Investigate_a_Dataset

November 19, 2017

> **Tip**: Welcome to the Investigate a Dataset project! You will find tips in quoted sections like this to help organize your approach to your investigation. Before submitting your project, it will be a good idea to go back through your report and remove these sections to make the presentation of your work as tidy as possible. First things first, you might want to double-click this Markdown cell and change the title so that it reflects your dataset and investigation.

1 Project: Investigate a Dataset (TMDb movie data!)

1.1 Table of Contents

Introduction

> **Tip**: In this section of the report, provide a brief introduction to the dataset you've selected for analysis. At the end of this section, describe the questions that you plan on exploring over the course of the report. Try to build your report around the analysis of at least one dependent variable and three independent variables. If you're not sure what questions to ask, then make sure you familiarize yourself with the dataset, its variables and the dataset context for ideas of what to explore.
>
> If you haven't yet selected and downloaded your data, make sure you do that first before coming back here. In order to work with the data in this workspace, you also need to upload it to the workspace. To do so, click on the jupyter icon in the upper left to be taken back to the workspace directory. There should be an 'Upload' button in the upper right that will let you add your data file(s) to the workspace. You can then click on the .ipynb file name to come back here.

```
In [16]: # Use this cell to set up import statements for all of the packages that you
         #   plan to use.

         # Remember to include a 'magic word' so that your visualizations are plotted
         #   inline with the notebook. See this page for more:
         #   http://ipython.readthedocs.io/en/stable/interactive/magics.html
```

Data Wrangling

Tip: In this section of the report, you will load in the data, check for cleanliness, and then trim and clean your dataset for analysis. Make sure that you document your steps carefully and justify your cleaning decisions.

1.1.1 General Properties

In [17]:
```
# Load your data and print out a few lines. Perform operations to inspect data
#   types and look for instances of missing or possibly errant data.
import pandas as pd
movie = pd.read_csv('tmdb_movies.csv') # reading the file
movie.head()                           # Printing top 5 rows of data
```

Out[17]:

	id	imdb_id	popularity	budget	revenue	original_title	cast	homepage	director	tagline	...
0	135397	tt0369610	32.985763	150000000	1513528810	Jurassic World	Chris Pratt|Bryce Dallas Howard|Irrfan Khan|Vi...	http://www.jurassicworld.com/	Colin Trevorrow	The park is open.	...
1	76341	tt1392190	28.419936	150000000	378436354	Mad Max: Fury Road	Tom Hardy|Charlize Theron|Hugh Keays-Byrne|Nic...	http://www.madmaxmovie.com/	George Miller	What a Lovely Day.	...
2	262500	tt2908446	13.112507	110000000	295238201	Insurgent	Shailene Woodley|Theo James|Kate Winslet|Ansel...	http://www.thedivergentseries.movie/#insurgent	Robert Schwentke	One Choice Can Destroy You	...
3	140607	tt2488496	11.173104	200000000	2068178225	Star Wars: The Force Awakens	Harrison Ford|Mark Hamill|Carrie Fisher|Adam D...	http://www.starwars.com/films/star-wars-episod...	J.J. Abrams	Every generation has a story.	...
4	168259	tt2820852	9.335014	190000000	1506249360	Furious 7	Vin Diesel|Paul Walker|Jason Statham|Michelle ...	http://www.furious7.com/	James Wan	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  137999939.3  1.392446e+09
1           7.1          2015  137999939.3  3.481613e+08
2           6.3          2015  101199955.5  2.716190e+08
3           7.5          2015  183999919.0  1.902723e+09
4           7.3          2015  174799923.1  1.385749e+09

