

Be suspicious of online movie rating

A capstone project by Nave Cohen

Is there a conflict of interest for a website that sells both movie tickets and displays review rating?

More specifically, does a website like Fandango¹ artificially display higher review rating to sell more movie tickets?

The short answer: YES

For this project, I'm actually basing this off of an article that came out in 2015

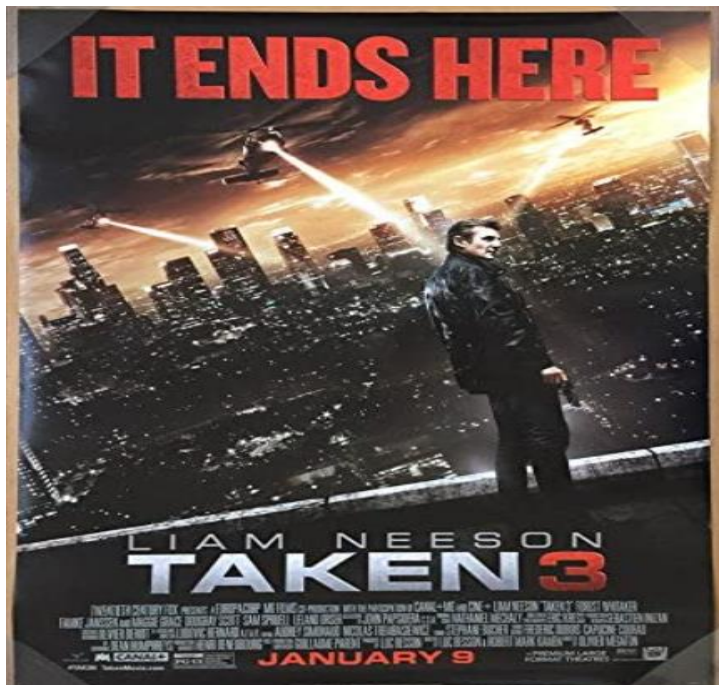
called "Be Suspicious of Online Movie Rating, Especially Fandango's"² which came from the website "FiveThirtyEight".

The project is divided into 3 parts:

Part1: Exploring the Fandango data

Part2: Exploring the other sites

Part3: Comparison of Fandango Ratings to Other Sites



¹ Fandango is the ultimate digital network for all things movies - [Fandango's website](#)

² link to the article - ["Be Suspicious of Online Movie Rating, Especially Fandango's"](#)

Part1 - Exploring the Fandango data:

The Fandango data consists of 4 columns:

FILM: film name and the year date inside the parenthesis.

STARS: the stars ranking displayed in the website.

RATING: the true rating user.

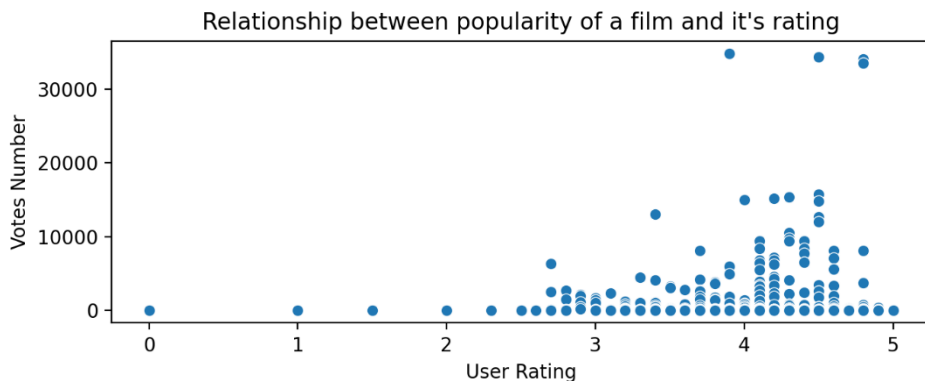
VOTES: number of voters per film.

