Investigate_a_Dataset

December 2, 2022

1 Project: Investigate a Dataset - [TMDb]

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- ## Introduction

1.1.1 Dataset Description

The Dataset I will be working on in this project is the TMDb dataset That has various Information about more than 10000 movies just like the popularity, budget, revenue, title, cast, director, production company, describtion of the film and othe information that would help me in my analysis and drawing conclusions.

1.1.2 Question(s) for Analysis

Questions to analyse:

Q1:What genre has the most popularity between people?

Q2:How the trends changed over the years before and after the year 2000?

Q3:Does the runtime of films has association with popularity?

Q4:What is the films that got the maximum and minimum (profit,budget,revenue,runtime

Q5:What is the year that its films got the biggest profits?

Q6:Is there any association between budget and the ratings of the film("vote_average"

```
In [63]: import numpy as np
         import pandas as pd
         import matplotlib.pyplot as plt
         import seaborn as sns
         % matplotlib inline
```

Data Wrangling

1.1.3 General Properties

```
In [64]: df = pd.read_csv('Database_TMDb_movie_data/tmdb-movies.csv')
         df.head()
```

Out[64]:

	id	imdb_id	popularity	budget	revenue	original_title	cast	homepage	director	tagline	...	overview	runtime	genres
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.	...	Twenty-two years after the events of Jurassic ...	124	Action|Adventure|Science Fiction|Thriller
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.	...	An apocalyptic story set in the furthest reach...	120	
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	...	Beatrice Prior must confront her inner demons ...	119	
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.	...	Thirty years after defeating the Galactic Empi...	136	
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	...	Deckard Shaw seeks revenge against Dominic Tor...	137	

```
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]
```

1.2 Displaying Some information about the Dataframe

- Number of rows and columns and data types of them.
- Some descriptive statistics and information

```
In [65]: df.shape

Out[65]: (10866, 21)

In [66]: df.describe()

Out[66]:                   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
```

```
In [67]: 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
```

1.3 Data Cleaning

1.4 Function to check for the duplicated rows, non values and to clean it.

1.4.1 Changing Zero values in the ["budget","revenue"] to NAN to clean it.

```
In [68]: df[["budget","revenue"]] = df[["budget","revenue"]].replace(0,np.NAN)
         def clean(df):

             print(f"Number Of Duplicate Rows: {df.duplicated().sum()}")
             print(f"Number of non values:\n{df[df.columns].isnull().sum()}")

             df.drop_duplicates(inplace=True)
             df.dropna(inplace=True)

             print("="*30)
```

```
        print(f"Number Of Duplicate Rows After Cleaning: {df.duplicated().sum()}")
        print(f"Number of non values After Cleaning:\n{df[df.columns].isnull().sum()}")

    clean(df)
```

```
Number Of Duplicate Rows: 1
Number of non values:
id                         0
imdb_id                   10
popularity                 0
budget                  5696
revenue                 6016
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
==============================
Number Of Duplicate Rows After Cleaning: 0
Number of non values After Cleaning:
id                      0
imdb_id                 0
popularity              0
budget                  0
revenue                 0
original_title          0
cast                    0
homepage                0
director                0
tagline                 0
keywords                0
overview                0
runtime                 0
genres                  0
production_companies    0
```

```
release_date            0
vote_count              0
vote_average            0
release_year            0
budget_adj              0
revenue_adj             0
dtype: int64
```

1.5 Changing the "|" to "," in str used columns.

```
In [69]: df["genres"] = df["genres"].str.replace("|",",")
         df["cast"] = df["cast"].str.replace("|",",")
         df["production_companies"] = df["production_companies"].str.replace("|",",")

         df["cast"].head()
```

```
Out[69]: 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 ...
         Name: cast, dtype: object
```

1.6 Making changes on the "release_date" column type.

```
In [70]: df["release_date"] = pd.to_datetime(df["release_date"])
         df["release_date"].dtype == 'datetime64[ns]'
```

```
Out[70]: True
```