[5 rows x 21 columns]
```

```
In [18]: movie.shape # checking # of rows and columns
```

```
Out[18]: (10866, 21)
```

```
In [19]: sum(movie.duplicated()) # finding number of duplicated rows
```

```
Out[19]: 1
```

```
In [20]: movie.isnull().sum() # finding the null values for each column
```

```
Out[20]: 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
```

```
In [21]: movie.dtypes #checking the datatypes of each column
```

```
Out[21]: 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
```

Tip: You should *not* perform too many operations in each cell. Create cells freely to explore your data. One option that you can take with this project is to do a lot of explorations in an initial notebook. These don't have to be organized, but make sure you use enough comments to understand the purpose of each code cell. Then, after you're done with your analysis, create a duplicate notebook where you will trim the excess and organize your steps so that you have a flowing, cohesive report.

Tip: Make sure that you keep your reader informed on the steps that you are taking in your investigation. Follow every code cell, or every set of related code cells, with

a markdown cell to describe to the reader what was found in the preceding cell(s). Try to make it so that the reader can then understand what they will be seeing in the following cell(s).

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

we identified duplicated rows, missing/null values and unrleated columns. Now we need to clean the data by removing these respective rows and columns from the table.

```
In [22]: # After discussing the structure of the data and any problems that need to be
         #   cleaned, perform those cleaning steps in the second part of this section.

In [23]: movie.drop_duplicates(inplace=True)  #Removing the duplicate rows.
         sum(movie.duplicated())  # Confirmation for removal of duplicated rows

Out[23]: 0

In [24]: movie = movie.drop(movie[movie.budget_adj== 0].index) #removing zero values from budget
         movie = movie.drop(movie[movie.revenue_adj== 0].index) #removing zero values from reven

         movie.shape

Out[24]: (3854, 21)

In [25]: movie.drop(['budget','revenue','homepage','overview','vote_count'],1,inplace=True) # Re
         movie.dtypes # checking columns for confoirmation

Out[25]: id                      int64
         imdb_id                object
         popularity            float64
         original_title         object
         cast                   object
         director               object
         tagline                object
         keywords               object
         runtime                 int64
         genres                 object
         production_companies   object
         release_date           object
         vote_average          float64
         release_year            int64
         budget_adj            float64
         revenue_adj           float64
         dtype: object
```

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.

1.1.3 Research Question 1 (Finding the profits based on the average ratings. In this question trying to understand does a good rating gives more profits.)

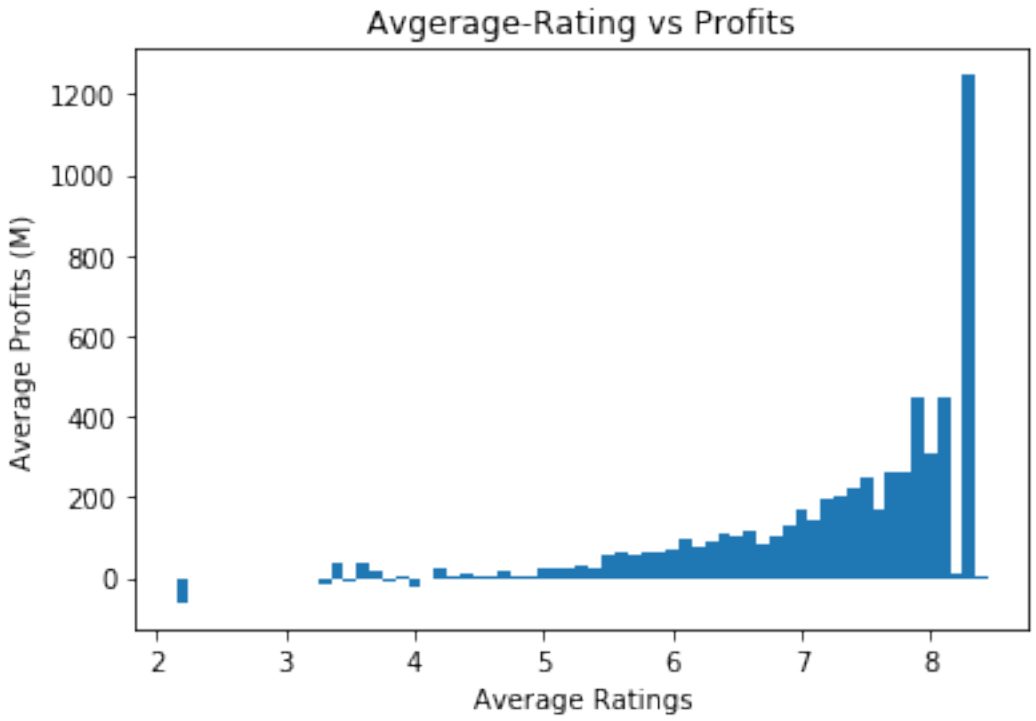
1.1.4 Considering Budget_adj and Revenu_adj columns for calculating profits for each movie. (I think Budget_adj and Revenu_adj columns are considered as these values are adjusted according to the inflation and provides a good side by side comparision.)

