Investigate_a_Dataset

October 19, 2018

1 Project: Investigate a Movies Dataset

1.1 Table of Contents

Introduction Investigate a movie dataset to find the common thing for a good movie as well as some of their charateristic to be able to make the highest rating or profit. Here are my curious question that I am seeking to answer based on this data 1. How did the customer rating of those movies change from the past to present? 2. What is the sweet spot for a movie length? (of which they make the most revenue)

Firsly, I imported some libraries that needed for the analysis

```
In [19]: import numpy as np
         import pandas as pd
         import matplotlib.pyplot as plt
         import seaborn as sns
         % matplotlib inline
```

Data Wrangling

1.1.1 General Properties

Secondly, we read the data from CSV file, then we take a look at some of the rows in the top of the files

```
In [20]: df = pd.read_csv('tmdb-movies.csv')
         df.head()
```

```
Out[20]:        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  \
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 ...   

                                             homepage          director  \
0                       http://www.jurassicworld.com/   Colin Trevorrow   
1                         http://www.madmaxmovie.com/     George Miller   
2     http://www.thedivergentseries.movie/#insurgent  Robert Schwentke   
3  http://www.starwars.com/films/star-wars-episod...       J.J. Abrams   
4                            http://www.furious7.com/         James Wan   

                         tagline      ...       \
0              The park is open.      ...        
1             What a Lovely Day.      ...        
2     One Choice Can Destroy You      ...        
3  Every generation has a story.      ...        
4            Vengeance Hits Home      ...        

                                             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
0           6.5          2015  1.379999e+08  1.392446e+09
1           7.1          2015  1.379999e+08  3.481613e+08
2           6.3          2015  1.012000e+08  2.716190e+08
3           7.5          2015  1.839999e+08  1.902723e+09
4           7.3          2015  1.747999e+08  1.385749e+09

[5 rows x 21 columns]
```

To see how many rows and columns it has

```
In [21]: df.shape
```

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

To look at the data by its count, mean, standard deviation, ...

```
In [22]: df.describe()
```

```
Out[22]:                   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
```

Taking a look at the data info to see how many cell are missing, NA or zeros

```
In [23]: 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
```

1.1.2 Data Cleaning (Replace this with more specific notes!)

Dropping some unnecessary columns

```
In [24]: df.drop(['id', 'imdb_id', 'original_title', 'cast', 'homepage', 'director', 'tagline',
```

To see if these columns are all gone

```
In [25]: df.head()
```

```
Out[25]:    popularity     budget     revenue  runtime  \
         0   32.985763  150000000  1513528810      124
         1   28.419936  150000000   378436354      120
         2   13.112507  110000000   295238201      119
         3   11.173104  200000000  2068178225      136
         4    9.335014  190000000  1506249360      137

                                            genres  vote_count  vote_average  \
         0  Action|Adventure|Science Fiction|Thriller        5562           6.5
         1  Action|Adventure|Science Fiction|Thriller        6185           7.1
         2         Adventure|Science Fiction|Thriller        2480           6.3
         3   Action|Adventure|Science Fiction|Fantasy        5292           7.5
         4                      Action|Crime|Thriller        2947           7.3

            release_year
         0          2015
```

```
1         2015
2         2015
3         2015
4         2015
```

To see how much data is missing

```
In [26]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10866 entries, 0 to 10865
Data columns (total 8 columns):
popularity      10866 non-null float64
budget          10866 non-null int64
revenue         10866 non-null int64
runtime         10866 non-null int64
genres          10843 non-null object
vote_count      10866 non-null int64
vote_average    10866 non-null float64
release_year    10866 non-null int64
dtypes: float64(2), int64(5), object(1)
memory usage: 679.2+ KB
```

