

PREDICTING IMDB STAR RATINGS

Michael Green

TOPICS

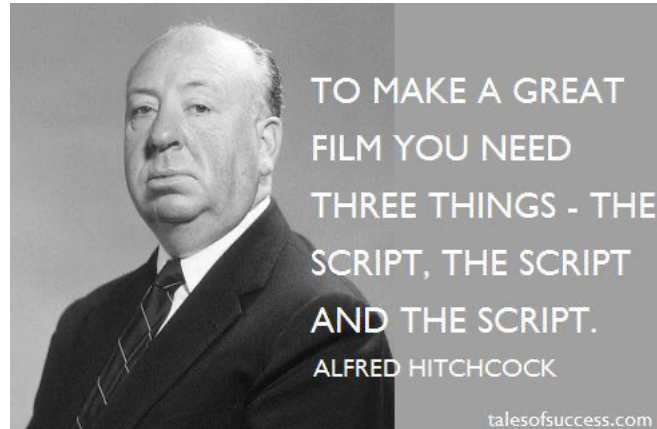
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DESCRIPTION OF THE PROBLEM

- There are many ideas of how to make a good movie:

Cinema is a matter of what's in the frame and what's out.

— Martin Scorsese



DESCRIPTION OF THE PROBLEM

- The problem is that these are not easily quantifiable.
- Many content creation companies (like Netflix) want be able to make movie making/buy decisions faster and with greater efficacy and over a larger volume of movie proposals.
- This project develops a model that uses as inputs features of movies that can be *well known on or before its release date* to *predict* if the movie will be well liked by viewers.

DESCRIPTION OF THE PROBLEM

- This model could then assist executives by doing a quick first pass scoring of large volumes of movie proposals.
- This would enable movie executives to then focus valuable deep analysis time on already quantitatively promising movies.