	FILM	STARS	RATING	VOTES
0	Fifty Shades of Grey (2015)	4.0	3.9	34846
1	Jurassic World (2015)	4.5	4.5	34390
2	American Sniper (2015)	5.0	4.8	34085
3	Furious 7 (2015)	5.0	4.8	33538
4	Inside Out (2015)	4.5	4.5	15749

We can notice that Fandango tends to round up the rating in order to display stars, which make sense because it's difficult to show 3.9 stars ranking if you can only fill wholly or half star way.

	STARS	RATING	VOTES
count	504.0	504.0	504.0
mean	3.6	3.4	1147.9
std	1.6	1.5	3830.6
min	0.0	0.0	0.0
25%	3.5	3.1	3.0
50%	4.0	3.8	18.5
75%	4.5	4.3	189.8
max	5.0	5.0	34846.0

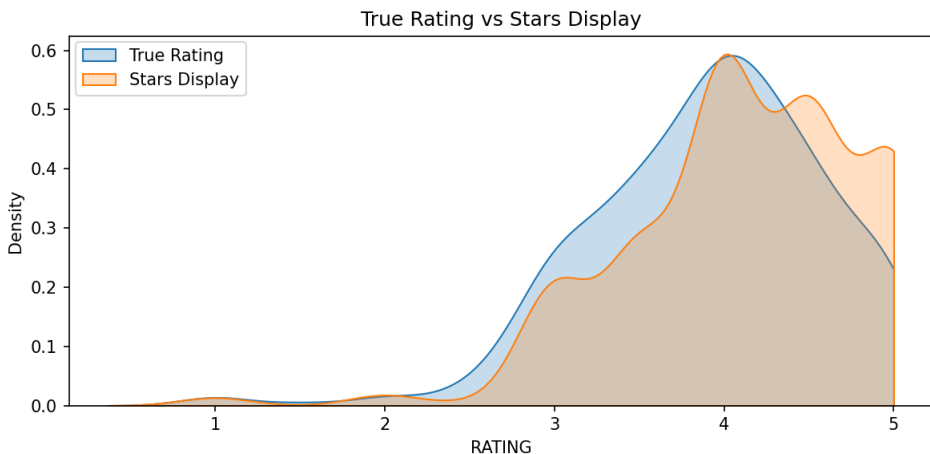
We have 504 rows in this data, and we can see (in the table above) that the mean ranking stars is a bit greater than the user rating mean



If we check the correlation, we can see that stars and rating are not perfectly correlated, which means that there is some sort of discrepancy between the stars being displayed vs the rating being

	STARS	RATING	VOTES
STARS	1.000000	0.994696	0.164218
RATING	0.994696	1.000000	0.163764
VOTES	0.164218	0.163764	1.000000

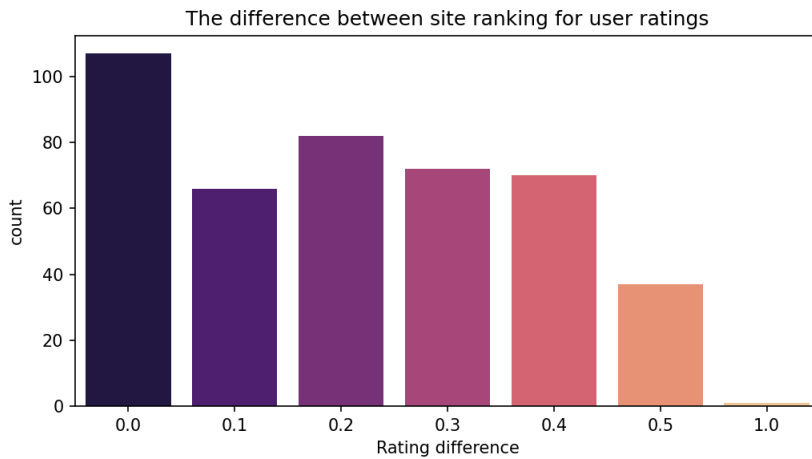
in the article, due to HTML and star rating displays, the true user rating may be slightly different than the rating shown to a user.



