Investigate_a_Dataset

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1 Data Analysis Nanodegree

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2 Project: Investigate a Dataset (TMDb Movie Dataset)

2.1 Table of Contents

Introduction

For this project, I have selected TMDb Movie dataset and I uploaded the file. I looked over the dataset and I will do some cleaning and exploring the data which that help me to answer my questions.

These are my questions: 1. What is the most runtime liked according to the most popular? 2. How the vote rating is affected by the number of voters and over the years? 3. Which movie had the highest and lowest runtime? 4. Which movie had the highest and lowest popularity? 5. Which movie had the highest and lowest vote average? 6. Which movie had the highest and lowest voters?

In [75]:
```
# Import the packages that I plan to use
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

Data Wrangling

In this section of report, I loaded the data. I will do some cleaning for the data and keep the columns which I need.

2.1.1 General Properties

```
In [76]: # Load dataset and print first two lines
         df_mo = pd.read_csv('tmdb-movies.csv')
         df_mo.head(2)
```

```
Out[76]:        id    imdb_id  popularity     budget     revenue      original_title  \
         0  135397  tt0369610   32.985763  150000000  1513528810      Jurassic World
         1   76341  tt1392190   28.419936  150000000   378436354  Mad Max: Fury Road

                                                 cast  \
         0  Chris Pratt|Bryce Dallas Howard|Irrfan Khan|Vi...
         1  Tom Hardy|Charlize Theron|Hugh Keays-Byrne|Nic...

                            homepage         director             tagline  \
         0  http://www.jurassicworld.com/  Colin Trevorrow   The park is open.
         1    http://www.madmaxmovie.com/    George Miller  What a Lovely Day.

               ...                                                overview runtime  \
         0     ...       Twenty-two years after the events of Jurassic ...     124
         1     ...       An apocalyptic story set in the furthest reach...     120

                                          genres  \
         0  Action|Adventure|Science Fiction|Thriller
         1  Action|Adventure|Science Fiction|Thriller

                                    production_companies release_date vote_count  \
         0  Universal Studios|Amblin Entertainment|Legenda...     6/9/2015       5562
         1  Village Roadshow Pictures|Kennedy Miller Produ...    5/13/2015       6185

            vote_average  release_year    budget_adj   revenue_adj
         0           6.5          2015  137999939.3  1.392446e+09
         1           7.1          2015  137999939.3  3.481613e+08

         [2 rows x 21 columns]
```

Here we can know that, there are 10866 rows and 21 columns.

```
In [77]: # To know number of columns and rows in dataset
         df_mo.shape
```

```
Out[77]: (10866, 21)
```

```
In [78]: # To know which column has non value
         df_mo.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 [79]: df_mo.describe()
```

Out[79]:

	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

Data Description

As we see from description of the dataset, there are 0 values in some columns. Such as budget, revenue, runtime, budget_adj, and revenue_adj. I will clean the dataset in Data Cleaning section.

```
In [80]: # To know data type for each column
         df_mo.dtypes
```

```
Out[80]: id                      int64
         imdb_id                 object
         popularity             float64
         budget                   int64
         revenue                  int64
         original_title          object
         cast                    object
         homepage                object
         director                object
         tagline                 object
         keywords                object
         overview                object
         runtime                  int64
         genres                  object
         production_companies    object
         release_date            object
         vote_count               int64
         vote_average           float64
         release_year             int64
         budget_adj             float64
         revenue_adj            float64
         dtype: object
```

Change Format > As we see above, the data type for release_date is not DateTime. I'll change it to date time format.

