Investigate_a_Dataset

January 1, 2022

1 Project: Investigate a Dataset - TDP Movies

1.1 Table of Contents

Introduction

Dataset Description This data set contains information about 10,000 movies collected from The Movie Database (TMDb), including user ratings and revenue.

Certain columns, like 'cast' and 'genres', contain multiple values separated by pipe (|) characters. There are some odd characters in the 'cast' column. Don't worry about cleaning them. You can leave them as is. The final two columns ending with "_adj" show the budget and revenue of the associated movie in terms of 2010 dollars, accounting for inflation over time.

Columns: Imdb_id - - original_title cast - - popularity director - - production_companies release_year - - revenue budget_adj - - revenue_adj

1.1.1 Question(s) for Analysis

Which acrtor achieve revenue in their movies

who the director has top successfull movies

production companies revenue vs budget (loss or gain)

import statements for all of the packages we need to run the project

In [3]:
```
# import statements for all of the packages

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as snb
%matplotlib inline
```

```
In [2]: # Upgrade pandas to use dataframe.explode() function.
        !pip install --upgrade pandas==0.25.0
```

```
Collecting pandas==0.25.0
  Downloading https://files.pythonhosted.org/packages/1d/9a/7eb9952f4b4d73fbd75ad1d5d6112f407e69
    100% || 10.5MB 3.2MB/s eta 0:00:01   33% |                     | 3.5MB 28.7MB/s eta 0:00:01
Collecting numpy>=1.13.3 (from pandas==0.25.0)
  Downloading https://files.pythonhosted.org/packages/45/b2/6c7545bb7a38754d63048c7696804a0d9473
    100% || 13.4MB 2.7MB/s eta 0:00:01   24% |                        | 3.2MB 27.3MB/s eta 0:00:
Requirement already satisfied, skipping upgrade: python-dateutil>=2.6.1 in /opt/conda/lib/python
Requirement already satisfied, skipping upgrade: pytz>=2017.2 in /opt/conda/lib/python3.6/site-p
Requirement already satisfied, skipping upgrade: six>=1.5 in /opt/conda/lib/python3.6/site-packa
tensorflow 1.3.0 requires tensorflow-tensorboard<0.2.0,>=0.1.0, which is not installed.
Installing collected packages: numpy, pandas
  Found existing installation: numpy 1.12.1
    Uninstalling numpy-1.12.1:
      Successfully uninstalled numpy-1.12.1
  Found existing installation: pandas 0.23.3
    Uninstalling pandas-0.23.3:
      Successfully uninstalled pandas-0.23.3
Successfully installed numpy-1.19.5 pandas-0.25.0
```

Data Wrangling

1.1.2 General Properties

Load data from tmdb-movies.csv file

```
In [4]: df= pd.read_csv('Database_TMDb_movie_data/tmdb-movies.csv')
        df.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
```

Check the statistics for the data frame

In [5]:
```
df.describe()
```

Out[5]:
```
                  id    popularity        budget       revenue       runtime  \
count   10866.000000  10866.000000  1.086600e+04  1.086600e+04  10866.000000
mean    66064.177434      0.646441  1.462570e+07  3.982332e+07    102.070863
std     92130.136561      1.000185  3.091321e+07  1.170035e+08     31.381405
min         5.000000      0.000065  0.000000e+00  0.000000e+00      0.000000
25%     10596.250000      0.207583  0.000000e+00  0.000000e+00     90.000000
50%     20669.000000      0.383856  0.000000e+00  0.000000e+00     99.000000
75%     75610.000000      0.713817  1.500000e+07  2.400000e+07    111.000000
max    417859.000000     32.985763  4.250000e+08  2.781506e+09    900.000000

         vote_count  vote_average  release_year    budget_adj   revenue_adj
count  10866.000000  10866.000000  10866.000000  1.086600e+04  1.086600e+04
mean     217.389748      5.974922   2001.322658  1.755104e+07  5.136436e+07
std      575.619058      0.935142     12.812941  3.430616e+07  1.446325e+08
min       10.000000      1.500000   1960.000000  0.000000e+00  0.000000e+00
25%       17.000000      5.400000   1995.000000  0.000000e+00  0.000000e+00
50%       38.000000      6.000000   2006.000000  0.000000e+00  0.000000e+00
75%      145.750000      6.600000   2011.000000  2.085325e+07  3.369710e+07
max     9767.000000      9.200000   2015.000000  4.250000e+08  2.827124e+09
```

Check the number of columns and rows for the dataframe

In [6]:
```
# Check the number of columns and rows for the dataframe
df.shape
```

Out[6]:
```
(10866, 21)
```

Get the number of NA/Null values for each feature

In [7]:
```
# Get the number of NA/Null values for each feature
df.isnull().sum()
```

Out[7]:
```
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
```

1.1.3 Data Cleaning

Which data to be droped For the questions about cast and director, it will be necessary to drop the rows has NA values. Production_companies will droped in the question number 3.

which data to be filled The production companies missing data will be filled with "Other companies" value

Columns to be droped The columns home page, tagline and keywords NA values will be dropped because it is not inculded in the calculations

```
In [8]: ''' Drop the cast and directors NA values from
        the dataframe to calculate the average revenue and top rated movies
        '''
        df.dropna(subset=['cast','director'], how='any',inplace=True)
```

```
In [11]: df.drop(['homepage','tagline','keywords'],axis=1, inplace=True)
```

Check features after drop the NA

```
In [12]: # Check features after drop the NA
         df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 10752 entries, 0 to 10865
Data columns (total 18 columns):
id                       10752 non-null int64
```

```
imdb_id                 10746 non-null object
popularity              10752 non-null float64
budget                  10752 non-null int64
revenue                 10752 non-null int64
original_title          10752 non-null object
cast                    10752 non-null object
director                10752 non-null object
overview                10749 non-null object
runtime                 10752 non-null int64
genres                  10732 non-null object
production_companies    9780 non-null object
release_date            10752 non-null object
vote_count              10752 non-null int64
vote_average            10752 non-null float64
release_year            10752 non-null int64
budget_adj              10752 non-null float64
revenue_adj             10752 non-null float64
dtypes: float64(4), int64(6), object(8)
memory usage: 1.9+ MB
```