Now, actually I want to quantify this discrepancy, therefore I am going to create a new column of the difference between STARS displayed versus

	STARS	RATING	VOTES	YEAR	STARS_DIFF
FILM					
Fifty Shades of Grey (2015)	4.0	3.9	34846	2015	0.1
Jurassic World (2015)	4.5	4.5	34390	2015	0.0
American Sniper (2015)	5.0	4.8	34085	2015	0.2
Furious 7 (2015)	5.0	4.8	33538	2015	0.2
Inside Out (2015)	4.5	4.5	15749	2015	0.0

true RATING



We can see that there are more movies displayed with a different set of stars then we have total matches (the sum of all colored bars are probably much higher than the total count of the zero column) **that means on average, fandango shows a higher rating in the stars then the true rating.**

Also, we can see that there is actually one movie in which the stars being displayed is **one** higher than the true rating

	STARS	RATING	VOTES	YEAR	STARS_DIFF
FILM					
Turbo Kid (2015)	5.0	4.0	2	2015	1.0

Now we are going to compare the scores from Fandango to other movies sites and see how they compare.

First, we are going to explore the other movies sites data.

Part2 - Exploring the other sites:

The other sites data consists of 8 columns and 146 rows:

FILM: film name and the year date inside the parenthesis.

RottenTomatoes³: the stars ranking displayed in the website

RottenTomatoes_User: the true rating user.

Metacritic⁴: the stars ranking displayed in the website

Metacritic_User: the true rating user.

IMDB⁵: the stars ranking displayed in the website

Metacritic_user_vote_count: number of voters per film (metacritic web)

IMDB_user_vote_count: number of voters per film. (IMDb web)

* For convenience of displaying the tables I switched to using the Jupiter notebook

	FILM	RottenTomatoes	RottenTomatoes_User	Metacritic	Metacritic_User	IMDB	Metacritic_user_vote_count	IMDB_user_vote_count
0	Avengers: Age of Ultron (2015)	74	86	66	7.1	7.8	1330	271107
1	Cinderella (2015)	85	80	67	7.5	7.1	249	65709
2	Ant-Man (2015)	80	90	64	8.1	7.8	627	103660
3	Do You Believe? (2015)	18	84	22	4.7	5.4	31	3136
4	Hot Tub Time Machine 2 (2015)	14	28	29	3.4	5.1	88	19560

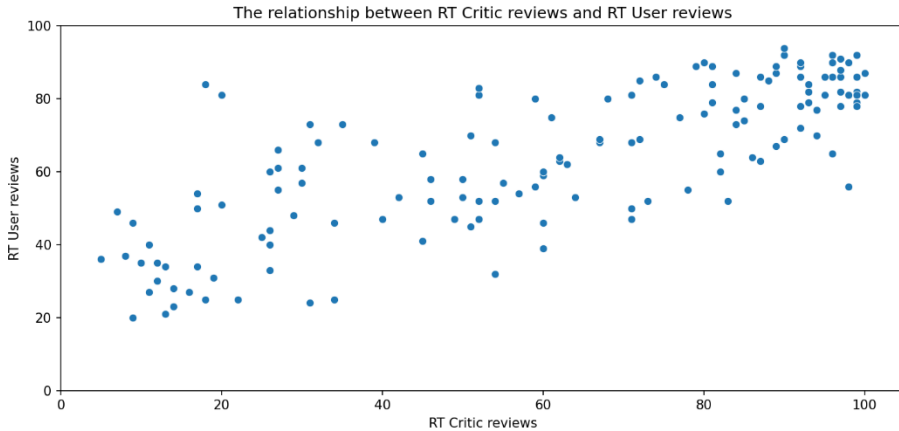
	RottenTomatoes	RottenTomatoes_User	Metacritic	Metacritic_User	IMDB	Metacritic_user_vote_count	IMDB_user_vote_count
count	146.000000	146.000000	146.000000	146.000000	146.000000	146.000000	146.000000
mean	60.849315	63.876712	58.808219	6.519178	6.736986	185.705479	42846.205479
std	30.168799	20.024430	19.517389	1.510712	0.958736	316.606515	67406.509171
min	5.000000	20.000000	13.000000	2.400000	4.000000	4.000000	243.000000
25%	31.250000	50.000000	43.500000	5.700000	6.300000	33.250000	5627.000000
50%	63.500000	66.500000	59.000000	6.850000	6.900000	72.500000	19103.000000
75%	89.000000	81.000000	75.000000	7.500000	7.400000	168.500000	45185.750000
max	100.000000	94.000000	94.000000	9.600000	8.600000	2375.000000	334164.000000