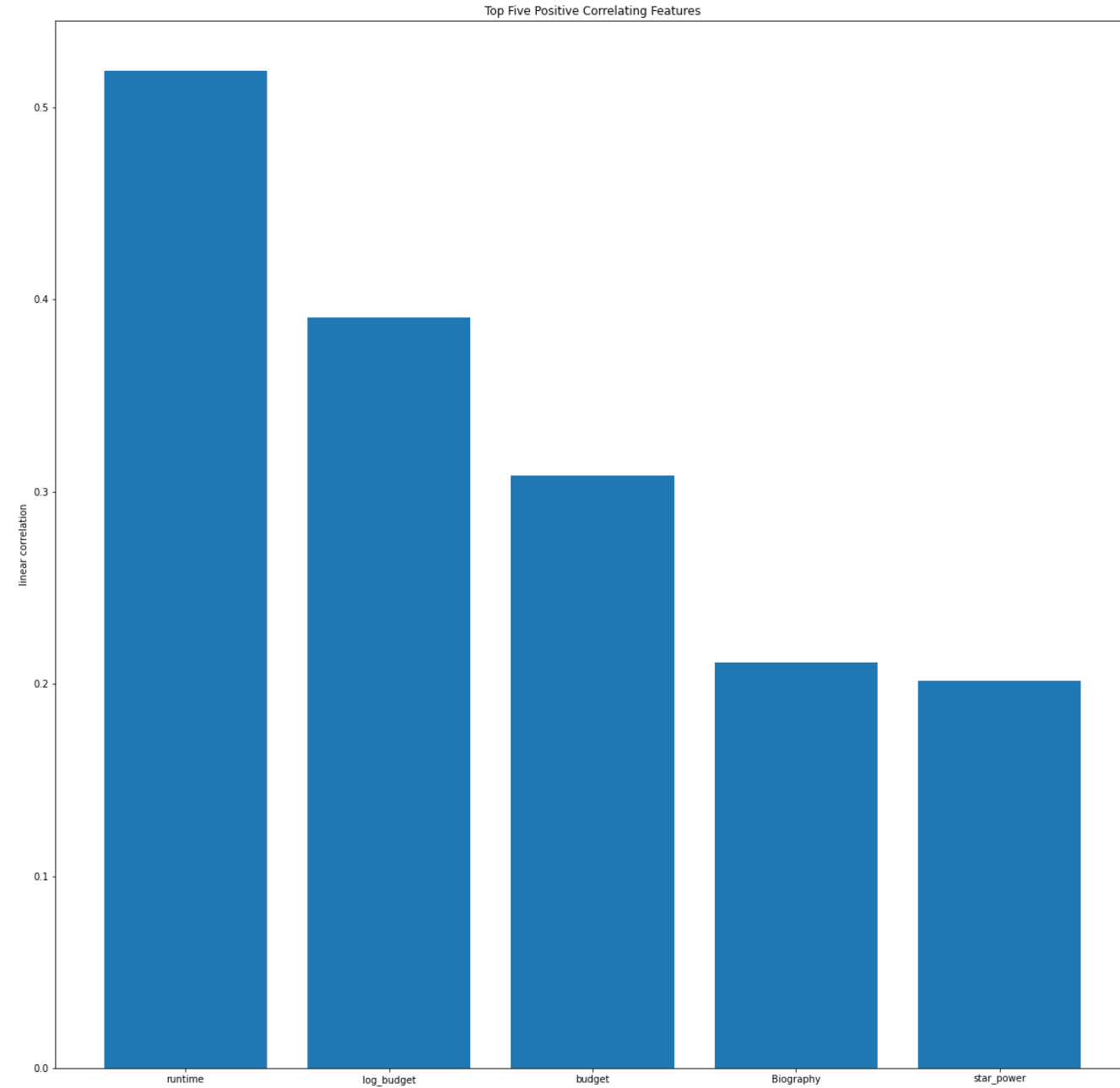
DATA SOURCE

- The starting data set are 4000 movies released in the US with an MPAA rating between January 1, 2010 and December 31, 2019.
- This original data set was then cleaned to 2127 movies that had all required data fields defined.
- The data was scraped from imdb.com using Python `requests` and `BeautifulSoup`.