In [19]: df.drop_duplicates()

```
Out[19]:          id    imdb_id  popularity     budget     revenue  \
         0    135397  tt0369610   32.985763  150000000  1513528810
         1     76341  tt1392190   28.419936  150000000   378436354
         2    262500  tt2908446   13.112507  110000000   295238201
         3    140607  tt2488496   11.173104  200000000  2068178225
         4    168259  tt2820852    9.335014  190000000  1506249360
         5    281957  tt1663202    9.110700  135000000   532950503
         6     87101  tt1340138    8.654359  155000000   440603537
         7    286217  tt3659388    7.667400  108000000   595380321
         8    211672  tt2293640    7.404165   74000000  1156730962
         9    150540  tt2096673    6.326804  175000000   853708609
         10   206647  tt2379713    6.200282  245000000   880674609
         11    76757  tt1617661    6.189369  176000003   183987723
         12   264660  tt0470752    6.118847   15000000    36869414
         13   257344  tt2120120    5.984995   88000000   243637091
         14    99861  tt2395427    5.944927  280000000  1405035767
         15   273248  tt3460252    5.898400   44000000   155760117
         16   260346  tt2446042    5.749758   48000000   325771424
         17   102899  tt0478970    5.573184  130000000   518602163
         18   150689  tt1661199    5.556818   95000000   542351353
         19   131634  tt1951266    5.476958  160000000   650523427
         20   158852  tt1964418    5.462138  190000000   209035668
         21   307081  tt1798684    5.337064   30000000    91709827
         22   254128  tt2126355    4.907832  110000000   470490832
         23   216015  tt2322441    4.710402   40000000   569651467
```

```
24      318846  tt1596363   4.648046   28000000   133346506
25      177677  tt2381249   4.566713  150000000   682330139
26      214756  tt2637276   4.564549   68000000   215863606
27      207703  tt2802144   4.503789   81000000   403802136
28      314365  tt1895587   4.062293   20000000    88346473
29      294254  tt4046784   3.968891   61000000   311256926
...        ...        ...        ...        ...         ...
10836    38720  tt0061170   0.239435          0           0
10837    19728  tt0060177   0.291704          0           0
10838    22383  tt0060862   0.151845          0           0
10839    13353  tt0060550   0.276133          0           0
10840    34388  tt0060437   0.102530          0           0
10841    42701  tt0062262   0.264925      75000           0
10842    36540  tt0061199   0.253437          0           0
10843    29710  tt0060588   0.252399          0           0
10844    23728  tt0059557   0.236098          0           0
10845     5065  tt0059014   0.230873          0           0
10846    17102  tt0059127   0.212716          0           0
10847    28763  tt0060548   0.034555          0           0
10848     2161  tt0060397   0.207257    5115000    12000000
10849    28270  tt0060445   0.206537          0           0
10850    26268  tt0060490   0.202473          0           0
10851    15347  tt0060182   0.342791          0           0
10852    37301  tt0060165   0.227220          0           0
10853    15598  tt0060086   0.163592          0           0
10854    31602  tt0060232   0.146402          0           0
10855    13343  tt0059221   0.141026     700000           0
10856    20277  tt0061135   0.140934          0           0
10857     5921  tt0060748   0.131378          0           0
10858    31918  tt0060921   0.317824          0           0
10859    20620  tt0060955   0.089072          0           0
10860     5060  tt0060214   0.087034          0           0
10861       21  tt0060371   0.080598          0           0
10862    20379  tt0060472   0.065543          0           0
10863    39768  tt0060161   0.065141          0           0
10864    21449  tt0061177   0.064317          0           0
10865    22293  tt0060666   0.035919      19000           0

                                  original_title  \
0                                 Jurassic World
1                             Mad Max: Fury Road
2                                      Insurgent
3                   Star Wars: The Force Awakens
4                                      Furious 7
5                                   The Revenant
6                             Terminator Genisys
7                                     The Martian
8                                        Minions
```

9	Inside Out
10	Spectre
11	Jupiter Ascending
12	Ex Machina
13	Pixels
14	Avengers: Age of Ultron
15	The Hateful Eight
16	Taken 3
17	Ant-Man
18	Cinderella
19	The Hunger Games: Mockingjay - Part 2
20	Tomorrowland
21	Southpaw
22	San Andreas
23	Fifty Shades of Grey
24	The Big Short
25	Mission: Impossible - Rogue Nation
26	Ted 2
27	Kingsman: The Secret Service
28	Spotlight
29	Maze Runner: The Scorch Trials
...	...
10836	Walk Don't Run
10837	The Blue Max
10838	The Professionals
10839	It's the Great Pumpkin, Charlie Brown
10840	Funeral in Berlin
10841	The Shooting
10842	Winnie the Pooh and the Honey Tree
10843	Khartoum
10844	Our Man Flint
10845	Carry On Cowboy
10846	Dracula: Prince of Darkness
10847	Island of Terror
10848	Fantastic Voyage
10849	Gambit
10850	Harper
10851	Born Free
10852	A Big Hand for the Little Lady
10853	Alfie
10854	The Chase
10855	The Ghost & Mr. Chicken
10856	The Ugly Dachshund
10857	Nevada Smith
10858	The Russians Are Coming, The Russians Are Coming
10859	Seconds
10860	Carry On Screaming!
10861	The Endless Summer

```
10862                                           Grand Prix
10863                                  Beregis Avtomobilya
10864                               What's Up, Tiger Lily?
10865                             Manos: The Hands of Fate

                                                    cast  \
0      Chris Pratt|Bryce Dallas Howard|Irrfan Khan|Vi...
1      Tom Hardy|Charlize Theron|Hugh Keays-Byrne|Nic...
2      Shailene Woodley|Theo James|Kate Winslet|Ansel...
3      Harrison Ford|Mark Hamill|Carrie Fisher|Adam D...
4      Vin Diesel|Paul Walker|Jason Statham|Michelle ...
5      Leonardo DiCaprio|Tom Hardy|Will Poulter|Domhn...
6      Arnold Schwarzenegger|Jason Clarke|Emilia Clar...
7      Matt Damon|Jessica Chastain|Kristen Wiig|Jeff ...
8      Sandra Bullock|Jon Hamm|Michael Keaton|Allison...
9      Amy Poehler|Phyllis Smith|Richard Kind|Bill Ha...
10     Daniel Craig|Christoph Waltz|LÃI’a Seydoux|Ralp...
11     Mila Kunis|Channing Tatum|Sean Bean|Eddie Redm...
12     Domhnall Gleeson|Alicia Vikander|Oscar Isaac|S...
13     Adam Sandler|Michelle Monaghan|Peter Dinklage|...
14     Robert Downey Jr.|Chris Hemsworth|Mark Ruffalo...
15     Samuel L. Jackson|Kurt Russell|Jennifer Jason ...
16     Liam Neeson|Forest Whitaker|Maggie Grace|Famke...
17     Paul Rudd|Michael Douglas|Evangeline Lilly|Cor...
18     Lily James|Cate Blanchett|Richard Madden|Helen...
19     Jennifer Lawrence|Josh Hutcherson|Liam Hemswor...
20     Britt Robertson|George Clooney|Raffey Cassidy|...
21     Jake Gyllenhaal|Rachel McAdams|Forest Whitaker...
22     Dwayne Johnson|Alexandra Daddario|Carla Gugino...
23     Dakota Johnson|Jamie Dornan|Jennifer Ehle|Eloi...
24     Christian Bale|Steve Carell|Ryan Gosling|Brad ...
25     Tom Cruise|Jeremy Renner|Simon Pegg|Rebecca Fe...
26     Mark Wahlberg|Seth MacFarlane|Amanda Seyfried|...
27     Taron Egerton|Colin Firth|Samuel L. Jackson|Mi...
28     Mark Ruffalo|Michael Keaton|Rachel McAdams|Lie...
29     Dylan O'Brien|Kaya Scodelario|Thomas Brodie-Sa...
...                                                  ...
10836  Cary Grant|Samantha Eggar|Jim Hutton|John Stan...
10837  George Peppard|James Mason|Ursula Andress|Jere...
10838  Burt Lancaster|Lee Marvin|Robert Ryan|Woody St...
10839  Christopher Shea|Sally Dryer|Kathy Steinberg|A...
10840  Michael Caine|Paul Hubschmid|Oskar Homolka|Eva...
10841  Will Hutchins|Millie Perkins|Jack Nicholson|Wa...
10842  Sterling Holloway|Junius Matthews|Sebastian Ca...
10843  Charlton Heston|Laurence Olivier|Richard Johns...
10844  James Coburn|Lee J. Cobb|Gila Golan|Edward Mul...
10845  Sid James|Jim Dale|Angela Douglas|Kenneth Will...
10846  Christopher Lee|Barbara Shelley|Andrew Keir|Fr...
```

```
10847  Peter Cushing|Edward Judd|Carole Gray|Eddie By...
10848  Stephen Boyd|Raquel Welch|Edmond O'Brien|Donal...
10849  Michael Caine|Shirley MacLaine|Herbert Lom|Joh...
10850  Paul Newman|Lauren Bacall|Julie Harris|Arthur ...
10851  Virginia McKenna|Bill Travers|Geoffrey Keen|Pe...
10852  Henry Fonda|Joanne Woodward|Jason Robards|Paul...
10853  Michael Caine|Shelley Winters|Millicent Martin...
10854  Marlon Brando|Jane Fonda|Robert Redford|E.G. M...
10855  Don Knotts|Joan Staley|Liam Redmond|Dick Sarge...
10856  Dean Jones|Suzanne Pleshette|Charles Ruggles|K...
10857  Steve McQueen|Karl Malden|Brian Keith|Arthur K...
10858  Carl Reiner|Eva Marie Saint|Alan Arkin|Brian K...
10859  Rock Hudson|Salome Jens|John Randolph|Will Gee...
10860  Kenneth Williams|Jim Dale|Harry H. Corbett|Joa...
10861  Michael Hynson|Robert August|Lord 'Tally Ho' B...
10862  James Garner|Eva Marie Saint|Yves Montand|Tosh...
10863  Innokentiy Smoktunovskiy|Oleg Efremov|Georgi Z...
10864  Tatsuya Mihashi|Akiko Wakabayashi|Mie Hama|Joh...
10865  Harold P. Warren|Tom Neyman|John Reynolds|Dian...

                            director  \
0                    Colin Trevorrow
1                      George Miller
2                   Robert Schwentke
3                        J.J. Abrams
4                          James Wan
5      Alejandro GonzÃąlez IÃśÃąrritu
6                        Alan Taylor
7                       Ridley Scott
8            Kyle Balda|Pierre Coffin
9                        Pete Docter
10                        Sam Mendes
11     Lana Wachowski|Lilly Wachowski
12                       Alex Garland
13                     Chris Columbus
14                       Joss Whedon
15                 Quentin Tarantino
16                   Olivier Megaton
17                       Peyton Reed
18                   Kenneth Branagh
19                  Francis Lawrence
20                         Brad Bird
21                     Antoine Fuqua
22                       Brad Peyton
23                 Sam Taylor-Johnson
24                        Adam McKay
25           Christopher McQuarrie
26                    Seth MacFarlane
```

```
27                        Matthew Vaughn
28                          Tom McCarthy
29                              Wes Ball
...                                  ...
10836                   Charles Walters
10837                   John Guillermin
10838                    Richard Brooks
10839                     Bill Melendez
10840                      Guy Hamilton
10841                     Monte Hellman
10842               Wolfgang Reitherman
10843     Basil Dearden|Eliot Elisofon
10844                       Daniel Mann
10845                     Gerald Thomas
10846                    Terence Fisher
10847                    Terence Fisher
10848                 Richard Fleischer
10849                      Ronald Neame
10850                       Jack Smight
10851                        James Hill
10852                      Fielder Cook
10853                     Lewis Gilbert
10854                       Arthur Penn
10855                      Alan Rafkin
10856                      Norman Tokar
10857                    Henry Hathaway
10858                    Norman Jewison
10859                John Frankenheimer
10860                     Gerald Thomas
10861                       Bruce Brown
10862                John Frankenheimer
10863                    Eldar Ryazanov
10864                       Woody Allen
10865                  Harold P. Warren

                                                overview  runtime  \
0      Twenty-two years after the events of Jurassic ...      124
1      An apocalyptic story set in the furthest reach...      120
2      Beatrice Prior must confront her inner demons ...      119
3      Thirty years after defeating the Galactic Empi...      136
4      Deckard Shaw seeks revenge against Dominic Tor...      137
5      In the 1820s, a frontiersman, Hugh Glass, sets...      156
6      The year is 2029. John Connor, leader of the r...      125
7      During a manned mission to Mars, Astronaut Mar...      141
8      Minions Stuart, Kevin and Bob are recruited by...       91
9      Growing up can be a bumpy road, and it's no ex...       94
10     A cryptic message from Bondâs past sends him...     148
11     In a universe where human genetic material is ...      124
```