1.7 Dropping some unused columns to target specific data and adding a new "profit" column.

```
In [71]: df = df.drop(["imdb_id","tagline","homepage","keywords","overview"],axis=1)
         df["profit"] = df["revenue"] - df["budget"]
         df.head()
```

```
Out[71]:        id  popularity       budget       revenue  \
         0  135397   32.985763  150000000.0  1.513529e+09
         1   76341   28.419936  150000000.0  3.784364e+08
         2  262500   13.112507  110000000.0  2.952382e+08
         3  140607   11.173104  200000000.0  2.068178e+09
         4  168259    9.335014  190000000.0  1.506249e+09

                         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

   runtime                                     genres  \
0      124  Action,Adventure,Science Fiction,Thriller
1      120  Action,Adventure,Science Fiction,Thriller
2      119         Adventure,Science Fiction,Thriller
3      136   Action,Adventure,Science Fiction,Fantasy
4      137                      Action,Crime,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
2  Summit Entertainment,Mandeville Films,Red Wago...   2015-03-18        2480
3         Lucasfilm,Truenorth Productions,Bad Robot   2015-12-15        5292
4  Universal Pictures,Original Film,Media Rights ...   2015-04-01        2947

   vote_average  release_year    budget_adj   revenue_adj        profit
0           6.5          2015  1.379999e+08  1.392446e+09  1.363529e+09
1           7.1          2015  1.379999e+08  3.481613e+08  2.284364e+08
2           6.3          2015  1.012000e+08  2.716190e+08  1.852382e+08
3           7.5          2015  1.839999e+08  1.902723e+09  1.868178e+09
4           7.3          2015  1.747999e+08  1.385749e+09  1.316249e+09
```

Exploratory Data Analysis

1.7.1 Research Question 1 (What genre has the most popularity between people?)

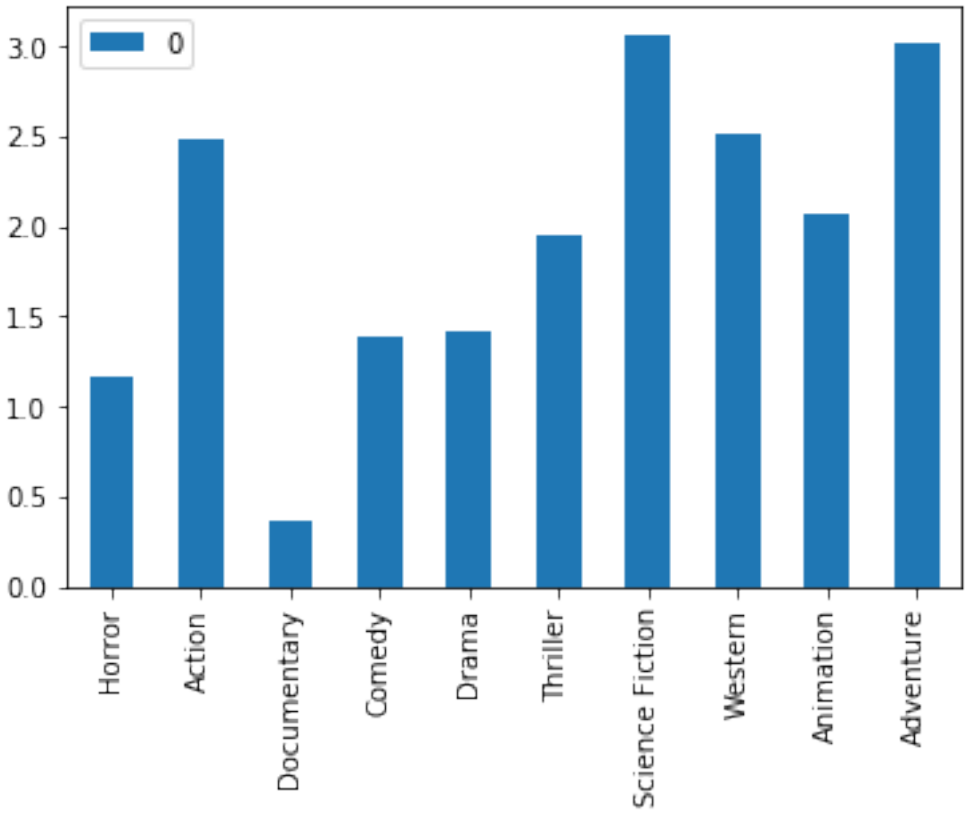
```
In [72]: # Extracting the unique genres
         gen = df["genres"].unique()
         unique_gen = set()
         for i in gen:
             if "," not in i:
                 unique_gen.add(i)
         unique_gen = list(unique_gen)
         unique_gen

Out[72]: ['Horror',
          'Action',
          'Documentary',
          'Comedy',
```

```
 'Drama',
 'Thriller',
 'Science Fiction',
 'Western',
 'Animation',
 'Adventure']
```

```
In [73]: g_mean = []
         for g in unique_gen:
             g_mean.append(df[df["genres"].str.contains(g)].popularity.mean())

         gen_popularity = pd.DataFrame(g_mean,unique_gen)
         gen_popularity.plot(kind="bar");
```