```
In [81]: # Change data type for release_date from string to datetime
         df_mo['release_date'] = pd.to_datetime(df_mo['release_date'])
         df_mo['release_date'].head()
```

```
Out[81]: 0   2015-06-09
         1   2015-05-13
         2   2015-03-18
         3   2015-12-15
         4   2015-04-01
         Name: release_date, dtype: datetime64[ns]
```

2.2 Data Cleaning

In this section, I will do some cleaning for the dataset. - Drop unneeded columns. - Change the 0 values to NAN. - Drop the NAN values. - Drop duplicated rows.

2.2.1 Drop columns

I will drop unneeded columns. Such as homepage, cast, tagline, revenue_adj, and budget_adj

```
In [82]: # Drop columns homepage, cast, tagline, revenue_adj, and budget_adj.
         df_mo.drop(['homepage', 'cast', 'tagline', 'revenue_adj', 'budget_adj', 'keywords'], ax
```

```
In [83]: # To check columns were deleted.
         df_mo.head(2)
```

```
Out[83]:       id    imdb_id  popularity     budget     revenue      original_title  \
         0  135397  tt0369610   32.985763  150000000  1513528810      Jurassic World
         1   76341  tt1392190   28.419936  150000000   378436354  Mad Max: Fury Road

                director                                           overview  \
         0  Colin Trevorrow  Twenty-two years after the events of Jurassic ...
         1    George Miller  An apocalyptic story set in the furthest reach...

            runtime                                     genres  \
         0      124  Action|Adventure|Science Fiction|Thriller
         1      120  Action|Adventure|Science Fiction|Thriller

                                       production_companies release_date  vote_count  \
         0  Universal Studios|Amblin Entertainment|Legenda...   2015-06-09        5562
         1  Village Roadshow Pictures|Kennedy Miller Produ...   2015-05-13        6185

            vote_average  release_year
         0           6.5          2015
         1           7.1          2015
```

After droping columns, we can see the number on columns became 15 columns after droping 6 columns.

```
In [84]: df_mo.shape
```

```
Out[84]: (10866, 15)
```

2.2.2 Change the 0 values to NAN

- I will check how many 0 values are there in runtime column.
- Change the 0 values to NAN in runtime.

```
In [85]: zero_value = df_mo[(df_mo['runtime']==0)].shape[0]
         print(zero_value)
```

```
31
```

2.2.3 Drop the NAN values

- As we see above, there are 31 zero values in runtime column.
- I will change al 31 values to NAN.

```
In [86]: # Creating a variable for runtime column.
         run_time=['runtime']

         # Replace all the value from '0' to NAN in runtime column.
         df_mo[run_time] = df_mo[run_time].replace(0, np.NAN)

         # Drop all the row which has NaN value in runtime column.
         df_mo.dropna(subset = run_time, inplace = True)

         rows, col = df_mo.shape
         print('After droping all  NAN rows in runtime column, now we have only {} movies.'.form
```

```
After droping all  NAN rows in runtime column, now we have only 10834 movies.
```

2.2.4 Drop duplicated rows

- I will check if there any dublicated rows.
- I will drop all dubplicated rows.

```
In [87]: # Print number of duplicated of rows
         print(df_mo.duplicated().sum())
```

```
1
```

```
In [88]: # Drop a duplicated row
         df_mo.drop_duplicates(inplace=True)

In [89]: # To cofirm, there are not any duplicate row
         # The result should be false
         df_mo.duplicated().any()