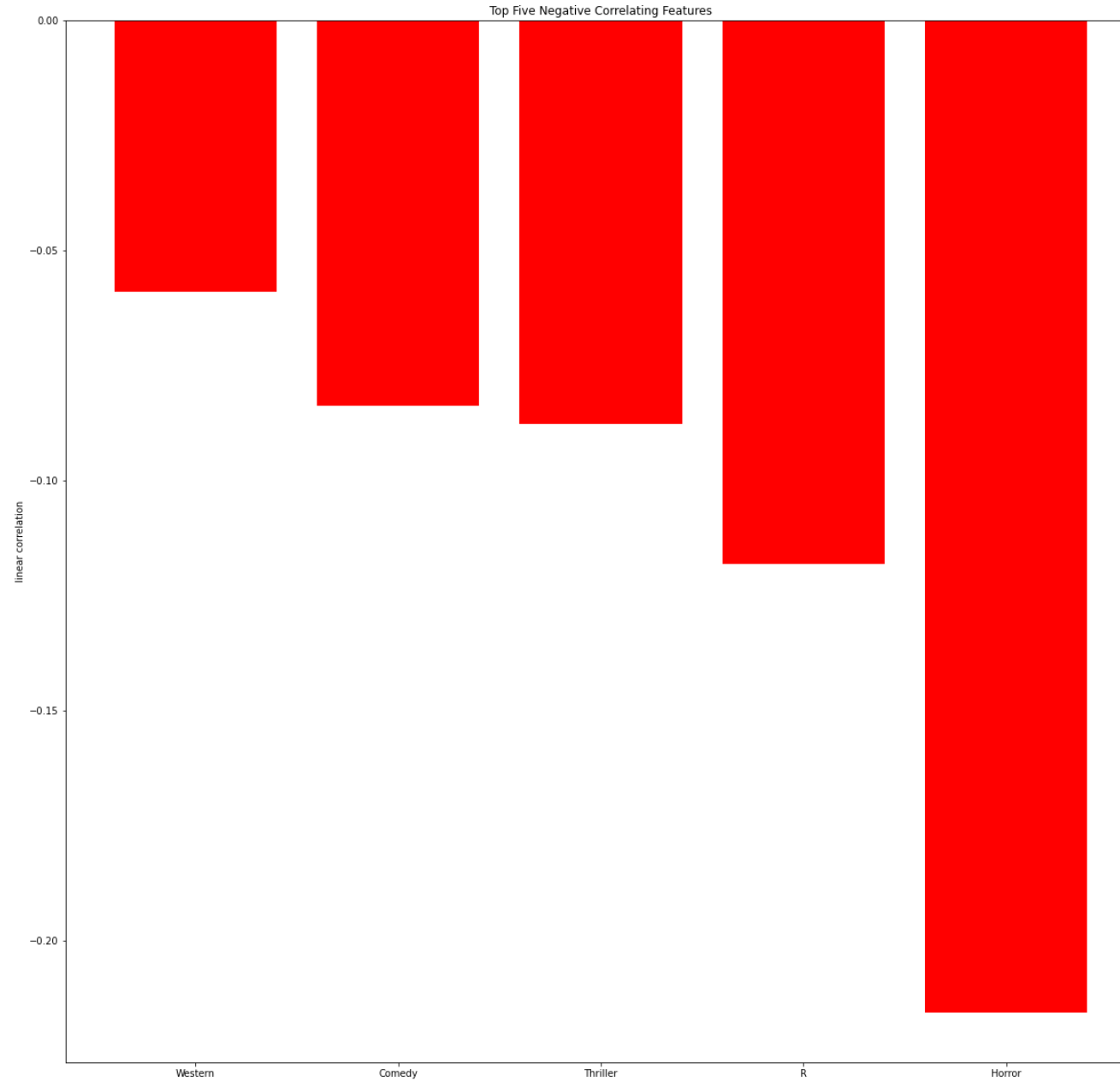
FEATURES IN DATA SOURCE USED IN MODEL

- The following features were used in the model:
 - Runtime: length of the movie in minutes
 - Budget: Amount of money it took to make the movie (in US \$)
 - Release month of the movie: One-hot encoded (12 categories)
 - Genre of the movie: One-hot encoded (17 categories)
 - MPAA Rating of the Movie: (4 categories)
 - One-hot encoded value of the month the movie was released (12 categories encoded)
 - One-hot encoded value of the genre of the movie (17 categories encoded)
 - **Director Star Power**: 1 point for each Best Director Award for earned or nominated by the director of said movie
 - **Cast 1 Star Power**: 1 point for each Best Actor or Best Actress Award earned or nominated by the 1st cast member listed for the movie
 - **Cast 2 Star Power**: 1 point for each Best Actor or Best Actress Award earned or nominated by the 2nd cast member listed for the movie
 - **Cast 3 Star Power**: 1 point for each Best Actor or Best Actress Award earned or nominated by the 3rd cast member listed for the movie
 - **Log(Budget)**: Logarithm of the Budget

TOP 5 POSITIVE AND NEGATIVE CORRELATION FEATURES



TOP 5 POSITIVE AND NEGATIVE CORRELATION FEATURES



LINEAR EQUATION WITH COEFFICIENTS

$$\begin{aligned} & y = 0.0258\text{runtime} \\ & \quad + 1.878\text{budget} \\ & \quad + 0.0449\text{August} \\ & \quad - 0.1492\text{December} \\ & \quad 0.1206\text{February} \\ & \quad - 0.0363\text{January} \\ & \quad - 0.0672\text{July} \\ & \quad - 0.0296\text{June} \\ & \quad - 0.0638\text{March} \\ & \quad - 0.1692\text{May} \\ & \quad + 0.06582\text{November} \\ & \quad + 0.0294\text{October} \\ & + 0.005259\text{September} \\ & \quad + 0.3251\text{Adventure} \\ & \quad + 0.8829\text{Animation} \\ & \quad + 0.7957\text{Biography} \\ & \quad + 0.2936\text{Comedy} \\ & \quad + 0.3785\text{Crime} \\ & \quad + 0.5407\text{Drama} \\ & \quad - 0.3144\text{Family} \\ & \quad - 0.42562\text{Fantasy} \\ & \quad - 0.08323\text{Horror} \\ & \quad + 1.6462\text{Music} \\ & \quad + 2.198\text{Musical} \\ & \quad + 1.003\text{Myster} \\ & \quad + 0.45469\text{Romance} \\ & \quad + 0.9918\text{Sci-Fi} \\ & \quad + 1.93200\text{Sport} \\ & \quad - 0.53621\text{Thriller} \\ & \quad - 1.778\text{Wester} \\ & \quad - 1.146\text{PG} \\ & \quad - 0.977\text{PG-13} \\ & - 0.9303R + 0.18929\text{star_power} + 0.10356*\text{cast1_starpower} + 0*(\text{cast2_starpower} + \text{cast3_starpower}) + 0.14988\text{budget} \\ & \quad + 1.5468 \end{aligned}$$