This graph show that genre with the highest popularity between people is "Sience Fition" after it comes "Adventure" column and the least genre "Documentry"

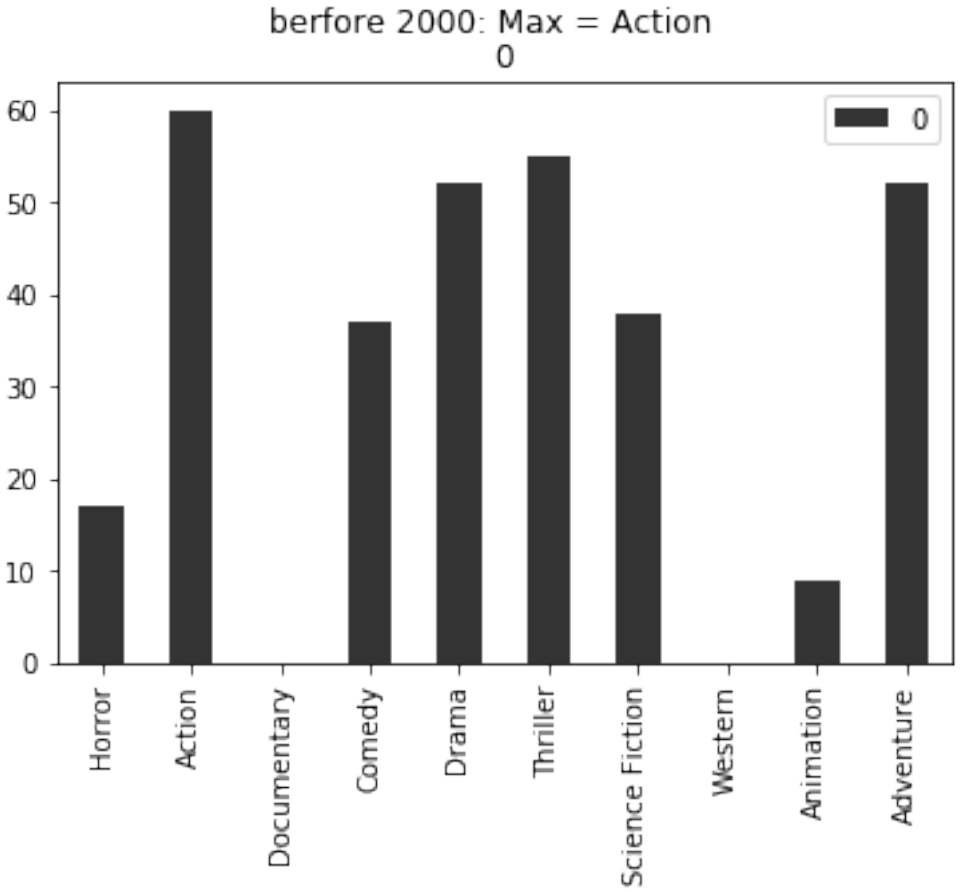
1.7.2 Research Question 2 (How the trends changed over the years esspecially before and after the year 2000?)