Out[89]: False
```

Exploratory Data Analysis

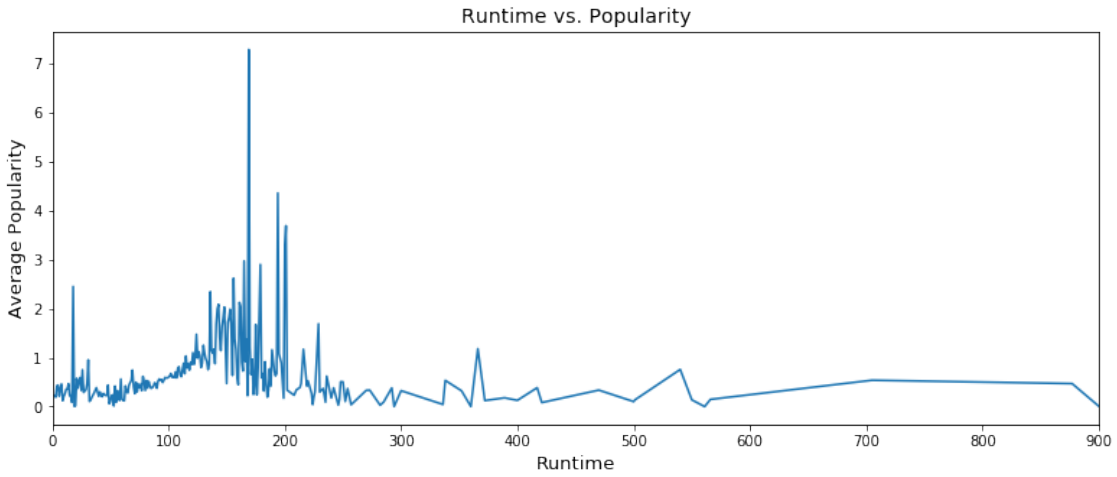
Tip: Now that you've trimmed and cleaned your data, you're ready to move on to exploration. Compute statistics and create visualizations with the goal of addressing the research questions that you posed in the Introduction section. It is recommended that you be systematic with your approach. Look at one variable at a time, and then follow it up by looking at relationships between variables.

2.2.5 Research Question 1: What is the most runtime liked according to the most popular?

```
In [90]: # Make the group by runtime and find the mean popularity and make plot.
         df_mo.groupby('runtime')['popularity'].mean().plot(figsize = (13,5),xticks=np.arange(0,

         #setup the figure
         plt.title("Runtime vs. Popularity",fontsize = 14)
         plt.xlabel('Runtime',fontsize = 13)
         plt.ylabel('Average Popularity',fontsize = 13)
```

```
Out[90]: Text(0,0.5,'Average Popularity')
```

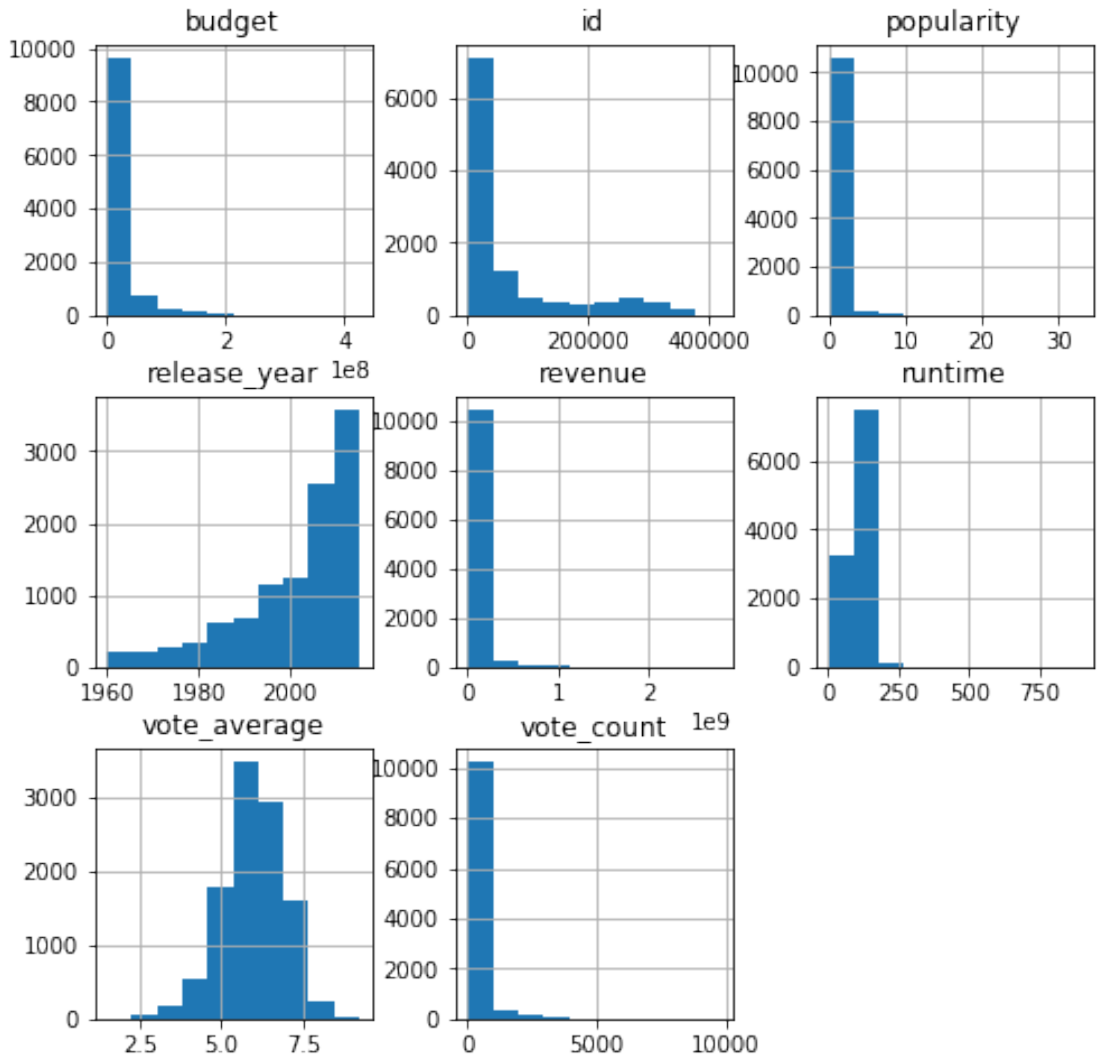


From Runtime vs. Popularity Plot, we can see the most runtime liked was between 100 and 200. It is about above 150.

2.2.6 Research Question 2: How the vote rating is affected by the number of voters and over the years?