12	Caleb, a 26 year old coder at the world's larg...	108
13	Video game experts are recruited by the milita...	105
14	When Tony Stark tries to jumpstart a dormant p...	141
15	Bounty hunters seek shelter from a raging bliz...	167
16	Ex-government operative Bryan Mills finds his ...	109
17	Armed with the astonishing ability to shrink i...	115
18	When her father unexpectedly passes away, youn...	112
19	With the nation of Panem in a full scale war, ...	136
20	Bound by a shared destiny, a bright, optimisti...	130
21	Billy "The Great" Hope, the reigning junior mi...	123
22	In the aftermath of a massive earthquake in Ca...	114
23	When college senior Anastasia Steele steps in ...	125
24	The men who made millions from a global econom...	130
25	Ethan and team take on their most impossible m...	131
26	Newlywed couple Ted and Tami-Lynn want to have...	115
27	The story of a super-secret spy organization t...	130
28	The true story of how The Boston Globe uncover...	128
29	Thomas and his fellow Gladers face their great...	132
...	...	...
10836	British industrialist Sir William Rutland - "B...	114
10837	A young pilot in the German air force of 1918,...	156
10838	The Professionals is a 1966 American Western f...	117
10839	This classic "Peanuts" tale focuses on the thu...	25
10840	Colonel Stok, a Soviet intelligence officer re...	102
10841	A hired gun seeks to enact revenge on a group ...	82
10842	Christopher Robin's bear attempts to raid a be...	25
10843	English General Charles George Gordon, a devou...	134
10844	When scientists use eco-terrorism to impose th...	108
10845	Stodge City is in the grip of the Rumpo Kid an...	93
10846	Whilst vacationing in the Carpathian Mountain,...	90
10847	A small island community is overrun with creep...	89
10848	The science of miniaturization has been unlock...	100
10849	Harry Dean (Michael Caine) has a perfect plan ...	109
10850	Harper is a cynical private eye in the best tr...	121
10851	Born Free (1966) is an Open Road Films Ltd./Co...	95
10852	A naive traveler in Laredo gets involved in a ...	95
10853	The film tells the story of a young man who le...	114
10854	Most everyone in town thinks that Sheriff Cald...	135
10855	Luther Heggs aspires to being a reporter for h...	90
10856	The Garrisons (Dean Jones and Suzanne Pleshett...	93
10857	Nevada Smith is the young son of an Indian mot...	128
10858	Without hostile intent, a Soviet sub runs agro...	126
10859	A secret organisation offers wealthy people a ...	100
10860	The sinister Dr Watt has an evil scheme going...	87
10861	The Endless Summer, by Bruce Brown, is one of ...	95
10862	Grand Prix driver Pete Aron is fired by his te...	176
10863	An insurance agent who moonlights as a carthie...	94
10864	In comic Woody Allen's film debut, he took the...	80

```
10865  A family gets lost on the road and stumbles up...       74

                                                  genres  \
0              Action|Adventure|Science Fiction|Thriller
1              Action|Adventure|Science Fiction|Thriller
2                     Adventure|Science Fiction|Thriller
3               Action|Adventure|Science Fiction|Fantasy
4                                  Action|Crime|Thriller
5                       Western|Drama|Adventure|Thriller
6              Science Fiction|Action|Thriller|Adventure
7                       Drama|Adventure|Science Fiction
8                      Family|Animation|Adventure|Comedy
9                                Comedy|Animation|Family
10                                Action|Adventure|Crime
11              Science Fiction|Fantasy|Action|Adventure
12                                 Drama|Science Fiction
13                        Action|Comedy|Science Fiction
14                      Action|Adventure|Science Fiction
15                           Crime|Drama|Mystery|Western
16                                 Crime|Action|Thriller
17                      Science Fiction|Action|Adventure
18                            Romance|Fantasy|Family|Drama
19                         War|Adventure|Science Fiction
20       Action|Family|Science Fiction|Adventure|Mystery
21                                          Action|Drama
22                                 Action|Drama|Thriller
23                                         Drama|Romance
24                                          Comedy|Drama
25                                                Action
26                                                Comedy
27                        Crime|Comedy|Action|Adventure
28                                Drama|Thriller|History
29                        Action|Science Fiction|Thriller
...                                                  ...
10836                                     Comedy|Romance
10837                          War|Action|Adventure|Drama
10838                            Action|Adventure|Western
10839                                   Family|Animation
10840                                           Thriller
10841                                            Western
10842                                   Animation|Family
10843                 Adventure|Drama|War|History|Action
10844           Adventure|Comedy|Fantasy|Science Fiction
10845                                     Comedy|Western
10846                                             Horror
10847                             Science Fiction|Horror
10848                          Adventure|Science Fiction
10849                                Action|Comedy|Crime
```

```
10850              Action|Drama|Thriller|Crime|Mystery
10851            Adventure|Drama|Action|Family|Foreign
10852                                          Western
10853                             Comedy|Drama|Romance
10854                             Thriller|Drama|Crime
10855                    Comedy|Family|Mystery|Romance
10856                              Comedy|Drama|Family
10857                                   Action|Western
10858                                       Comedy|War
10859           Mystery|Science Fiction|Thriller|Drama
10860                                           Comedy
10861                                      Documentary
10862                           Action|Adventure|Drama
10863                                   Mystery|Comedy
10864                                    Action|Comedy
10865                                           Horror

                                    production_companies release_date  \
0       Universal Studios|Amblin Entertainment|Legenda...       6/9/15
1       Village Roadshow Pictures|Kennedy Miller Produ...      5/13/15
2       Summit Entertainment|Mandeville Films|Red Wago...      3/18/15
3               Lucasfilm|Truenorth Productions|Bad Robot     12/15/15
4       Universal Pictures|Original Film|Media Rights ...       4/1/15
5       Regency Enterprises|Appian Way|CatchPlay|Anony...     12/25/15
6                 Paramount Pictures|Skydance Productions      6/23/15
7       Twentieth Century Fox Film Corporation|Scott F...      9/30/15
8            Universal Pictures|Illumination Entertainment      6/17/15
9       Walt Disney Pictures|Pixar Animation Studios|W...       6/9/15
10                           Columbia Pictures|Danjaq|B24     10/26/15
11      Village Roadshow Pictures|Dune Entertainment|A...       2/4/15
12      DNA Films|Universal Pictures International (UP...      1/21/15
13             Columbia Pictures|Happy Madison Productions      7/16/15
14      Marvel Studios|Prime Focus|Revolution Sun Studios      4/22/15
15      Double Feature Films|The Weinstein Company|Fil...     12/25/15
16      Twentieth Century Fox Film Corporation|M6 Film...       1/1/15
17                                         Marvel Studios      7/14/15
18      Walt Disney Pictures|Genre Films|Beagle Pug Fi...      3/12/15
19      Studio Babelsberg|StudioCanal|Lionsgate|Walt D...     11/18/15
20                     Walt Disney Pictures|Babieka|A113      5/19/15
21                Escape Artists|Riche-Ludwig Productions      6/15/15
22      New Line Cinema|Village Roadshow Pictures|Warn...      5/27/15
23      Focus Features|Trigger Street Productions|Mich...      2/11/15
24      Paramount Pictures|Plan B Entertainment|Regenc...     12/11/15
25      Paramount Pictures|Skydance Productions|China ...      7/23/15
26      Universal Pictures|Media Rights Capital|Fuzzy ...      6/25/15
27      Twentieth Century Fox Film Corporation|Marv Fi...      1/24/15
28      Participant Media|Open Road Films|Anonymous Co...      11/6/15
29      Gotham Group|Temple Hill Entertainment|TSG Ent...       9/9/15
```

```
...                                                   ...          ...
10836               Columbia Pictures Corporation       1/1/66
10837          Twentieth Century Fox Film Corporation   6/21/66
10838                           Columbia Pictures      11/1/66
10839                     Warner Bros. Home Video      10/27/66
10840                 Lowndes Productions Limited      12/22/66
10841                                Proteus Films     10/23/66
10842                                          NaN      1/1/66
10843           Julian Blaustein Productions Ltd.       6/9/66
10844                             20th Century Fox      1/16/66
10845                      Peter Rogers Productions      3/1/66
10846    Seven Arts Productions|Hammer Film Productions      1/9/66
10847          Planet Film Productions|Protelco      6/20/66
10848          Twentieth Century Fox Film Corporation   8/24/66
10849                           Universal Pictures     12/16/66
10850                                 Warner Bros.      2/23/66
10851                                    High Road      6/22/66
10852                       Eden Productions Inc.      5/31/66
10853                                          NaN      3/29/66
10854    Horizon Pictures|Columbia Pictures Corporation      2/17/66
10855                           Universal Pictures      1/20/66
10856                          Walt Disney Pictures      2/16/66
10857  Paramount Pictures|Solar Productions|Embassy P...      6/10/66
10858                    The Mirisch Corporation      5/25/66
10859  Gibraltar Productions|Joel Productions|John Fr...      10/5/66
10860  Peter Rogers Productions|Anglo-Amalgamated Fil...      5/20/66
10861                            Bruce Brown Films      6/15/66
10862  Cherokee Productions|Joel Productions|Douglas ...     12/21/66
10863                                      Mosfilm       1/1/66
10864                     Benedict Pictures Corp.      11/2/66
10865                                    Norm-Iris     11/15/66

       vote_count  vote_average  release_year    budget_adj   revenue_adj  \
0            5562           6.5          2015  1.379999e+08  1.392446e+09
1            6185           7.1          2015  1.379999e+08  3.481613e+08
2            2480           6.3          2015  1.012000e+08  2.716190e+08
3            5292           7.5          2015  1.839999e+08  1.902723e+09
4            2947           7.3          2015  1.747999e+08  1.385749e+09
5            3929           7.2          2015  1.241999e+08  4.903142e+08
6            2598           5.8          2015  1.425999e+08  4.053551e+08
7            4572           7.6          2015  9.935996e+07  5.477497e+08
8            2893           6.5          2015  6.807997e+07  1.064192e+09
9            3935           8.0          2015  1.609999e+08  7.854116e+08
10           3254           6.2          2015  2.253999e+08  8.102203e+08
11           1937           5.2          2015  1.619199e+08  1.692686e+08
12           2854           7.6          2015  1.379999e+07  3.391985e+07
13           1575           5.8          2015  8.095996e+07  2.241460e+08
14           4304           7.4          2015  2.575999e+08  1.292632e+09
```