```
In [26]: movie['profit'] = ((movie['revenue_adj']-movie['budget_adj'])/1000000) #adding new colu
```

```
In [36]: x = movie.groupby(['vote_average'],as_index = False).mean().loc[:,'vote_average'] #grou
         y = movie.groupby(['vote_average'],as_index = False)['profit'].mean().loc[:,'profit'] #
```

2 Plotting bar graph to see the findings average rating versus profits

```
In [37]: import seaborn as sns
         import matplotlib.pyplot as plt
         % matplotlib inline
         bar_width=0.1   #thickness of bar
         plt.bar(x,y, bar_width) #plot bar graph with x-average rating and y- profit axis along
         plt.title('Avgerage-Rating vs Profits') #giving title name
         plt.xlabel('Average Ratings') #labelling the x-axis
         plt.ylabel('Average Profits (M)') #labelling the y-axis
         plt.show() #displaying the graph
```

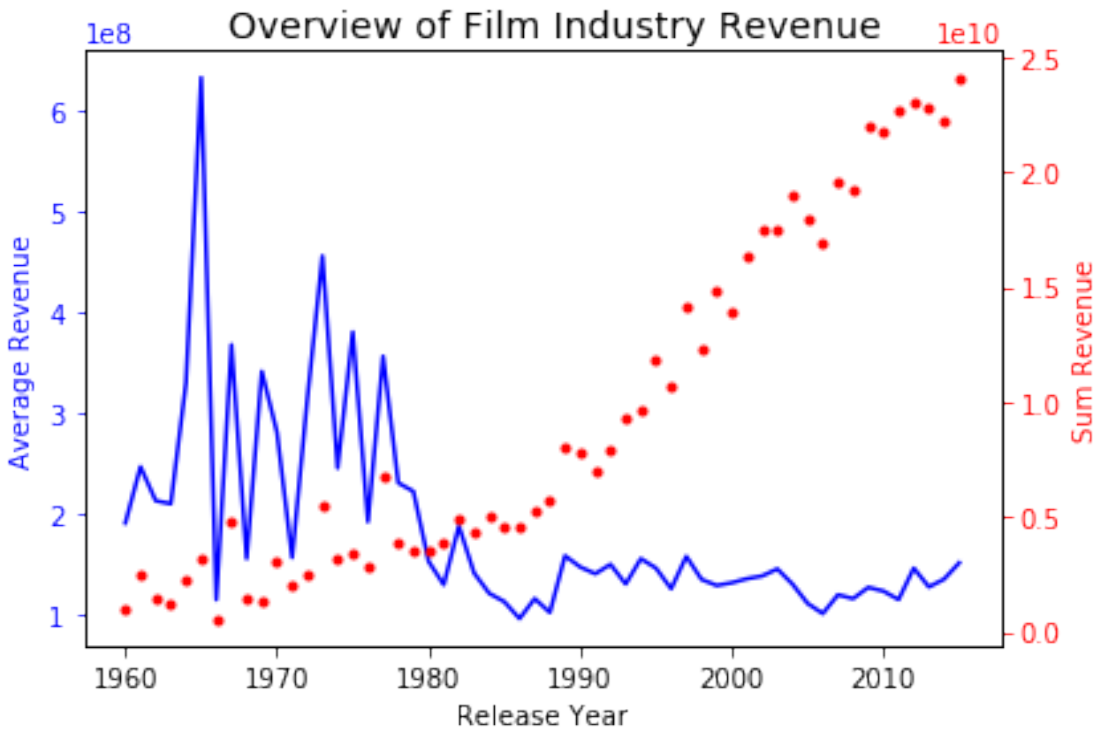


Conclusion 1 (Finding the profits based on the average ratings.!) Conclusion: From the plot we can see there is a strong correlation between the ratings and profits. Better the rating more people will watch the movie which in turn give more revenue and leads to profits.

Limitations: We started with 10865 datasets, after cleaning data by removing the zeros both from Budget_adj and Revenue_adj columns and ended up with 3854 datasets. This means we are using only 35% of the data. Accuracy would have been improved if we all the datasets available.

2.0.5 Research Question 2 (Understanding film industry revenue over the years. Exploring film industry revenues to know if it is a good choice to invest.)