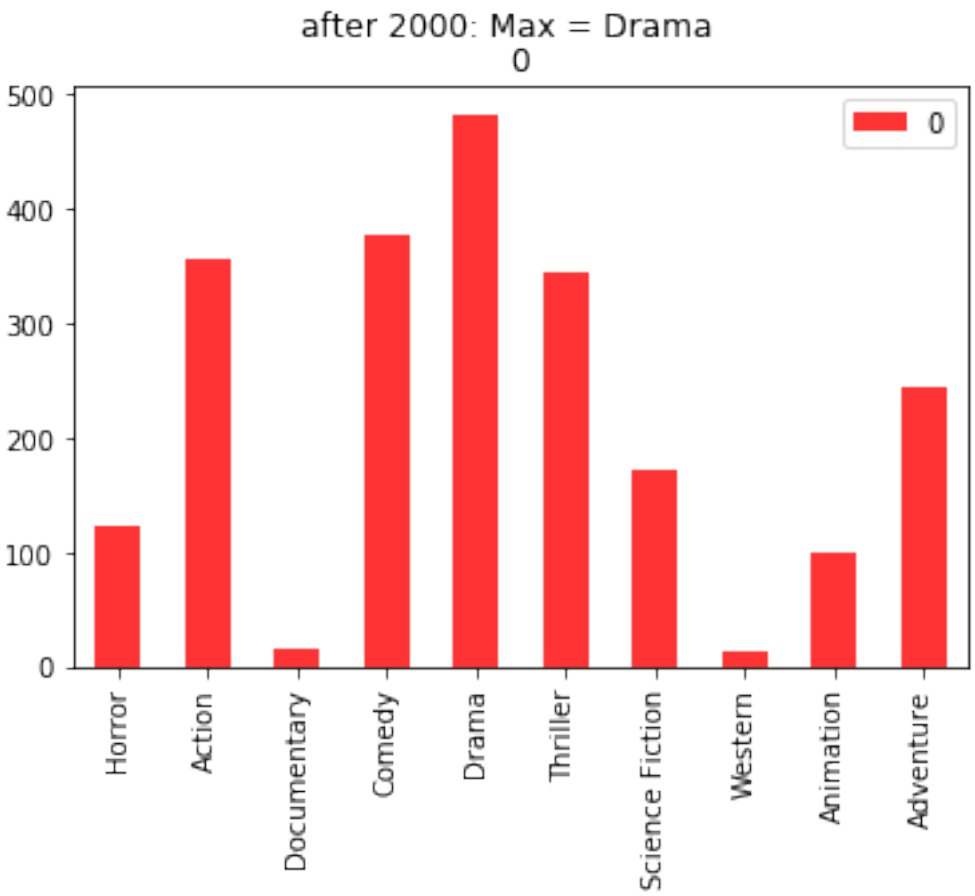
```
In [74]: df[(df["genres"].str.contains(unique_gen[1])) & (df["release_year"] < 2000)]
```

```
old_gen_freq = []
new_gen_freq = []
for g in unique_gen:
    old_gen_freq.append(len(df[(df["genres"].str.contains(g)) & (df["release_year"] < 2
    new_gen_freq.append(len(df[(df["genres"].str.contains(g)) & (df["release_year"] >=

old_gen_frequency = pd.DataFrame(old_gen_freq,unique_gen)
new_gen_frequency = pd.DataFrame(new_gen_freq,unique_gen)

old_gen_frequency.plot(kind="bar",alpha = 0.8,subplots = True, title="berfore 2000: Max
new_gen_frequency.plot(kind="bar",alpha = 0.8,subplots = True, title="after 2000: Max =
```



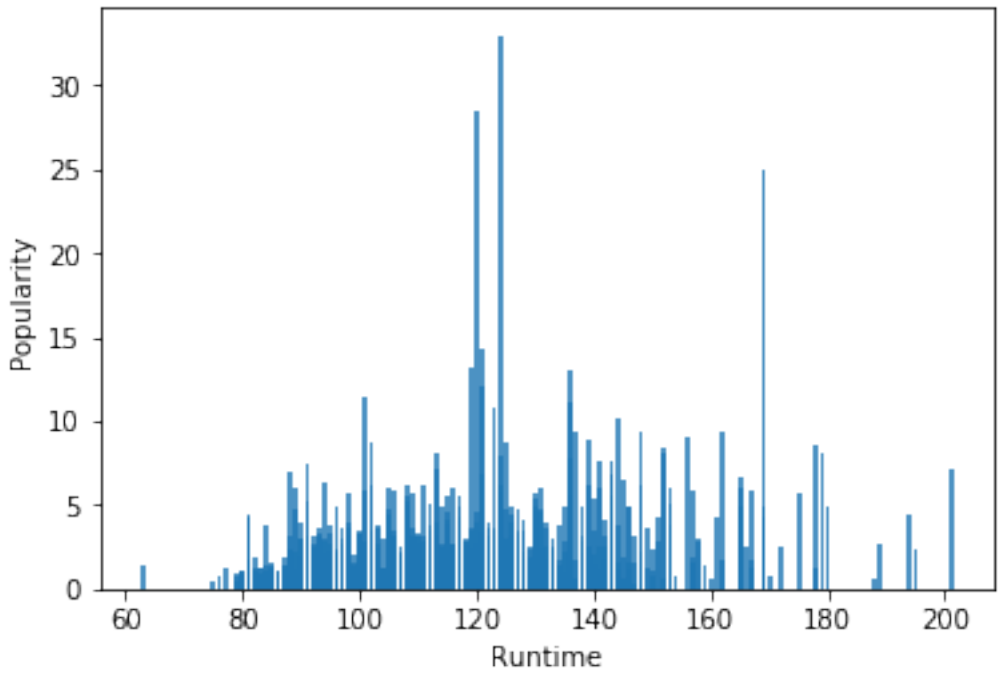


The first graph refers to the genres trends in the past century before 2000: "Action" after it "Thriller"

The second graph refers to the genres trends in the present after 2000: "Drama" after it "Comedy"

1.7.3 Research Question 3 (Does the runtime of films has association with popularity?)

```
In [75]: plt.bar(df['runtime'],df['popularity'],alpha=0.8);
         plt.xlabel('Runtime');
         plt.ylabel('Popularity');
```



this graph as we see states the range that the popularity get high in (90,135) approximately.

