

*Final Project*  
*Critic vs Audience Rating Movie Analysis*

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## **1. Introduction**

According to a study done by the University of New Hampshire Scholars' Repository, participants were gone through a test of movie ratings and reviews, resulting in the respondents being influenced by the contents of the reviews as well as the source (Pentheny, 2015). Based on these results, we wondered if these ratings from popular movie critic sources have any relationship with the audience scores alike. Do scores like Tomatometer and Metascore affect audience score? Maybe certain genres have popular scores for both critic and audience members. Are certain directors or production companies more popular among audience reviews than critic reviews? Do popular movie review websites have similar critic scores for the same movies from the same year?

In this project, we plan to use Metacritic's Metascores along with Rotten Tomatoes's Tomatometer and audience rating to see if there is a correlation between audience reviews and critic reviews when evaluating a movie's characteristics.

## **2. Data**

### *2.1 Scraping Metacritic:*

For our first data set, we utilized data from Metacritic which we obtained through scraping. The data scraping process began with configuring a user-agent in our script to allow us to scrape the site. Next, we set up a loop that looped through the various pages on Metacritic's top movies in 2016. For each page we visited, we extracted the *Movie titles*, *release dates*, and *summary*. This was done by finding out where these pieces of information were in the HTML structure and then collecting the data in R. To manage the load on Metacritic's servers, we incorporated random delays ranging from three to fifteen seconds between each page request. Once the data was scraped from each page it was stored in a temporary data frame. After all the pages of the site were processed, the data from the temporary data frames were combined into a single data frame, allowing us to successfully create a data frame ready for data analysis.

### *2.2 Rotten Tomatoes Data:*

We followed the same format as Metacritic's scraping to scrape the Rotten Tomatoes website, finding the CSS embedded into the website's structure. We planned on doing the Rotten Tomatoes scraping last after we calculated our Metacritic data, but our scraping was quickly put to a halt when the error on RStudio came back as 403 Client Error: Forbidden for URL. This meant that Rotten Tomatoes knew that we created a script to scrape their website's data and preemptively kept us from obtaining any movie data. We decided to instead use a Rotten Tomatoes Kaggle dataset, which is composed of Rotten Tomatoes Tomatometer scores, critic reviews, audience ratings, and much more with movies ranging from 1914 to 2020.

### *2.3 Combining the Movie Reviews Datasets:*

Our Metacritic scraping data set gave us four columns total (movie\_title, release\_date, and summary). Our Kaggle Rotten Tomatoes data set gave us 17 columns of data of which we cleaned down to 14 (movie\_title, summary, content, genres, directors, authors, actors, original\_release\_date, runtime, production\_company, tomatometer\_rating, tomatometer\_count, audience\_rating, and audience\_count). We decided to horizontally merge the data sets among having the same movie title, merging both x and y by movie title into a dataset called "merged\_movie\_reviews." This merged movie reviews dataset is the **intersection** of the data, containing only data that appears in both data sets.

Since the data frames merging was solely through the movie titles, we then decided to clean the data even more and verify that the data had no overlapping with one another. We removed one of the summary columns, mutated and filtered the original\_release\_date to match other release\_date column and verify referential integrity, and eventually remove the release\_date column to have solely original\_release\_date. This **subset** we named "subset\_merged." This dataset also had multiple ASCII characters that we removed with a short for-loop, and we deleted the extra Spanish characters within the directors and actors columns that stayed in as "???" using gsub. We also added in the combo\_score between Tomatometer and Metascore, calculating row means and removing NA data where necessary. This **intersect subset** known as subset\_merged had 376 observations of 16 variables.

*Table 1 Data Dictionary*

Column	Type	Source	Description
<b>movie_title</b>	Text	Both	Title of the movie
<b>director</b>	Text	Rotten Tomatoes	Director of the movie
<b>summary</b>	Text	Both	A description of the movie
<b>release_date</b>	Date	Both	The month and year the movie was released
<b>Tomatometer_rating</b>	Numeric	Rotten Tomatoes	The review score as decided by Rotten Tomatoes movie critics
<b>meta_score</b>	Numeric	Metacritic	The review score as decided by Metacritic movie critics
<b>combo_score</b>	Numeric	Both	The average critic review ranking between metascore and tomatometer
<b>audience_rating</b>	Numeric	Rotten Tomatoes	The review score as decided on by the users of Rotten Tomatoes
<b>content_rating</b>	Text	Rotten Tomatoes	The motion picture rating of the movie (e.g. PG-13,R)
<b>genres</b>	Text	Rotten Tomatoes	The genre of the movie
<b>director</b>	Text	Rotten Tomatoes	Director of the movie
<b>authors</b>	Text	Rotten Tomatoes	Writers or writer of the movie
<b>actors</b>	Text	Rotten Tomatoes	Actors featured in the movie
<b>runtime</b>	Numeric	Rotten Tomatoes	Runtime of the movie in minutes