```
In [40]: import numpy as np
         import matplotlib.pyplot as plt

         fig, ax1 = plt.subplots()    # creates a figure with subplot
         release_year= movie.groupby(['release_year']).mean().index #group by release year colum
         avg_revenue = movie.groupby(['release_year'],as_index = False).mean().loc[:,'revenue_ad

         ax1.plot(release_year, avg_revenue, 'b-') #plotting on plot with x and y1
         ax1.set_xlabel('Release Year') #setting the label for x-axis
         # Make the y-axis label, ticks and tick labels match the line color.
         ax1.set_ylabel('Average Revenue', color='b') #setting the label for y1-axis
         ax1.tick_params('y', colors='b') #mark the tick on y1-axis and color with blue

         ax2 = ax1.twinx() #share same x-axis
         sum_revenue = movie.groupby(['release_year'],as_index = False).sum().loc[:,'revenue_adj
         ax2.plot(release_year, sum_revenue, 'r.') #plotting on plot with x and y2
         ax2.set_ylabel('Sum Revenue', color='r') #setting the label for y1-axis
         ax2.tick_params('y', colors='r') #mark the tick on y1-axis and color with red

         fig.suptitle("Overview of Film Industry Revenue", fontsize = 14) #Adding title and Font

         fig.tight_layout() #layout the figure.
         plt.show() #display the graph
```



Conclusion 2 (Understanding film industry revenue over the years !) Conclusion: Plot describes the change in average revenue_adj and sum revenue_adj over the years. We can observe that sum revenue_adj increasing rapidly over the years whereas the average revenue_adj is fluctuating. Average revenue is peak at 1965. Even though film industry is making more revenue but the average revenue gradually went down from 1977. This suggest that we are making more movies for less revenue than previous years. Film industry is risky to invest as we can observe that only few movies are making profits.

Limitations: Again we are definately loosing many datasets due to revenue_adj values are zero.

Conclusions

> **Tip**: Finally, summarize your findings and the results that have been performed. Make sure that you are clear with regards to the limitations of your exploration. If you haven't done any statistical tests, do not imply any statistical conclusions. And make sure you avoid implying causation from correlation!

> **Tip**: Once you are satisfied with your work, you should save a copy of the report in HTML or PDF form. Before exporting your report, check over it to make sure that the flow of the report is complete. You should probably remove all of the "Tip" quotes like this one so that the presentation is as tidy as possible. It's also a good idea to look over the project rubric, found on the project submission page at the end of the lesson.

> To export the report to the workspace, you should run the code cell below. If it worked correctly, you should get a return code of 0, and you should see the generated .html

file in the workspace directory (click on the jupyter icon in the upper left). Alternatively, you can download the html report via the **File** > **Download as** submenu and then manually upload it to the workspace directory. Once you've done this, you can submit your project by clicking on the "Submit Project" button in the lower right. Congratulations!

Conclusion: From plot2 we can observe only few movies are making revenue, from plot1 higher the rating higher the profits. This implies we have to make a movie that gets higher rating to make profits in film industry.

Referrences: https://pandas.pydata.org/pandas-docs/stable/visualization.html
https://stackoverflow.com/questions/42506819/graph-with-multiple-x-and-y-axis-using-matplotlib

```
In [31]: from subprocess import call
         call(['python', '-m', 'nbconvert', 'Investigate_a_Dataset.ipynb'])
```

```
Out[31]: 0
```