1.7.4 Research Question 4 (What is the films that got the maximum and minimum (profit,budget,revenue,runtime) ?

1.7.5 With a function that gets maximum and minimum values in the numeric columns and the most and leart frequent in the Object columns?

```
In [76]: def clac_column(column):
             if df[column].dtype == 'O':
                 most_freq = df[column].value_counts().idxmax()
                 least_freq = df[column].value_counts().idxmin()
                 print(f"Most Frequent in the {column} column: {most_freq}")
                 print(f"Least Frequent in the {column} column: {least_freq}")
             else:
                 max = df[column].max()
                 min = df[column].min()
                 print("Max Film: {} => {}".format(df.loc[df[column].idxmax(),"original_title"],
                 print("Minimum Film: {} => {}".format(df.loc[df[column].idxmin(),"original_titl
```

```
In [77]: clac_column('profit')
```

```
Max Film: Avatar => 2544505847.0
Minimum Film: The Warrior's Way => -413912431.0
```

```
In [78]: clac_column('budget')
```

```
Max Film: The Warrior's Way => 425000000.0
Minimum Film: Love, Wedding, Marriage => 1.0
```

```
In [79]: clac_column('revenue')
```

```
Max Film: Avatar => 2781505847.0
Minimum Film: Boy => 43.0
```

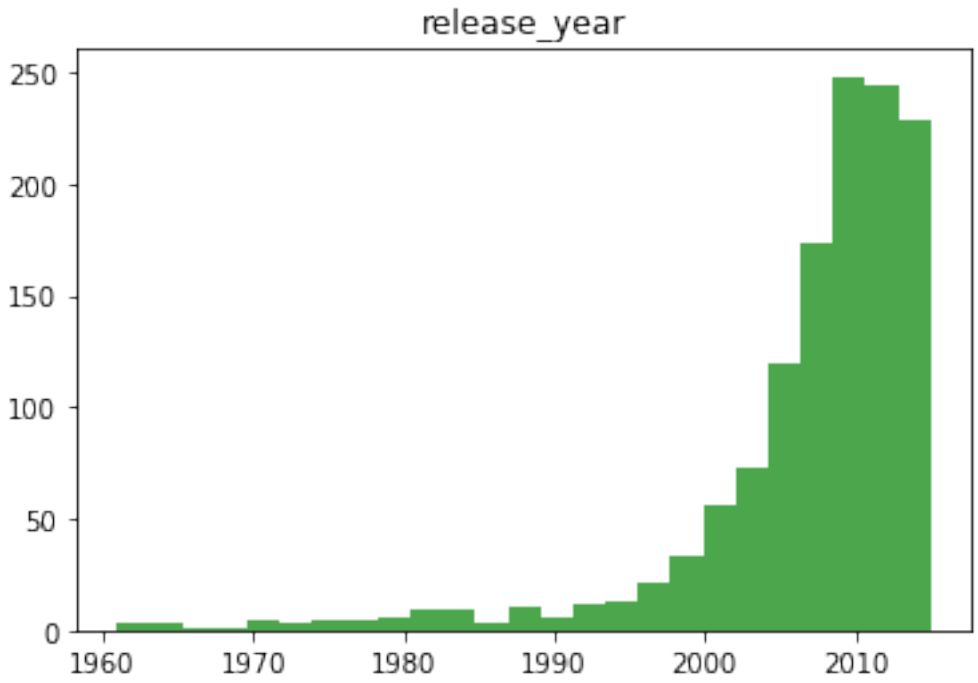
1.7.6 Research Question 5 (What is the year that its films got the biggest profits?)

```
In [80]: years = df["release_year"].unique()
         profits = []
         for year in years:
             df_year = df[df.release_year == year]
             profits.append(df_year['profit'].sum())

         df_best_year = pd.DataFrame(profits,years)
         df_best_year = df_best_year[df_best_year[0] > 0]
         df_best_year.columns = ["y"]
         df_best_year.sort_values(by = ["y"])
         df_best_year = df_best_year["y"][0:5]
         print("The year with the highest profits: {}".format(df_best_year.idxmax()))
```

```
The year with the highest profits: 2015
```