³ Link to [RottenTomatoes website](#)

⁴ Link to [Metacritic website](#)

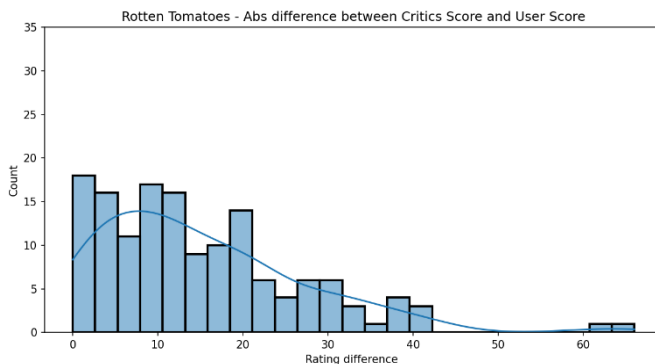
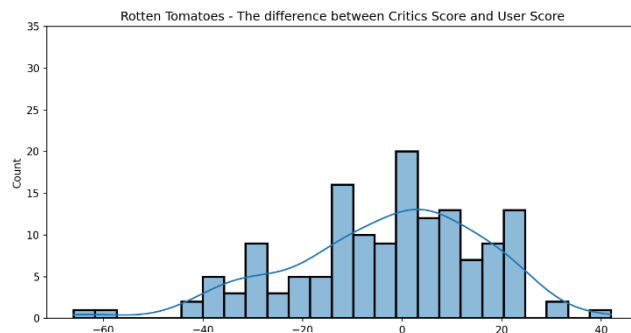
⁵ Link to [IMDb website](#)

First, let's take a look at Rotten Tomatoes. RT has two sets of reviews, their critics reviews (ratings published by official critics) and user reviews.



On average it looks like users are kind of like movies more than the critics.

We shall quantify this difference by comparing the critics ratings and the RT User ratings. So values closer to 0 means agreement between Critics and Users. Larger positive values means critics rated much higher than users. Larger negative values means users rated much higher than critics.



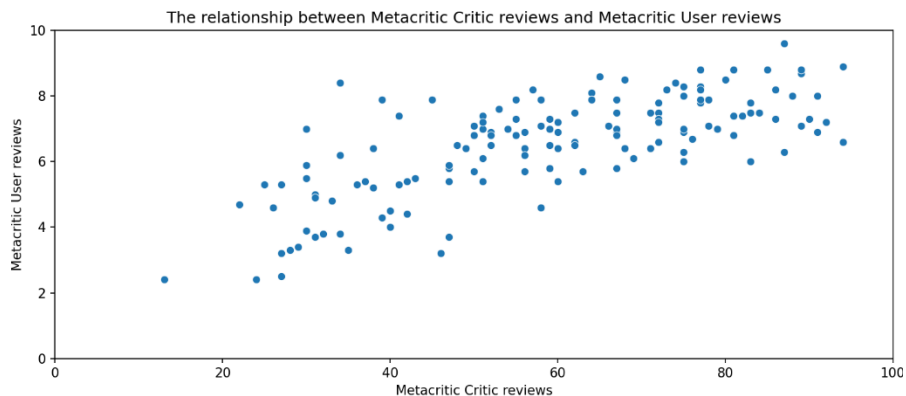
Top 5 movies that the users like but the critics don't like:

	FILM	Rating_diff
3	Do You Believe? (2015)	-66
85	Little Boy (2015)	-61
134	The Longest Ride (2015)	-42
105	Hitman: Agent 47 (2015)	-42
125	The Wedding Ringer (2015)	-39