15	2389	7.4	2015	4.047998e+07	1.432992e+08
16	1578	6.1	2015	4.415998e+07	2.997096e+08
17	3779	7.0	2015	1.195999e+08	4.771138e+08
18	1495	6.8	2015	8.739996e+07	4.989630e+08
19	2380	6.5	2015	1.471999e+08	5.984813e+08
20	1899	6.2	2015	1.747999e+08	1.923127e+08
21	1386	7.3	2015	2.759999e+07	8.437300e+07
22	2060	6.1	2015	1.012000e+08	4.328514e+08
23	1865	5.3	2015	3.679998e+07	5.240791e+08
24	1545	7.3	2015	2.575999e+07	1.226787e+08
25	2349	7.1	2015	1.379999e+08	6.277435e+08
26	1666	6.3	2015	6.255997e+07	1.985944e+08
27	3833	7.6	2015	7.451997e+07	3.714978e+08
28	1559	7.8	2015	1.839999e+07	8.127872e+07
29	1849	6.4	2015	5.611998e+07	2.863562e+08
...	...	...	...	...	...
10836	11	5.8	1966	0.000000e+00	0.000000e+00
10837	12	5.5	1966	0.000000e+00	0.000000e+00
10838	21	6.0	1966	0.000000e+00	0.000000e+00
10839	49	7.2	1966	0.000000e+00	0.000000e+00
10840	13	5.7	1966	0.000000e+00	0.000000e+00
10841	12	5.5	1966	5.038511e+05	0.000000e+00
10842	12	7.9	1966	0.000000e+00	0.000000e+00
10843	12	5.8	1966	0.000000e+00	0.000000e+00
10844	13	5.6	1966	0.000000e+00	0.000000e+00
10845	15	5.9	1966	0.000000e+00	0.000000e+00
10846	16	5.7	1966	0.000000e+00	0.000000e+00
10847	13	5.3	1966	0.000000e+00	0.000000e+00
10848	42	6.7	1966	3.436265e+07	8.061618e+07
10849	14	6.1	1966	0.000000e+00	0.000000e+00
10850	14	6.0	1966	0.000000e+00	0.000000e+00
10851	15	6.6	1966	0.000000e+00	0.000000e+00
10852	11	6.0	1966	0.000000e+00	0.000000e+00
10853	26	6.2	1966	0.000000e+00	0.000000e+00
10854	17	6.0	1966	0.000000e+00	0.000000e+00
10855	14	6.1	1966	4.702610e+06	0.000000e+00
10856	14	5.7	1966	0.000000e+00	0.000000e+00
10857	10	5.9	1966	0.000000e+00	0.000000e+00
10858	11	5.5	1966	0.000000e+00	0.000000e+00
10859	22	6.6	1966	0.000000e+00	0.000000e+00
10860	13	7.0	1966	0.000000e+00	0.000000e+00
10861	11	7.4	1966	0.000000e+00	0.000000e+00
10862	20	5.7	1966	0.000000e+00	0.000000e+00
10863	11	6.5	1966	0.000000e+00	0.000000e+00
10864	22	5.4	1966	0.000000e+00	0.000000e+00
10865	15	1.5	1966	1.276423e+05	0.000000e+00