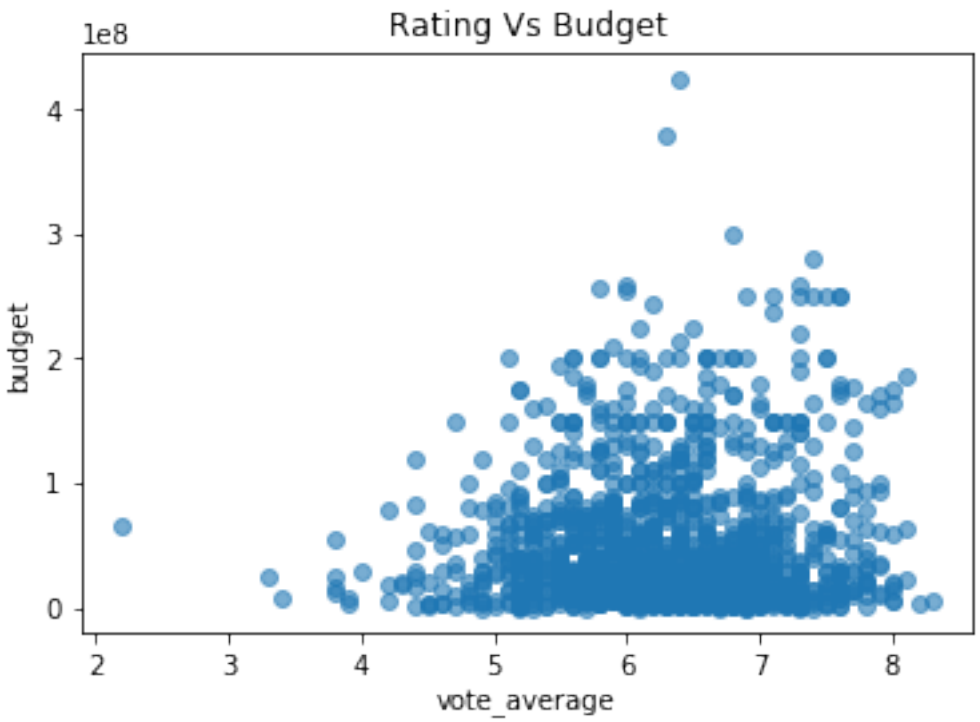
```
In [81]: plt.hist(df['release_year'],alpha=0.7, bins=25,color = 'green');
         plt.title('release_year');
```



We can see that this graph is left-skewed and refers to the increase of the number of films after the begining of this century till its peak in 2008-2012 period.

1.7.7 Research Question 6 (Is there any association between budget and the ratings of the film("vote_average")?)

```
In [82]: plt.scatter(df['vote_average'],df['budget'],alpha=0.6);
         plt.xlabel('vote_average');
         plt.ylabel('budget');
         plt.title('Rating Vs Budget');
```



This graph clarify the relation between Rating and budget and tells us that the high budget dooesn't confirm high rating it could be the opposite. ## Conclusions

Q1:What genre has the most popularity between people?

Conclusion: The genre with the most popularity is "Science Fiction" and the "Adventure" comes right after it.

Q2:How the trends changed over the years before and after the year 2000?

Conclusion: before the year 2000 the "Action" genre was the trend and "Thriller" in the second place but after 2000 the trends has changed and the "Drama" genre is on top and "Comedy" in the second place.

Q3:Does the runtime of films has association with popularity?

Conclusion: the range of runtime that has high popularity is between 90 to 130 minutes and the popularity of the films

Q5:What is the year that its films got the biggest profits?

Conclusion: The calculation resulted that The year with the highest profits: 2015

Q6:Is there any association between budget and the ratings of the film("vote_average")?

Conclusion: There's no assosiation between the high budget and good rating as we can see it's quiet the opposite in lots of films so it doesn't depend on high budget.

Limitations: this analysis was done on the filtered data considring all of its important properties. we are not sure if the data provided to us is completel corect and up-to-date. As the budget and revenue columns doesn't have a currency unit so worked on it with available. and the filtering of the duplicates and missing values could slightly affect the analysis.

```
In [62]: from subprocess import call
         call(['python', '-m', 'nbconvert', 'Investigate_a_Dataset.ipynb'])
```

```
Out[62]: 0
```