```
In [91]: # Make histograms for all columns in dataset
         # To see how their shapes are
         df_mo.hist(figsize=(8,8))
```

```
Out[91]: array([[<matplotlib.axes._subplots.AxesSubplot object at 0x7effddcd4978>,
                 <matplotlib.axes._subplots.AxesSubplot object at 0x7effdd22a438>,
                 <matplotlib.axes._subplots.AxesSubplot object at 0x7effd80b3208>],
                [<matplotlib.axes._subplots.AxesSubplot object at 0x7effdc9700b8>,
                 <matplotlib.axes._subplots.AxesSubplot object at 0x7effdc4cd0b8>,
                 <matplotlib.axes._subplots.AxesSubplot object at 0x7effdc4cd438>],
                [<matplotlib.axes._subplots.AxesSubplot object at 0x7effdbcbdeb8>,
                 <matplotlib.axes._subplots.AxesSubplot object at 0x7effdb8aeeb8>,
                 <matplotlib.axes._subplots.AxesSubplot object at 0x7effdb41e0b8>]], dtype=objec
```



As we se from histgrams above, relaese_year histogram is Left Skewed. There is a positive relationship between the number of movie production and over the years. Also, we can see vote_average histogram is Right Skewed. So, we can say the old movise were most liked than new movise.

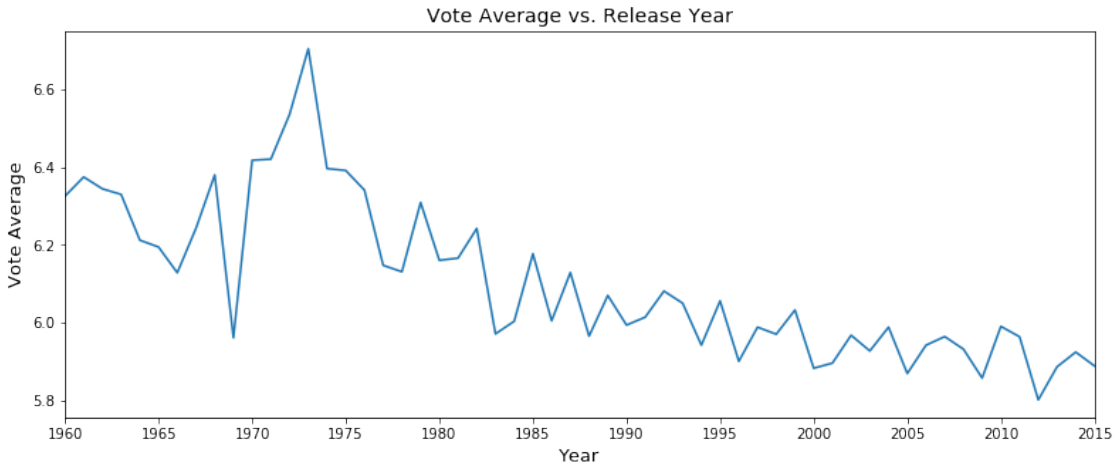
2.2.7 Vote Average vs. Release Year

In this section, we will see how the vote rating for movies is different and became lower from year to year. This confirms what we said before from histogram.