MainActor

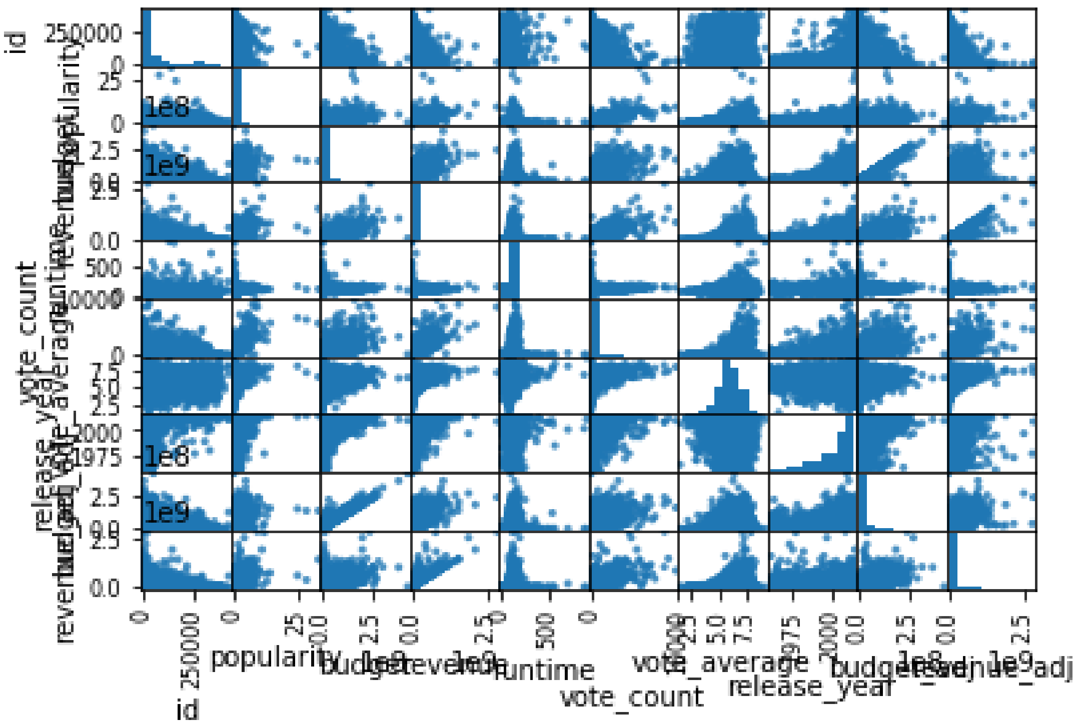
```
0                  Chris Pratt
1                    Tom Hardy
2             Shailene Woodley
3                Harrison Ford
4                   Vin Diesel
5            Leonardo DiCaprio
6        Arnold Schwarzenegger
7                   Matt Damon
8               Sandra Bullock
9                  Amy Poehler
10                Daniel Craig
11                  Mila Kunis
12            Domhnall Gleeson
13                Adam Sandler
14           Robert Downey Jr.
15           Samuel L. Jackson
16                 Liam Neeson
17                   Paul Rudd
18                  Lily James
19           Jennifer Lawrence
20             Britt Robertson
21             Jake Gyllenhaal
22              Dwayne Johnson
23              Dakota Johnson
24              Christian Bale
25                  Tom Cruise
26               Mark Wahlberg
27               Taron Egerton
28                Mark Ruffalo
29               Dylan O'Brien
...                        ...
10836               Cary Grant
10837           George Peppard
10838           Burt Lancaster
10839        Christopher Shea
10840            Michael Caine
10841            Will Hutchins
10842        Sterling Holloway
10843          Charlton Heston
10844             James Coburn
10845                Sid James
10846          Christopher Lee
10847           Peter Cushing
10848             Stephen Boyd
10849            Michael Caine
10850              Paul Newman
10851        Virginia McKenna
10852              Henry Fonda
```

```
10853             Michael Caine
10854             Marlon Brando
10855                Don Knotts
10856                Dean Jones
10857             Steve McQueen
10858               Carl Reiner
10859               Rock Hudson
10860          Kenneth Williams
10861            Michael Hynson
10862              James Garner
10863   Innokentiy Smoktunovskiy
10864           Tatsuya Mihashi
10865          Harold P. Warren

[10751 rows x 19 columns]
```

In [20]:
```
df.isnull().sum()
```

Out[20]:
```
id                        0
imdb_id                   6
popularity                0
budget                    0
revenue                   0
original_title            0
cast                      0
director                  0
overview                  3
runtime                   0
genres                   20
production_companies    972
release_date              0
vote_count                0
vote_average              0
release_year              0
budget_adj                0
revenue_adj               0
MainActor                 0
dtype: int64
```

In [37]:
```
pd.plotting.scatter_matrix(df, alpha=0.8);
```



Add new column Main Actor by applying lamda function to split the cast cell by | and get the first one