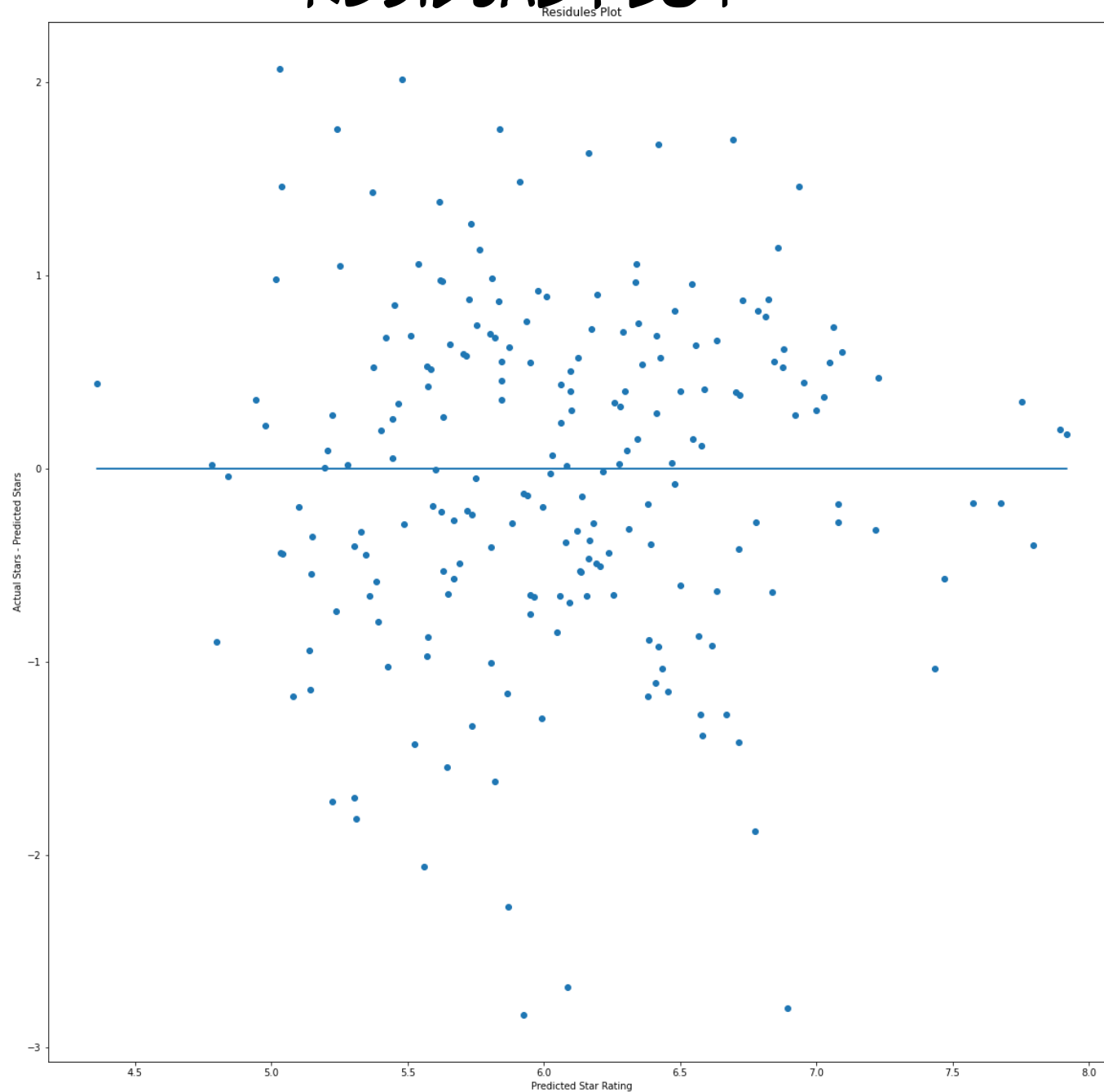
FINAL TEST SCORE

$$R^2 = 0.363$$