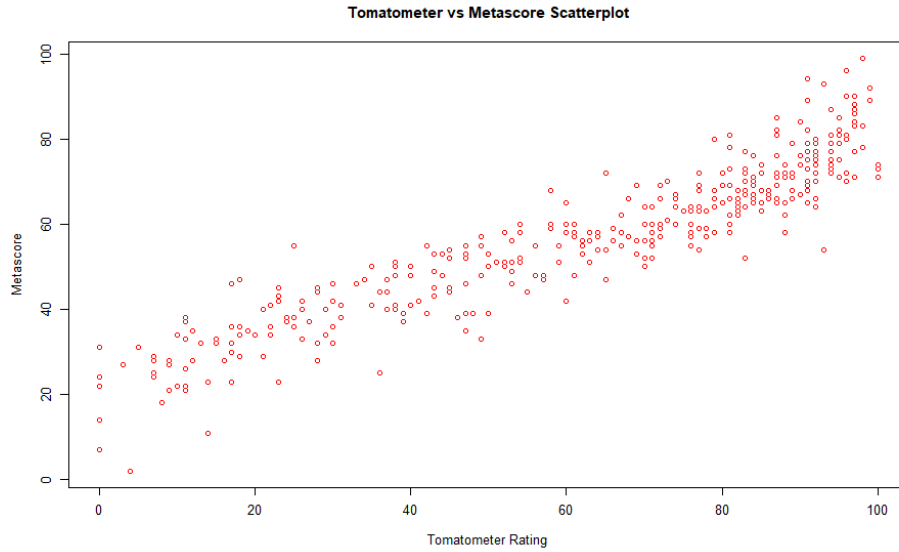
<b>production_company</b>	text	Rotten Tomatoes	The production company of the movie
<b>tomatometer_count</b>	Numeric	Rotten Tomatoes	Total number of reviews by critics
<b>audience_count</b>	Numeric	Rotten Tomatoes	Total number of reviews by non-critics (audience)
<b>rating_diff</b>	Numeric	Both	The audience rating minus the combo score

### 3. Analysis:

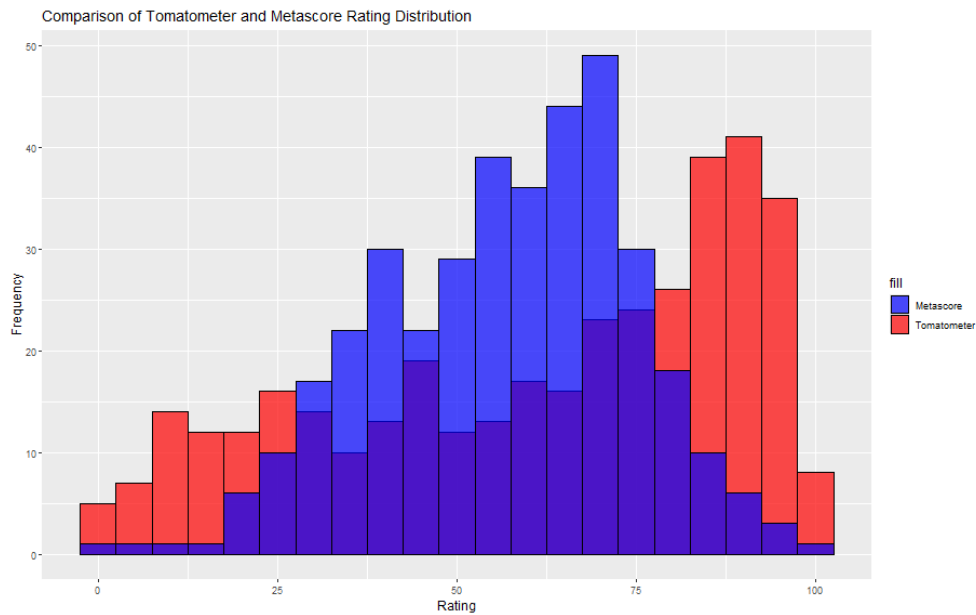
#### 3.1 Metacritic vs Rotten Tomatoes scores

We wanted to find out how Metacritic scores compared to Rotten Tomatoes scores for the same movies and navigate if there is a correlation between the two websites. After running a correlation test between the columns for *Tomatometer* and *Metascore* on our test data set, our p-value came back as  $< 2.2e-16$  (approximately 0), and our R value—or correlation coefficient—came back as 0.9256825. This is evidence of an extremely strong correlation between these two variables. The p-value has us come to the finding that we must reject the null hypothesis of no correlation between *meta\_score* and *tomatometer\_rating* and suggests that there is enough evidence to conclude a significant linear relationship between these two variables.