Taking a look at the cell where there are NaN values

```
In [27]: df[df.genres.isnull()]
```

```
Out[27]:       popularity  budget  revenue  runtime genres  vote_count  vote_average  \
         424     0.244648       0        0      100    NaN          21           6.1
         620     0.129696       0        0       90    NaN          13           5.0
         997     0.330431       0        0       44    NaN          13           6.8
         1712    0.302095       0        0       88    NaN          57           7.4
         1897    0.020701       0        0       76    NaN          11           7.0
         2370    0.081892       0        0        0    NaN          12           5.8
         2376    0.068411       0        0       62    NaN          11           7.7
         2853    0.130018       0        0      110    NaN          12           7.2
         3279    0.145331       0        0       96    NaN          11           6.1
         4547    0.520520       0        0      220    NaN          12           8.3
         4732    0.235911       0        0      100    NaN          12           6.2
         4797    0.167501       0        0       60    NaN          10           7.8
         4890    0.083202       0        0        2    NaN          14           7.0
         5830    0.248944       0        0       60    NaN          26           8.5
         5934    0.067433       0        0        3    NaN          27           6.9
         6043    0.039080       0        0      127    NaN          12           5.9
         6530    0.092724       0        0        6    NaN          24           5.9
         8234    0.028874       0        0      103    NaN          44           6.7
         8614    0.273934       0        0       12    NaN          14           6.7
         8878    0.038045       0        0       85    NaN          16           5.4
```

```
9307     0.094652       0         0       105    NaN           10            5.3
9799     0.175008       0         0         5    NaN           11            5.0
10659    0.344172    5000         0        71    NaN           10            3.0

       release_year
424            2015
620            2015
997            2014
1712           2009
1897           2009
2370           2010
2376           2010
2853           2001
3279           2008
4547           2012
4732           2012
4797           2012
4890           2012
5830           2013
5934           2013
6043           2013
6530           2005
8234           1995
8614           1996
8878           2000
9307           1989
9799           1974
10659          1970
```

Removing those NaN cells

```
In [28]: df.dropna(inplace=True)
```

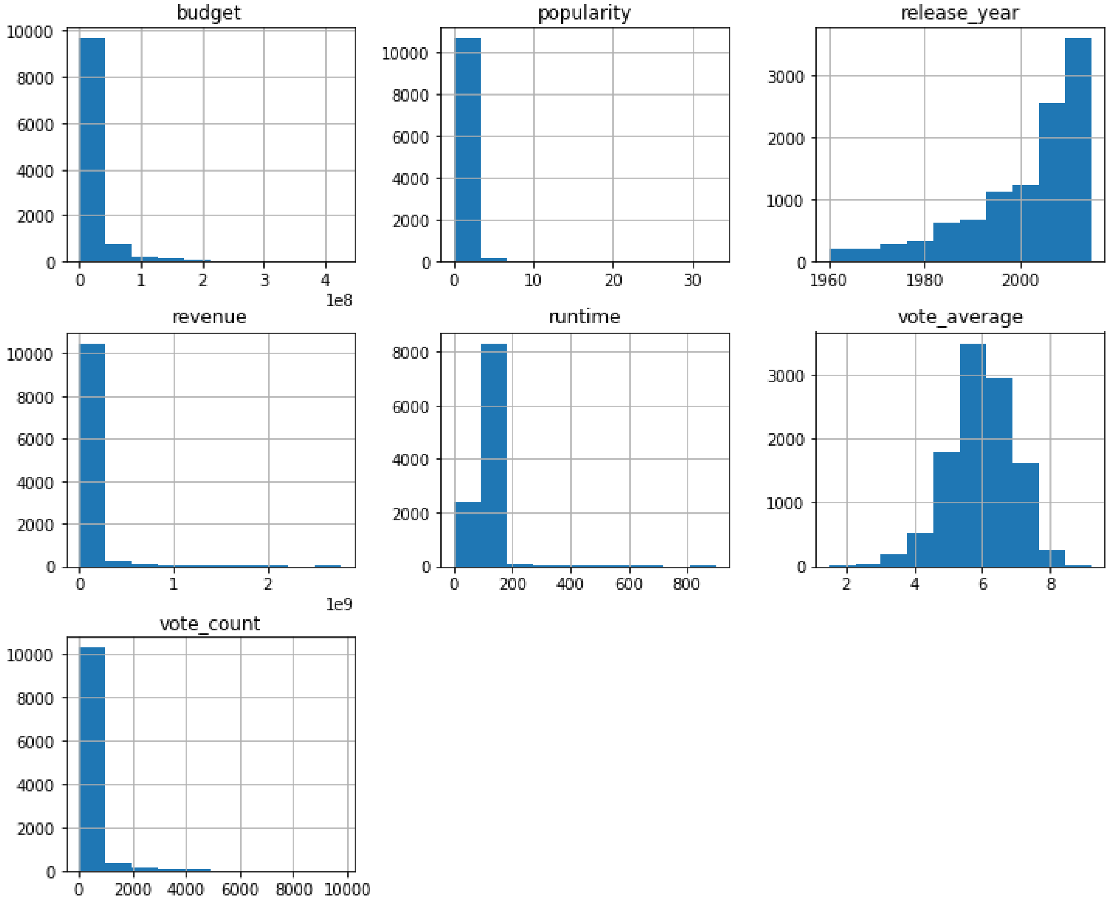
```
In [29]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 10843 entries, 0 to 10865
Data columns (total 8 columns):
popularity      10843 non-null float64
budget          10843 non-null int64
revenue         10843 non-null int64
runtime         10843 non-null int64
genres          10843 non-null object
vote_count      10843 non-null int64
vote_average    10843 non-null float64
release_year    10843 non-null int64
dtypes: float64(2), int64(5), object(1)
memory usage: 762.4+ KB
```