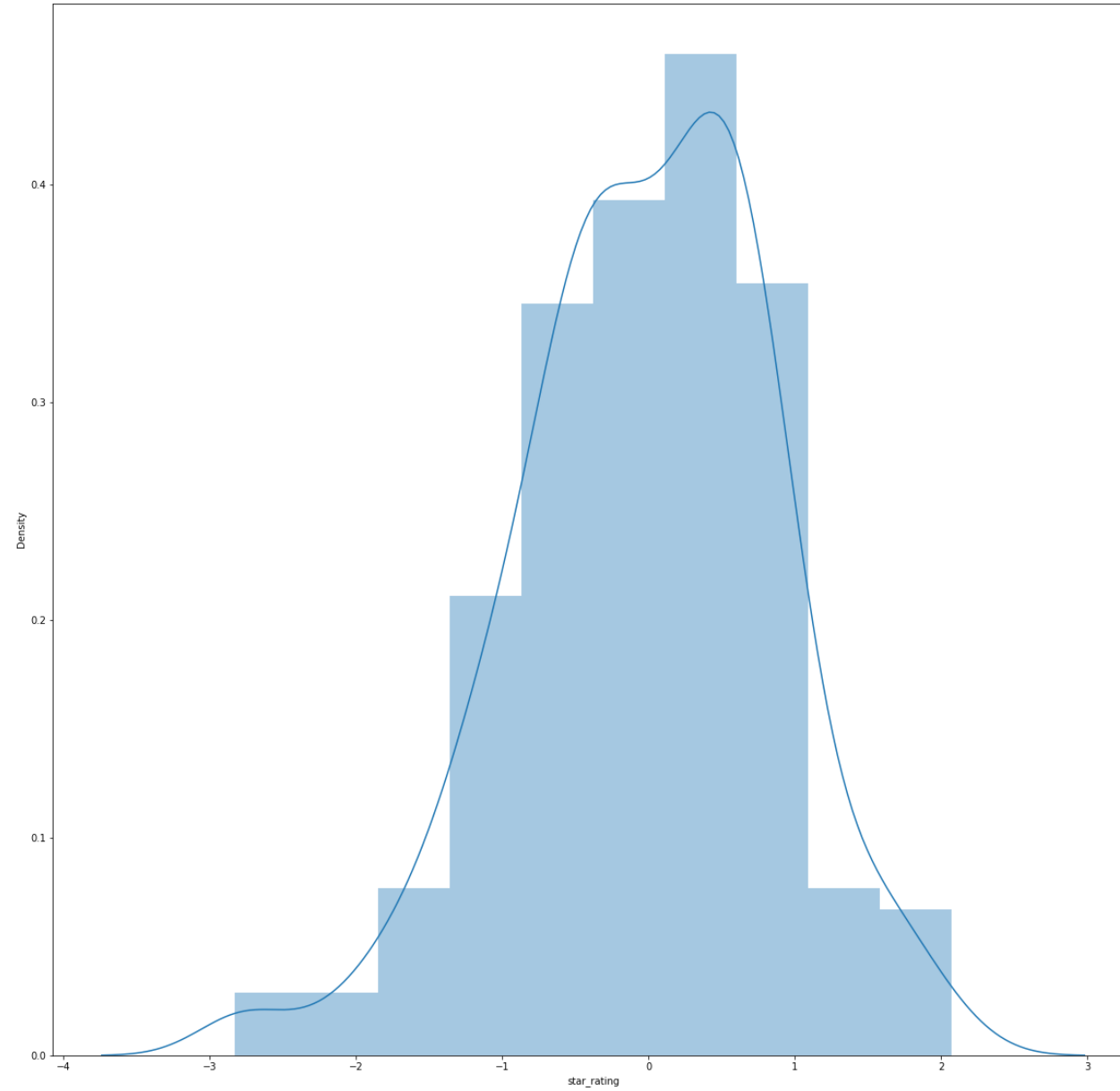
Better than guessing, where you have a 1/100 chance of getting it right.