To better visualize this relationship, we created a scatterplot of the two variable metrics using ggplot. This plot is shown in Figure 1. The relationship between *meta\_score* and *tomato\_meter\_rating* clearly has a very strong positive line of best fit between them. We wanted to dive further, however, and see if the distribution in scores is nearly identical due to the very strong relationship in the two websites' ratings. We created a histogram using ggplot to visualize the distribution of rating values between each metric respectively. The distribution, as shown in Figure 2, provides us further visual insight into any potential outliers and validation in assessing movies similarly with their score criteria. Rotten Tomatoes tends to score movies more within the 80 to 95 range while Metacritic's are lower at a 63 to 75 range. Both histograms skew left, making their correlation in comparable scores to highly related to one another.



*Figure 1: Tomato vs Metascore Relationship*



*Figure 2: Metascore vs Tomatometer Score Distribution*

The two scores, again, do not hold much difference across the movie ratings, so the websites are objectively similar in their grading criteria for the entirety of 2016. These findings tell us that both *Metascore* and *Tomatometer* are important in the critical acclaim of a movie within our

dataset, with an Oscar-winning movie like *Moonlight* receiving both a 98 Tomatometer and 99 Metascore respectively.

### 3.2 Movie Genre Scores

We wanted to find out which movie genres tend to receive higher or lower scores on Rotten Tomatoes compared to Metacritic, we used pipe operators to utilize group by with movie genres. We could then use summarize to group the average Tomatometer rating and average Metacritic ratings into their own columns by genre. Using ggplot, we created a bar chart using geometric objects, layering the different average ratings by movie genre against one another. The dark blue color is the stacking of the red *Tomatometer* score and the blue *Metascore*. The bright red or blue colors in a bar chart show if one critic website or the other holds a higher rating, with bright red at the top representing Rotten Tomatoes and bright blue at the top representing Metacritic.