Taking a general look at the data by histograms

```
In [30]: df.hist(figsize=(12,10))
```

```
Out[30]: array([[<matplotlib.axes._subplots.AxesSubplot object at 0x7f53a1b6dcc0>,
                 <matplotlib.axes._subplots.AxesSubplot object at 0x7f53a584b198>,
                 <matplotlib.axes._subplots.AxesSubplot object at 0x7f53a5806198>],
                [<matplotlib.axes._subplots.AxesSubplot object at 0x7f53a57bd208>,
                 <matplotlib.axes._subplots.AxesSubplot object at 0x7f53a5763c50>,
                 <matplotlib.axes._subplots.AxesSubplot object at 0x7f53a5763c88>],
                [<matplotlib.axes._subplots.AxesSubplot object at 0x7f53a56e2160>,
                 <matplotlib.axes._subplots.AxesSubplot object at 0x7f53a56991d0>,
                 <matplotlib.axes._subplots.AxesSubplot object at 0x7f53a56d30f0>]], dtype=objec
```



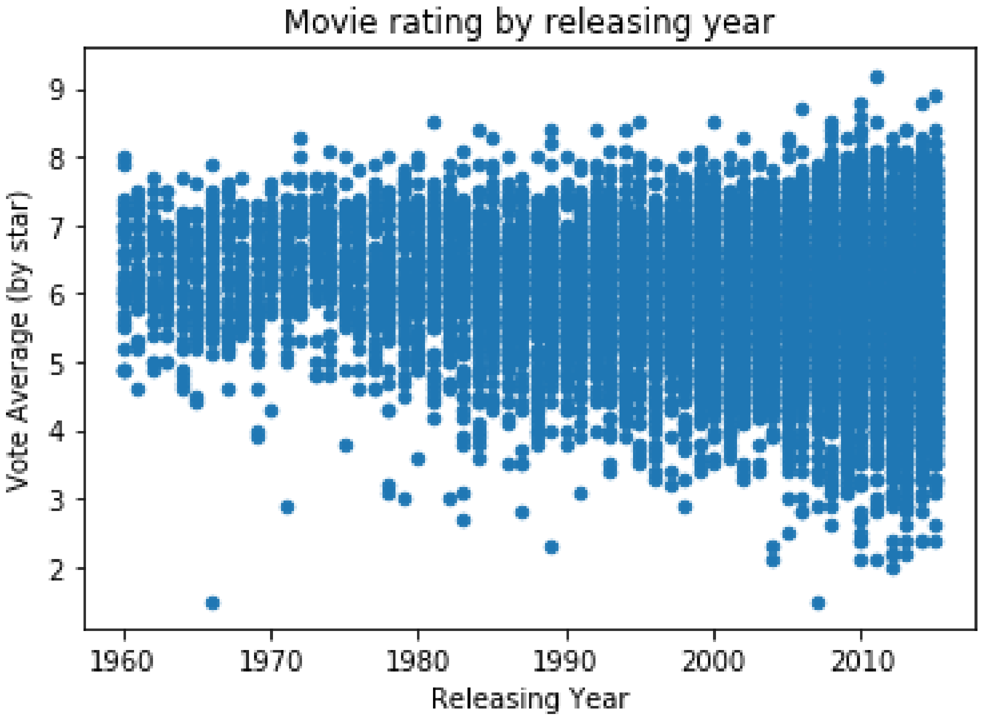
Exploratory Data Analysis

1.1.3 Research Question 1: How did the customer rating of those movies change from the past to present?

I create a scatter plot to show the relation between 'release_year' and 'vote_average'. It is better to use scatter plot than any other kinds of graph for this situation

```
In [37]: df1 = df.plot(x='release_year', y = 'vote_average', kind = 'scatter',title='Movie ratin
         df1.set_ylabel('Vote Average (by star)')
         df1.set_xlabel('Releasing Year')

Out[37]: Text(0.5,0,'Releasing Year')
```