```
In [92]: # Make the group by release year and find mean with vote average and make plot
         df_mo.groupby('release_year').mean()['vote_average'].plot(figsize = (13,5), xticks = np
```

```
#setup the figure
plt.title("Vote Average vs. Release Year",fontsize = 14)
plt.xlabel('Year',fontsize = 13)
plt.ylabel('Vote Average',fontsize = 13)
```

Out[92]: Text(0,0.5,'Vote Average')



From Vote Average vs. Year Plot, we can say the most vote average was above 6.6 and the movie was produced between the year 1970 and 1975.

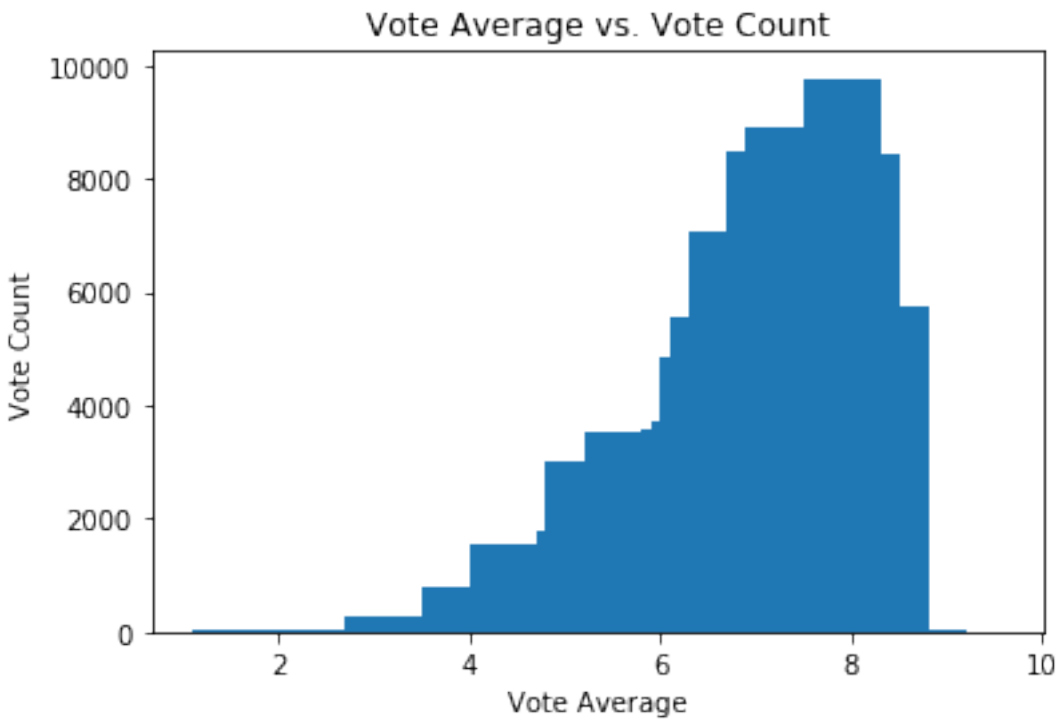
2.2.8 Vote Average vs. Vote Count

In this section, we will see how the vote rating for movies is different and became higher from year to year. This confirms that the vote average increase when vote count is increased.

In [93]:
```
# Create variables for vote count and vote average
voters = df_mo['vote_count']
vote_avg = df_mo['vote_average']