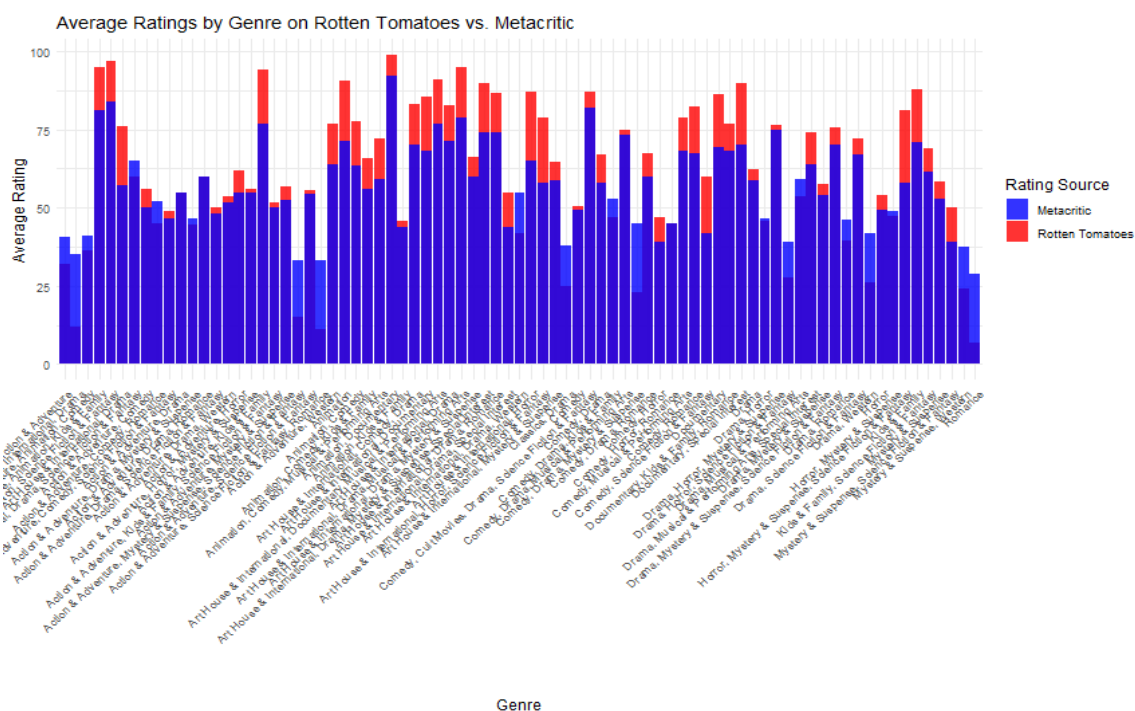


Figure 3: Comparing Genre Ratings Between Websites

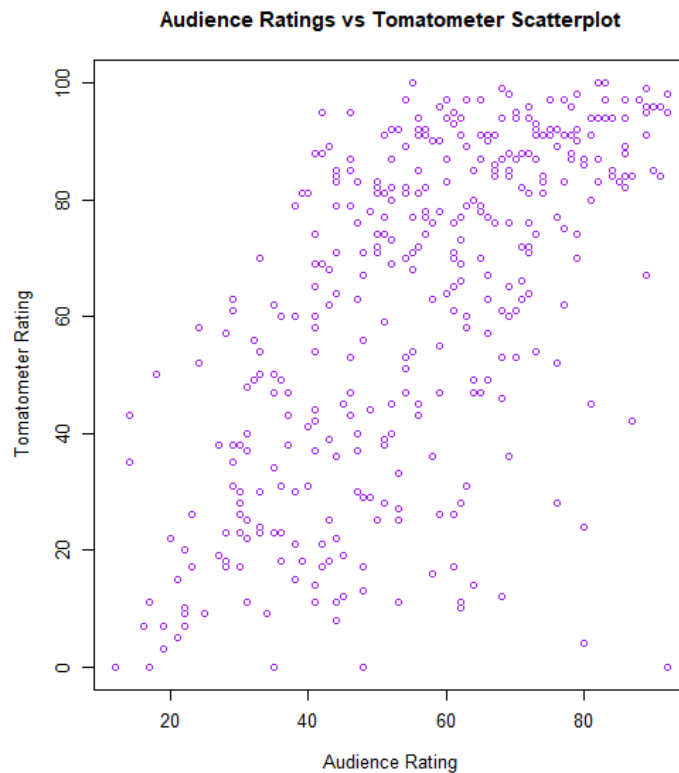
Based on this visualization alone, it is apparent that the far-right genre, *Romance*, holds the lowest average ratings for both critic websites. The average Tomatometer for Romance is 7, and the average Metacritic rating for Romance is 29. There is only one movie in the subset\_merged data frame that is solely “Romance,” with that movie being *No Stranger Than Love*.

Conversely, the genre that performed the best on average between both Rotten Tomatoes and Metacritic was *Animation, Documentary*, with an average tomatometer of 99 and an average Metascore of 92. Delving more into the subset\_merged data frame, there is only one movie that meets the “Animation, Documentary” genre, which was *Tower*. It is interesting to note that the highest and lowest scores from both critic websites came from the same two movies respectively.

### *3.3a Audience Scores vs Rotten Tomatoes Scores*

After thoroughly analyzing the data between Rotten Tomatoes and Metacritic, we must take into consideration how audience perception may differ from them both. We decided to run another correlation test to get both the correlation coefficient and the hypothesis test. Our p-value between these two variables resulted in  $< 2.2e-16$ , which means that *reject* the null hypothesis that there is no relationship between audience rating and Rotten Tomatoes score. This finding shows us that audience scores and critic scores from 2016 alone do not often differ from one another. If a critic responds positively or negatively to a movie, our findings suggest that the audience may very well do the same.

To visualize the relationship between Audience Rating and Tomatometer, we created a scatterplot on ggplot, as shown in Figure 4. The correlation coefficient between the two variables is 0.624, suggesting a moderately strong positive correlation between increased audience rating leading to increased Tomatometer.