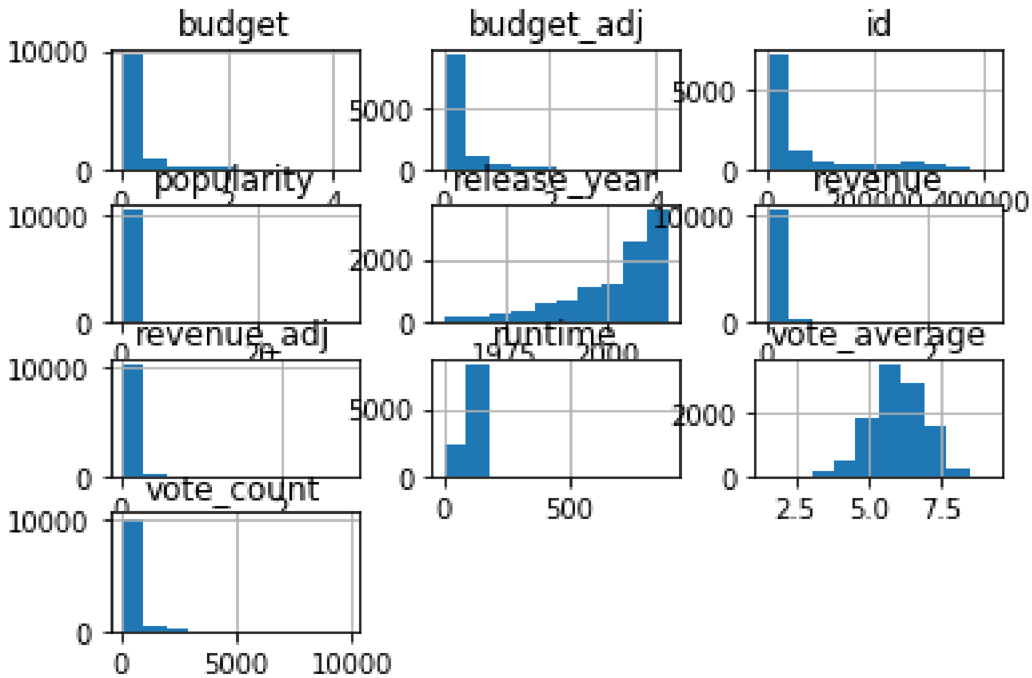
```
In [21]: # Add column Main Actor/Actress by applying lamda function to split the cast cell by |
         df['MainActor']= df['cast'].apply(lambda x: x.split('|')[0])
         # another way to get the Main actor df['MainActor']=[ act.split('|')[0] for act in df['
```

```
In [15]: df.head()
```

```
Out[15]:        id    imdb_id  popularity     budget     revenue  \
         0  135397  tt0369610   32.985763  150000000  1513528810
         1   76341  tt1392190   28.419936  150000000   378436354
         2  262500  tt2908446   13.112507  110000000   295238201
         3  140607  tt2488496   11.173104  200000000  2068178225
         4  168259  tt2820852    9.335014  190000000  1506249360

                          original_title  \
         0                Jurassic World
         1              Mad Max: Fury Road
         2                     Insurgent
         3  Star Wars: The Force Awakens
         4                     Furious 7

                                                             cast          director  \
```

```
0  Chris Pratt|Bryce Dallas Howard|Irrfan Khan|Vi...   Colin Trevorrow
1  Tom Hardy|Charlize Theron|Hugh Keays-Byrne|Nic...     George Miller
2  Shailene Woodley|Theo James|Kate Winslet|Ansel...  Robert Schwentke
3  Harrison Ford|Mark Hamill|Carrie Fisher|Adam D...       J.J. Abrams
4  Vin Diesel|Paul Walker|Jason Statham|Michelle ...         James Wan

                                            overview  runtime  \
0  Twenty-two years after the events of Jurassic ...      124
1  An apocalyptic story set in the furthest reach...      120
2  Beatrice Prior must confront her inner demons ...      119
3  Thirty years after defeating the Galactic Empi...      136
4  Deckard Shaw seeks revenge against Dominic Tor...      137

                                      genres  \
0  Action|Adventure|Science Fiction|Thriller
1  Action|Adventure|Science Fiction|Thriller
2         Adventure|Science Fiction|Thriller
3   Action|Adventure|Science Fiction|Fantasy
4                      Action|Crime|Thriller

                                production_companies release_date  vote_count  \
0  Universal Studios|Amblin Entertainment|Legenda...       6/9/15        5562
1  Village Roadshow Pictures|Kennedy Miller Produ...      5/13/15        6185
2  Summit Entertainment|Mandeville Films|Red Wago...      3/18/15        2480
3          Lucasfilm|Truenorth Productions|Bad Robot     12/15/15        5292
4  Universal Pictures|Original Film|Media Rights ...       4/1/15        2947

   vote_average  release_year    budget_adj   revenue_adj         MainActor
0           6.5          2015  1.379999e+08  1.392446e+09       Chris Pratt
1           7.1          2015  1.379999e+08  3.481613e+08         Tom Hardy
2           6.3          2015  1.012000e+08  2.716190e+08  Shailene Woodley
3           7.5          2015  1.839999e+08  1.902723e+09     Harrison Ford
4           7.3          2015  1.747999e+08  1.385749e+09        Vin Diesel
```

In [27]:
```
df.hist();
```



Exploratory Data Analysis

1.1.4 Research Question 1 (top acrtors achieved revenue in their movies)

group by Main actor and sum the revenue per actor.

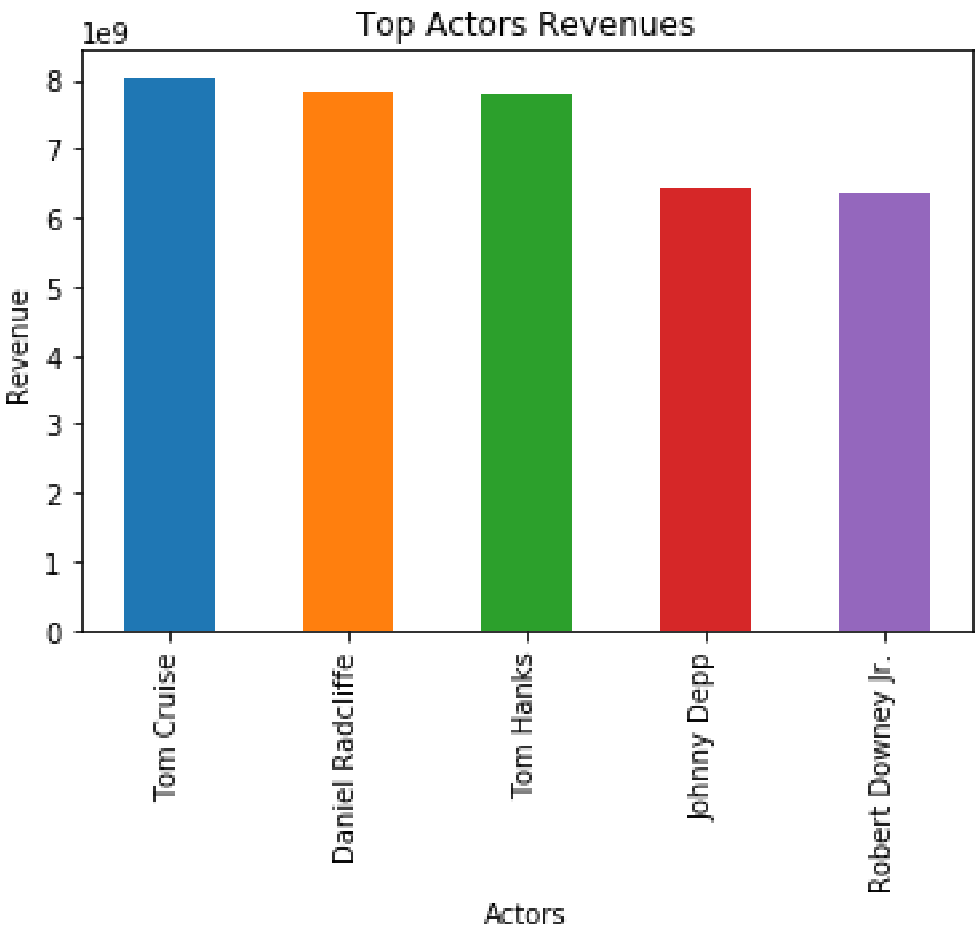
```
In [22]: #group by Main actor and sum the revenue per actor.
         top_actors = df.groupby('MainActor')['revenue'].sum().sort_values(ascending=False)
```

Get Top 5 actors

```
In [23]: top_actors =top_actors.head(5)
```

Present the 5 actors with top revenues

```
In [24]: top_actors.plot(kind='bar',title="Top Actors Revenues", label='Actor');
         plt.xlabel("Actors")
         plt.ylabel('Revenue')

Out[24]: Text(0,0.5,'Revenue')
```



The above chart, shows that, Tom cruise has the most successfull movies based on revenues