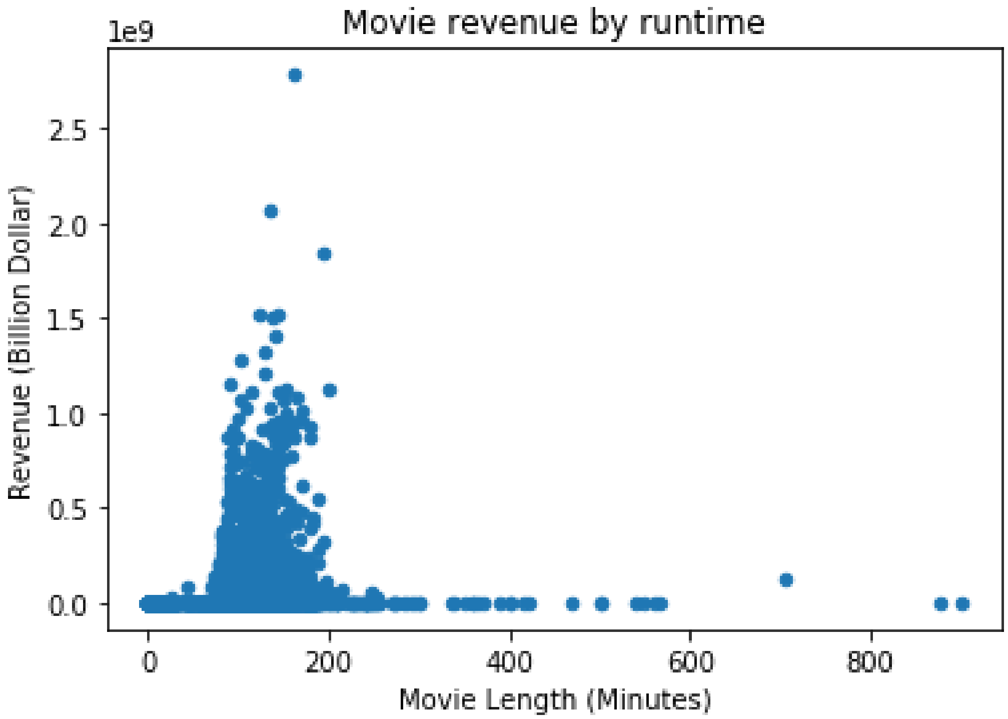
Answer: As illustrated in the scatter graph, recently released movies come with both higher and lower range of rating point compared to the old movies. In other words, customer rating are now more diversity than that of the past. More ever, in the other hand, it seems like we have more worse movie than better movies releasing than that of the past

1.1.4 Research Question 2: What is the sweet spot for a movie length? (of which they make the most revenue)

To answer this question, I demostate the relation between 'runtime' and 'revenue' by this graph. It is better to use scatter plot than any other kinds of graph for this situation

```
In [41]: df2 = df.plot(x = 'runtime', y='revenue', kind='scatter', title='Movie revenue by runti
         df2.set_xlabel('Movie Length (Minutes)')
         df2.set_ylabel('Revenue (Billion Dollar)')

Out[41]: Text(0,0.5,'Revenue (Billion Dollar)')
```



As demostrated by the graph, the most profitable movies were created in between 130 to 200 minutes. This is where the dots stay at the highest density level

Conclusions

The dataset seems like providing me enough information to answer my questions.

Based on my investigation, customer rating are now more diversity than that of the past with the old movie rating average is a little higher than nowaday's movie.

To get the most of of profit, a movie should go between 130 to 200 minutes. This charateristic are pretty accurate because it based on a large amount of movies investigated

Convert file command:

```
In [150]: from subprocess import call
          call(['python', '-m', 'nbconvert', 'Investigate_a_Dataset.ipynb'])

Out[150]: 0
```