# setup the plot
plt.bar(vote_avg, voters);
plt.xlabel('Vote Average')
plt.ylabel('Vote Count')
plt.title('Vote Average vs. Vote Count')
```

Out[93]: Text(0.5,1,'Vote Average vs. Vote Count')



From Vote Average vs. Vote Count Bar Plot, we can see the relationship between them is Right Skewed. So There is a positive relationship.

2.2.9 Research Question 3: Which movie had the highest and lowest runtime?

```
In [95]: # Define high_low function to return the highest and lowest values from dataset
         def high_low(column_name):
             # Create variabel and use idxmin to find the lowest value
             low_index = df_mo[column_name].idxmin()
             # Create variabel and use idxmax to find the highest value.
             high_index = df_mo[column_name].idxmax()
             # Create variables that contain highest, lowest, and rest of columns
             high = pd.DataFrame(df_mo.loc[high_index,:])
             low = pd.DataFrame(df_mo.loc[low_index,:])

             # Print the lowest and highest movie
             print("The Highest Movie is "+ column_name + " : ",df_mo['original_title'][high_ind
             print("The Lowest Movie is "+ column_name + "  : ",df_mo['original_title'][low_inde
             return pd.concat([high,low],axis = 1)

         # Call high_low function
         high_low('runtime')
```

```
The Highest Movie is runtime :  The Story of Film: An Odyssey
The Lowest Movie is runtime  :  Fresh Guacamole
```

Out[95]:

	3894	4883
id	125336	142563
imdb_id	tt2044056	tt2309977
popularity	0.006925	0.078472
budget	0	0
revenue	0	0
original_title	The Story of Film: An Odyssey	Fresh Guacamole
director	Mark Cousins	PES
overview	The Story of Film: An Odyssey, written and dir...	In this follow-up to his stop-motion hit Weste...
runtime	900	2
genres	Documentary	Animation
production_companies	NaN	NaN
release_date	2011-09-03 00:00:00	2012-03-02 00:00:00
vote_count	14	29
vote_average	9.2	7.9
release_year	2011	2012

2.2.10 Research Question 4: Which movie had the highest and lowest popularity?

In [96]:
```
# Call high_low function
high_low('popularity')
```

```
The Highest Movie is popularity :  Jurassic World
The Lowest Movie is popularity  :  North and South, Book I
```

Out[96]:

	0
id	135397

```
imdb_id                                                  tt0369610
popularity                                                32.9858
budget                                                  150000000
revenue                                                1513528810
original_title                                       Jurassic World
director                                            Colin Trevorrow
overview             Twenty-two years after the events of Jurassic ...
runtime                                                       124
genres                      Action|Adventure|Science Fiction|Thriller
production_companies  Universal Studios|Amblin Entertainment|Legenda...
release_date                                    2015-06-09 00:00:00
vote_count                                                   5562
vote_average                                                  6.5
release_year                                                 2015

                                                             6181
id                                                          18729
imdb_id                                                 tt0088583
popularity                                                6.5e-05
budget                                                          0
revenue                                                         0
original_title                            North and South, Book I
director                                                      NaN
overview             Two friends, one northern and one southern, st...
runtime                                                       561
genres                                        Drama|History|Western
production_companies                                          NaN
release_date                                    1985-11-03 00:00:00
vote_count                                                     17
vote_average                                                    6
release_year                                                 1985
```

2.2.11 Research Question 5: Which movie had the highest and lowest vote average?