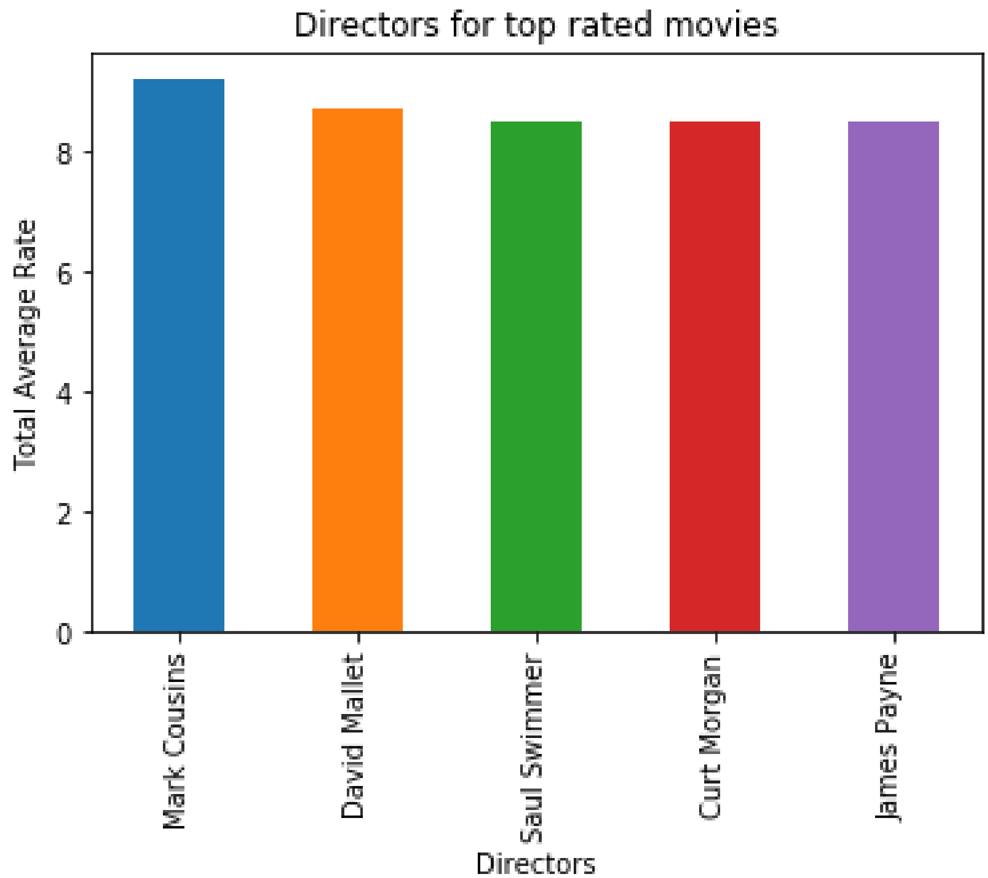
1.1.5 Research Question 2 (who the director has top rated movies)

group by directors to get the average of the vote average column for all movies directed by them.

```
In [15]: # group by directors to get the average of the vote average column for all movies direc

         top_five_directors=df.groupby('director')['vote_average'].mean().sort_values(ascending=
```

Present the directors have top rated movies

```
In [16]: top_five_directors.plot(kind='bar',title="Directors for top rated movies", label='Direc
         plt.xlabel("Directors")
         plt.ylabel('Total Average Rate')

Out[16]: Text(0,0.5,'Total Average Rate')
```



The chart above shows that the top rated movies has directed by Mark Cousins

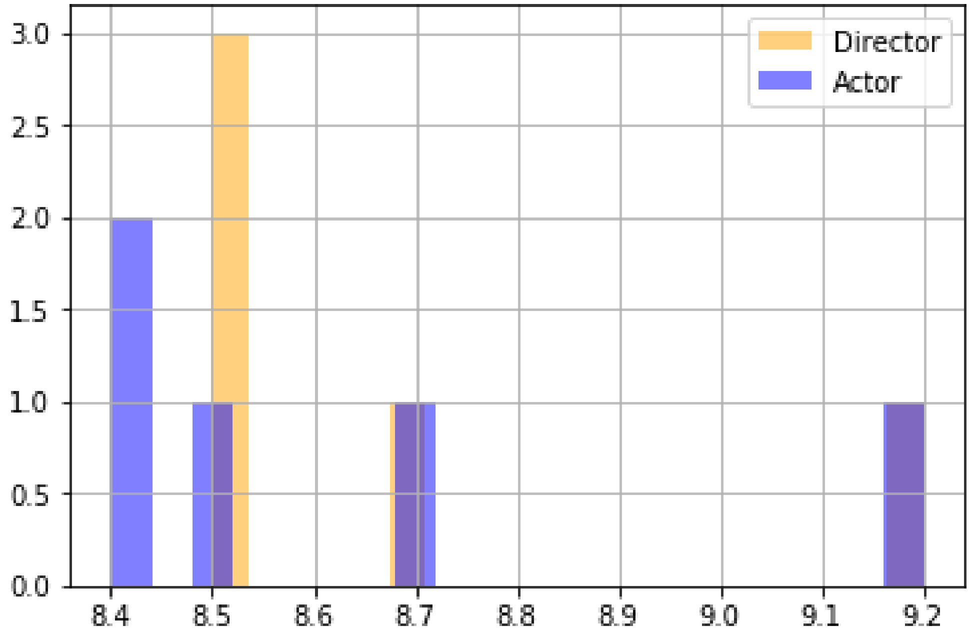
1.1.6 Extra Step

Comparing between the actors and directors for the top rated movies

```
In [17]: top_five_actors=df.groupby('MainActor')['vote_average'].mean().sort_values(ascending=Fa
```

the below chart view the relation between top rated movies for actors vs top rated movies for directors, if the blue and orange are the same hight , then both director and actor the cause to succuss this movie

```
In [18]: top_five_directors.hist(alpha=0.5, bins=20, color='orange' ,label='Director');
         top_five_actors.hist(alpha=0.5, bins=20, color='blue' ,label='Actor');
         plt.legend();
```



The chart above shows the relations between famouse actor and director, how can affect the popularity of a good movie

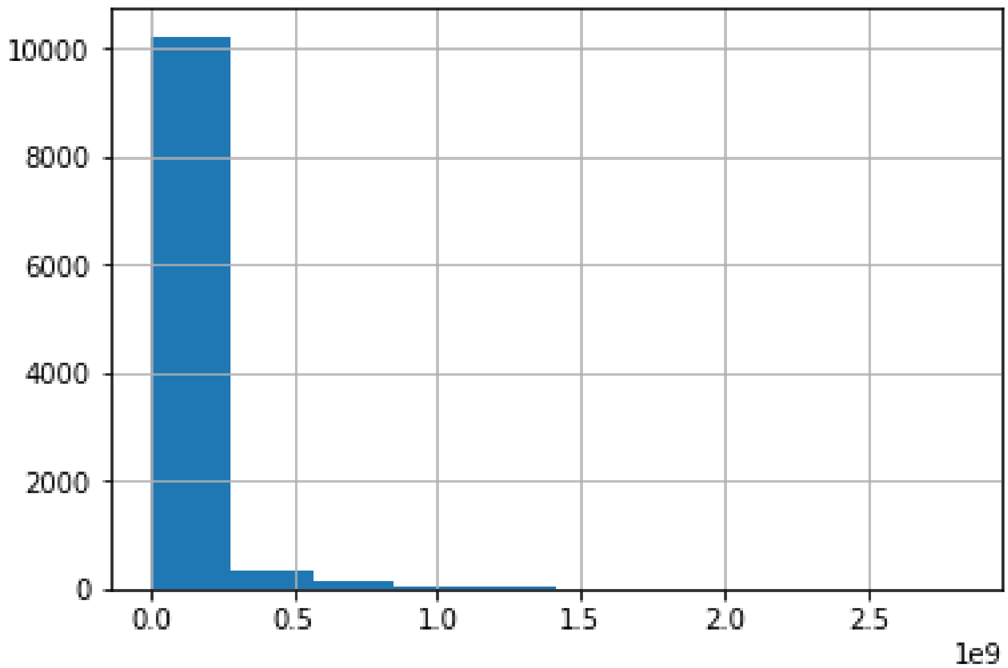
1.1.7 Question 3 (production companies revenue vs budget (loss or gain))

this question show the relation between budjet and revenue for production companies, is the companies gaining profit or lose