*Figure 4: Audience Rating vs Tomatometer Relationship*

### *3.4 Audience vs Critic Director and Production Company Assessment*

It would only be wise to investigate if both critics and audiences alike prefer the works of certain individuals and production companies over the span of the same year. To determine what these values are, we created an additional column in our `subset_merged` data frame known as “rating\_diff,” or audience rating minus `combo_score` (average between Metascore and Tomatometer). From there, we created a data frame where we aggregated the `rating_diff` values by the `directors` column through the `mean` function while also removing any NA values. We then ordered the rankings from highest to lowest value and created a list of the top 10 values. This process was repeated the same way for the top 10 production companies, but the values within the `rating_diff` column were sorted by production company rather than by director.



Director		Mean_Rating_Difference
260	Matt Cooper	88.5
102	Dinesh D'Souza, Bruce Schooley	77.0
53	Bruce Beresford	49.5
105	Duncan Jones	46.0
132	Harold Cronk	46.0
91	David Frankel	45.5
329	Takeshi Nozue	44.5
304	Rosa Katz	43.5
143	James Bid	38.5
326	Stewart Hendler	37.0

Production_Company		Mean_Rating_Difference
213	The Vault	88.50
52	D'Souza Media Corporation	77.00
73	Envision Media Arts	49.50
170	Pura Filz Entertainment	46.00
155	New Line Cinema	45.50
202	Square Enix Company	44.50
243	Zombot Pictures	38.50
99	Hyde Park Entertainment	36.50
117	Krannel Pictures	36.00
130	Liongate Films	35.75

Figure 5: Top 10 Audience-Rated Production Companies and Directors

This figure shows the results of the top 10 directors and production company average differentials, and it should come as no surprise that the directors and production companies are for the same top movies within the top 10. For example, the movie *Is That a Gun in Your Pocket?* was produced by The Vault and was directed by Matt Cooper. These results show that just because the critics rate your movie poorly does not mean the audience may not like it as well. In fact, our findings show quite the opposite. All these top 10 directors had movies that did not break 40 for either Metascore or Tomatometer, but the audiences may rate these movies as timeless classics for how they may subvert the expectations of traditional media and critic+ review.

#### 4. Conclusion

In this project, we analyzed multiple factors that explored the relationship between movie ratings and audience preferences through the analysis of Metacritic and Rotten Tomatoes data sets. Our objectives were to determine how the critic ratings correlated with one another, how critic ratings correlated with audience scores, whether certain movie genres were rated more favorable or unfavorable than others, and, overall, if the individuals who created the audience reviews were influenced by the contents of the reviews as well as the source. In summary, the following results were found from our presented analysis questions:

1. *How do Metacritic scores compare to Rotten Tomatoes scores for the same movies?*

There is an extremely high correlation between the two critic websites, with approximately 93% variance in Metascores being explained by Tomatometer. *Both* are objectively similar in critiquing movies.

2. *Do certain genres tend to receive higher or lower scores on Rotten Tomatoes compared to Metacritic?*

The “Romance” genre exhibited the lowest average across all movie genres, with a 7 on Tomatometer and 29 on Metascore. There is only one movie within this genre, however, which is *No Stranger Than Love*. Conversely, the “Animation, Documentary” genre performed the best

and had only one movie, *Tower*, within this genre as well, holding a 99 on Tomatometer and 92 on Metascore. More movies for every genre would be necessary to make sure each sample size is more valid for comparison.

### *3. How do audience scores compare to Rotten Tomatoes scores?*

The comparison between audience scores and Rotten Tomatoes scores resulted in a strong, positive correlation between the two variables with a correlation coefficient of 0.624. This result tells us that there is approximately 62.4% of variance in Tomatometer that is explained by Audience Rating. Audience scores tend to align moderately well with Tomatometer rating by Rotten Tomatoes, allowing us to conclude that audience movie perceptions are related to Rotten Tomatoes' critic perceptions.

### *4. What directors and production companies are more popular among audience reviews than critic reviews?*

By calculating the differences in average rating between audience and critic scores aggregated between both Metacritic and Rotten Tomatoes, we discerned the top 10 directors and their subsequent production companies in 2016. These directors in tandem with these production companies may continue to deliver cult-classic content that resonates more with audiences than critics.

This project has several limitations, including the data only being accumulated from 2016, the removal of movies with null values in certain columns, the data relying solely on Metacritic and Rotten Tomatoes that may not be representative of the entire critic space, the sample size only being 376 observations, the lack of movies in each genre, no analysis on audience demographic characteristics, and external factors like higher marketing strategies leading to higher audience ratings. Future work on this project could include scraping more data from various other critic websites, scraping box office data to find further correlation between critic/audience rating and box office sales, and compiling data from multiple years to create a larger sample for each movie genre, director, and production company.

### Work Cited

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