RESIDUAL PLOT

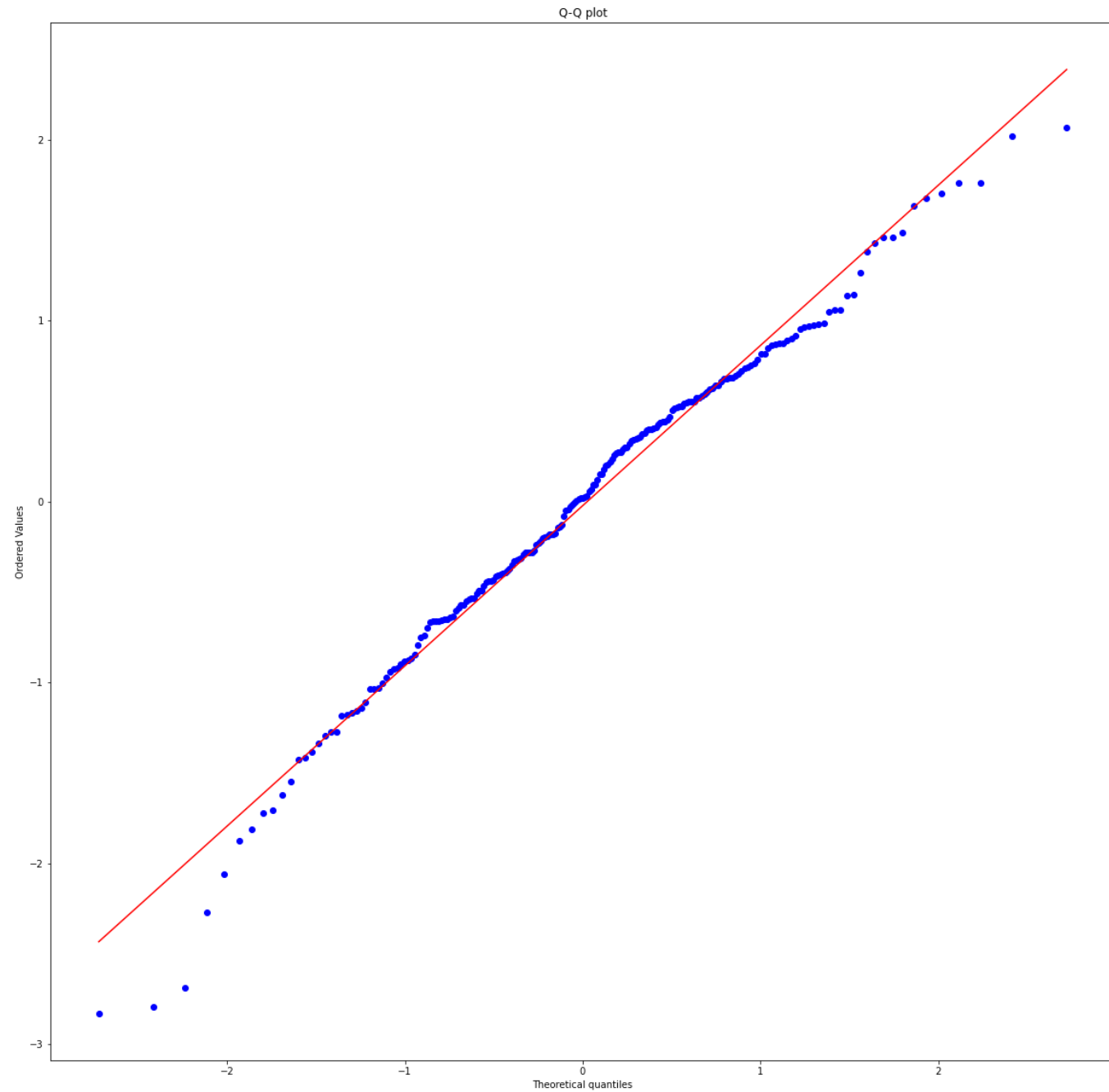
Mean of the Error = -0.02



DISTRIBUTION OF ERROR



QQ PLOT



FUTURE WORK

- Scrape more data. There are over 50,000 movies that have been released over the last 10 years.
- Collect more data on the cast and crew: How many producers on the movie have been awarded Best Picture, how many writers have been awarded for Best Adapted Screen Play.
- Dynamic Duos, Trios, Quartets, Etc.: Anecdotally there are a lot of movies where you see the same (director, cast) combinations. Quantify the level of influence the existence of these tuples have on the star rating of the movie.

APPENDIX