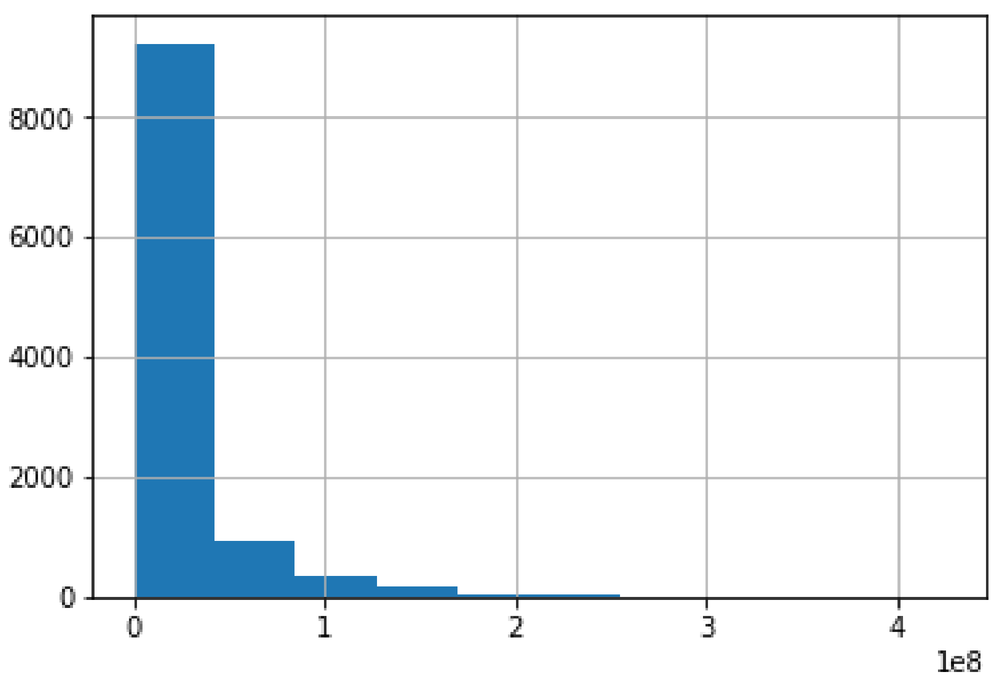
```
In [19]: def fillNAWithValue(df,colName,ValueToFill):
             '''
             This function to fill the Na values  in column
             with specific word
             args:
                 df : the dataframe
                 colName: the column name will be filled
                 ValueToFill: the value will be used to fill the NA
             '''
             df[colName].fillna(ValueToFill, inplace=True)
```

fill the NA in production companies to be Other companies

```
In [20]: #Fill NA with Other word
         fillNAWithValue(df,'production_companies','Other')

In [28]: df['revenue_adj'].hist();
```

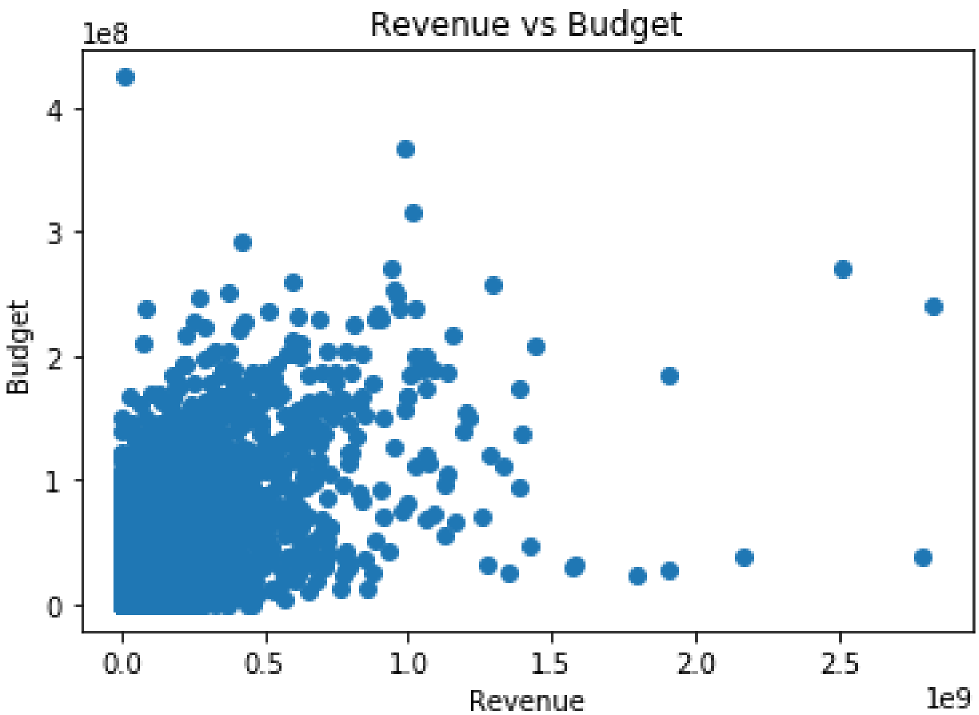



```
In [29]: df['budget_adj'].hist();
```

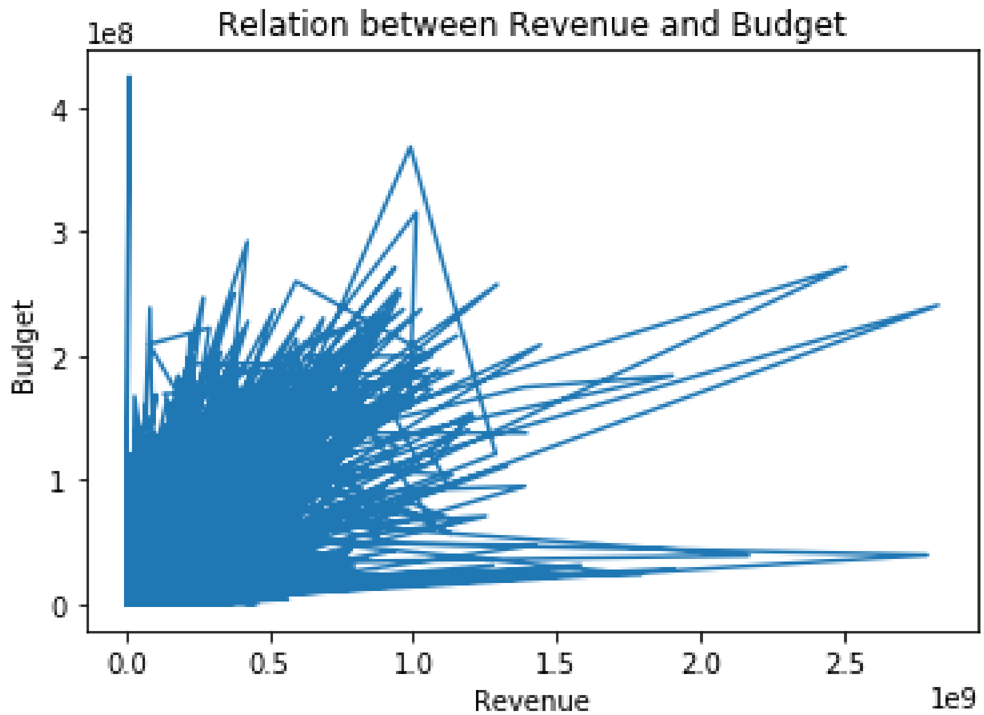


Both Budget and Revenue are right skewed, so if the budget increased the propability of the revenue increase

```
In [25]: plt.scatter(data = df, x = 'revenue_adj', y = 'budget_adj');
         plt.xlabel('Revenue')
         plt.ylabel('Budget')
         plt.title("Revenue vs Budget");
```




```
In [34]: plt.plot(df['revenue_adj'], df['budget_adj'])
         plt.xlabel('Revenue')
         plt.ylabel('Budget')
         plt.title('Relation between Revenue and Budget')
         plt.show()
```



Revenue vs budget are skeweed to the right, that means few companies are having most of the profits from the movies production

Conclusions

Last, after reviewing the movies and the revenue, we got the below:

The data sample contains data for movies with cast, production movies, titles, revenue, and budget.

In this explatory, I choose to check the success of movies based on rate and revenue, to check which actor or director has the most successfull movies.

Also checked the companies revenues, and the relation between how much they spend in production and the revenue.

findings:

1- popular actor and good director may be great factor to increase the revenue and get numerous positive ratings. 2- few companies in the movies prodcution gaining most of the revenue, but they have huge budgets.

2 Limitations

We can't get the revenue per company, because there alot of companies unions in the movies production.

2.1 Submitting your Project

```
In [24]: from subprocess import call
         call(['python', '-m', 'nbconvert', 'Investigate_a_Dataset.ipynb'])
```

Out[24]: 0

In [ ]: