average?

In [74]:
```
#movie having maximum vote average
df_tmdb[df_tmdb['vote_average']==max_function('vote_average')]['origina
l_title']
```

Out[74]:
```
3894    The Story of Film: An Odyssey
Name: original_title, dtype: object
```

In [75]:
```
#movies with minimum vote average
df_tmdb[df_tmdb['vote_average']==min_function('vote_average')]['origina
l_title']
```

Out[75]:
```
7772                  Transmorphers
10865    Manos: The Hands of Fate
Name: original_title, dtype: object
```

There are two movies which have same minimum rating(1.5)

Research Question 7:Movies having vote average less than or equal to 5 and greater than 5?

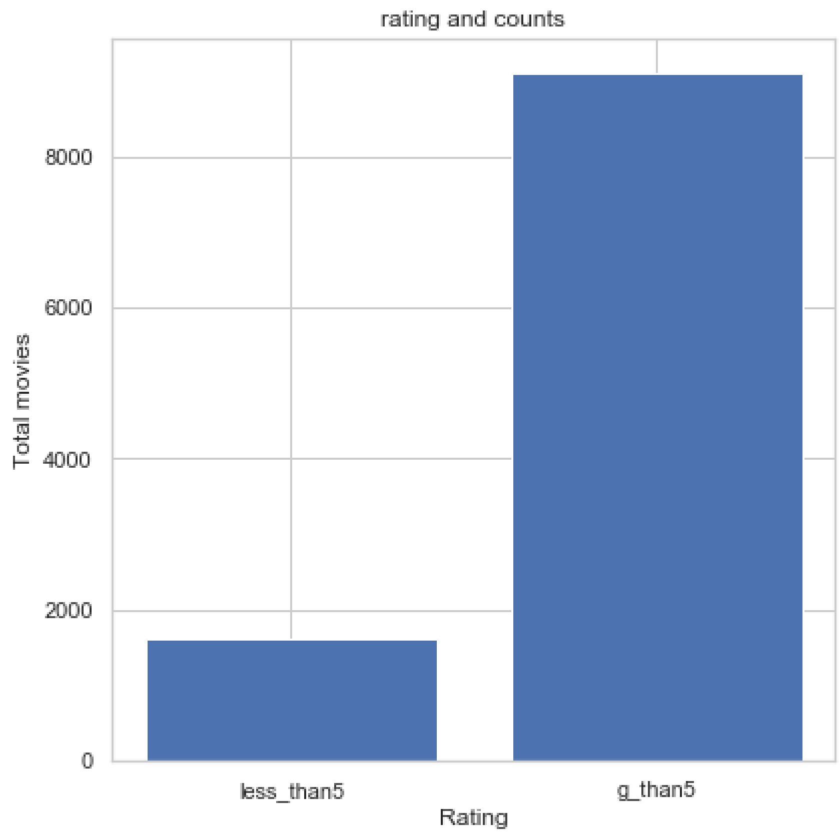
In [91]:
```
#Movies vote average greater than 5
print("Number of Movies with rating greater than 5:",greater_function(
'vote_average',5))
```

```
Number of Movies with rating greater than 5: 9099
```

In [92]:
```
#Movies vote average less than or equal to 5
print("Number of Movies with rating less than or equal to 5:",less_func
tion('vote_average',5))
```

```
Number of Movies with rating less than or equal to 5: 1632
```

In [93]:
```
#visualizing the rating less than or equal to 5 and greater than 5
fig = plt.figure()
ax = fig.add_axes([0,0,0.5,1])
Number = ['less_than5', 'g_than5']
counts = [less_function('vote_average',5),greater_function('vote_averag
e',5)]
ax.bar(Number,counts)
plt.title('rating and counts')
plt.xlabel('Rating')
plt.ylabel('Total movies')
plt.show()
```



Movies with rating greater than 5 has frequency higher than movies rating less than or equal to 5. It shows that directors are well aware of delivering quality content among the audience

Research Question 8: What is the vote average of most popular movie?

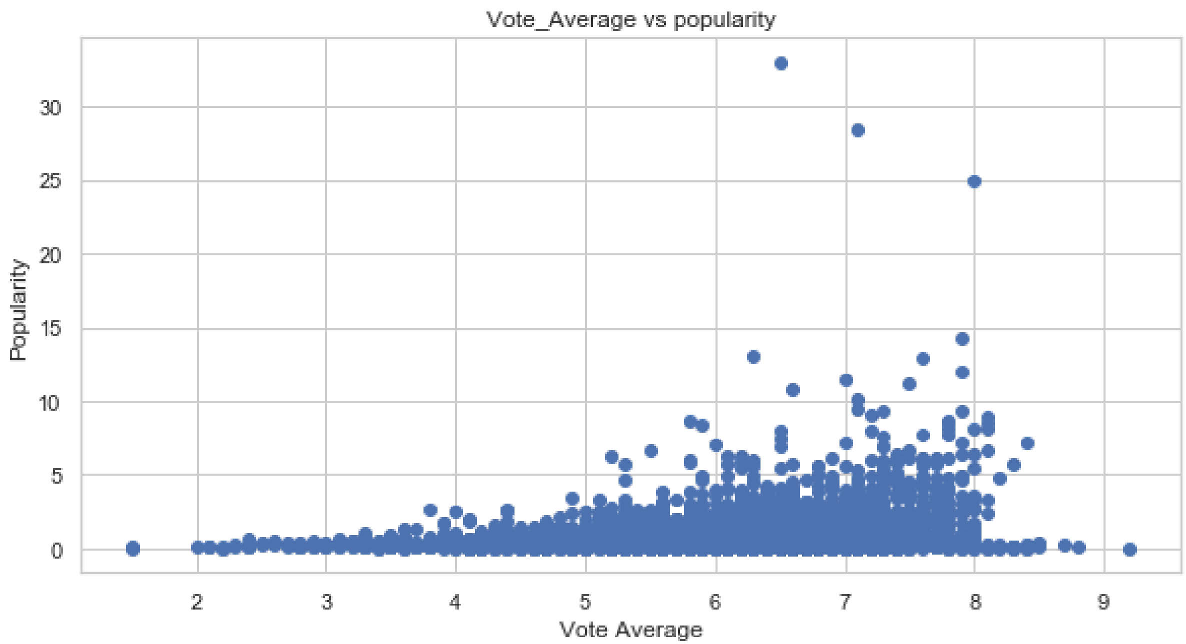
In [63]:
```
#get the vote average of popular movie
df_tmdb[df_tmdb['popularity']==max_function('popularity')]['vote_averag
e']
```

Out[63]: 0   6.5

Name: vote_average, dtype: float64

In [64]:
```
#visualizing the data using scatter plot
x = df_tmdb['vote_average']
y = df_tmdb['popularity']

plt.scatter(x, y)
plt.xlabel("Vote Average")
plt.ylabel("Popularity")
plt.title("Vote_Average vs popularity")
plt.show()
```



Movies having rating greater than 5 seems to be very popular

Research Question 9: Find the revenue of highest budget movie?

In [66]:
```
#getting revenue of highest budget movie
df_tmdb[df_tmdb['budget']==max_function('budget')]['revenue']
```

Out[66]:
```
2244    11087569.0
Name: revenue, dtype: float64
```

Research Question 10: Revenue of Most Popular movie?

In [68]:
```
#get revenue of most popular movie
df_tmdb[df_tmdb['popularity']==max_function('popularity')]['revenue']
```

Out[68]:
```
0    1.513529e+09
Name: revenue, dtype: float64
```

4.Conclusions

1. The movie 'The Story of Film: An Odyssey' has runtime 900 min.This is because many parts are counted together.

1. Movie length less than or equal to 2hrs is the ideal length for production.

1. Year 1961 has 31(lowest) and 2014 has 700(highest) numbers of movie released. This is because of evolution in technologies and public demand has raised the production of more movies year to year

1. According to dataset Woody Allen has directed maximum movies (45) so far.

1. The Story of Film: An Odyssey has the maximum vote average (9.2) whereas Transmorphers and Manos: The Hands of Fate has the lowest rating(1.5). It shows that people are interested in quality content.

1. Most popular movie has the rating 6.5 and revenue earned is 1513528810($).

1. Movie with highest budget had earned (11087569)($).

Limitations

1.This study has limitations of dealing with NaN values.It affects the process of data analysis. NAN values limit our scope of exploration when they are in significant amount. Sometimes deleting all these makes our data monotonous.

2.The data given to us was sufficient but columns containing outliers made the analysis less interesting.

This is how i conclude my General Data analysis of Movie data set!

In [ ]:

```

```