```
In [97]: # Call high_low function
         high_low('vote_average')
```

```
The Highest Movie is vote_average :  The Story of Film: An Odyssey
The Lowest Movie is vote_average  :  Transmorphers
```

```
Out[97]:                                                        3894  \
         id                                                   125336
         imdb_id                                          tt2044056
         popularity                                        0.006925
         budget                                                   0
         revenue                                                  0
         original_title                    The Story of Film: An Odyssey
```

```
director                                                  Mark Cousins
overview              The Story of Film: An Odyssey, written and dir...
runtime                                                             900
genres                                                      Documentary
production_companies                                                NaN
release_date                                        2011-09-03 00:00:00
vote_count                                                           14
vote_average                                                        9.2
release_year                                                       2011

                                                                   7772
id                                                                25055
imdb_id                                                      tt0960835
popularity                                                     0.12112
budget                                                               0
revenue                                                              0
original_title                                             Transmorphers
director                                                     Leigh Scott
overview              About a race of alien robots that have conquer...
runtime                                                             86
genres                                 Action|Adventure|Science Fiction
production_companies                                        Asylum, The
release_date                                        2007-06-26 00:00:00
vote_count                                                           10
vote_average                                                        1.5
release_year                                                       2007
```

2.2.12 Research Question 6: Which movie had the highest and lowest voters?

```
In [98]: # Call high_low function
         high_low('vote_count')
```

```
The Highest Movie is vote_count :  Inception
The Lowest Movie is vote_count  :  The Unspoken
```

```
Out[98]:                                                            1919  \
         id                                                        27205
         imdb_id                                                tt1375666
         popularity                                               9.36364
         budget                                                 160000000
         revenue                                                825500000
         original_title                                         Inception
         director                                          Christopher Nolan
         overview              Cobb, a skilled thief who commits corporate es...
         runtime                                                       148
         genres                Action|Thriller|Science Fiction|Mystery|Adventure
         production_companies           Legendary Pictures|Warner Bros.|Syncopy
```

```
release_date                                          2010-07-14 00:00:00
vote_count                                                           9767
vote_average                                                          7.9
release_year                                                         2010

                                                                      240
id                                                                 363689
imdb_id                                                         tt4229298
popularity                                                         0.5327
budget                                                                  0
revenue                                                                 0
original_title                                              The Unspoken
director                                                   Sheldon Wilson
overview             In 1997 the close-knit Anderson family vanishe...
runtime                                                                90
genres                                                    Thriller|Horror
production_companies         Lighthouse Pictures|Sapphire Fire Limited
release_date                                          2015-10-24 00:00:00
vote_count                                                             10
vote_average                                                          4.1
release_year                                                         2015
```

From the answers of questions above, I discovered that the longest movie got the highest rating.

The highest runtime : 900

The highest vote average : 9.2

The released year : 2011

Genres : Documentary

2.2.13 The movie is The Story of Film: An Odyssey.

Limitations > From TMDb Movie Dataset, I have analyzed this data according to runtime, popularity, vote average, vote count, and release year. I have cleaned the data to get the answers to my questions. I have seen a lot of 0 values in revenue and budget. Then, I decided not to use them in the analysis. Because the analysis will be not accurate. Also, I have dropped some columns which unneeded for my questions.There are some operations that I did such as changing the data type, changing 0 values to NAN for runtime column, defining the function high_low that returns the highest and lowest values, creating different types of plots such as bar plot, line plot and histograms plot.

Conclusions

From the analysis above, I have got all the answers to my questions. Now, I'm able to know the best run time of the movie for the most people, how the vote rating affected

by voters and over the year, the movies which had the highest and the lowest runtime, popularity, vote average, and voters. I did some cleaning, dropping, changing the data type, changing 0 values to NAN for runtime column, defining the function high_low that returns the highest and lowest values, creating different types of plots which make easy to find the information. This analysis is very helpful for the researcher about movies.

```
In [99]: from subprocess import call
         call(['python', '-m', 'nbconvert', 'Investigate_a_Dataset.ipynb'])
```

```
Out[99]: 0
```

```
In [ ]:
```

```
In [ ]:
```