Top 5 movies that the critics like but the users don't like

	FILM	Rating_diff
69	Mr. Turner (2014)	42
112	It Follows (2015)	31
115	While We're Young (2015)	31
145	Kumiko, The Treasure Hunter (2015)	24
37	Welcome to Me (2015)	24

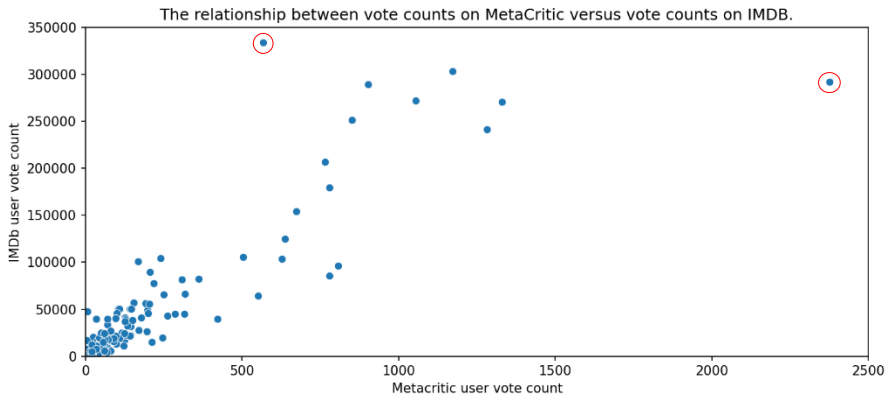
Now, let's take a quick look at the ratings from Metacritic.
Metacritic also shows an average user rating versus their official displayed rating.



Looks like a kind of linear, positive relationship (as the user scored higher on average, the metacritic rating also go higher)
and it doesn't look like there is any extreme outliers (like we had with rotten tomatoes)

Finally, we are going to explore IMDB. Notice that both Metacritic and IMDB report back vote counts and analyze the most popular movies.

So, the question is, are there some movies that are super popular to vote on IMDB and also popular to vote on Metacritic? Or are there some that are only popular voting on one platform?



We can notice right away that there is kind of two points that are outliers,

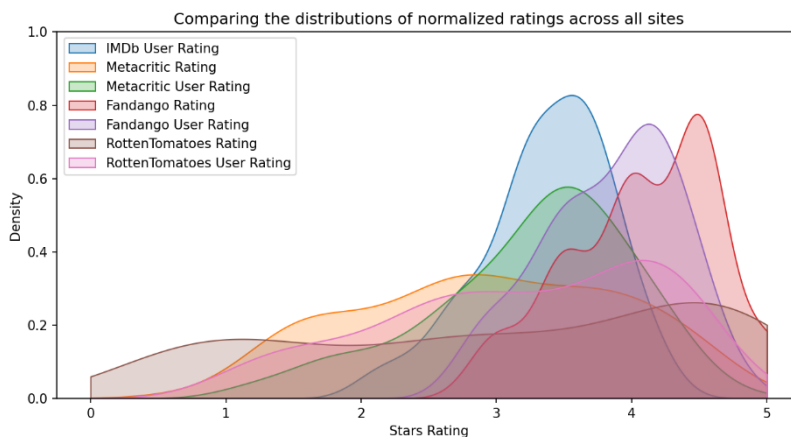
The highest IMDB user vote count

FILM	The Imitation Game (2014)
RottenTomatoes	90
RottenTomatoes_User	92
Metacritic	73
Metacritic_User	8.2
IMDB	8.1
Metacritic_user_vote_count	566
IMDB_user_vote_count	334164

And the highest Metacritic user vote count

FILM	Mad Max: Fury Road (2015)
RottenTomatoes	97
RottenTomatoes_User	88
Metacritic	89
Metacritic_User	8.7
IMDB	8.3
Metacritic_user_vote_count	2375
IMDB_user_vote_count	29203

And now after we explore our datasets, we are going to answer the question of **is Fandango artificially boosting the rating because they also sell tickets?** (if movies overall get higher rating, they're more likely to sell more tickets). We are going to answer this by comparing the distributions of displayed scores on Fandango with distribution of review rating across all sites.



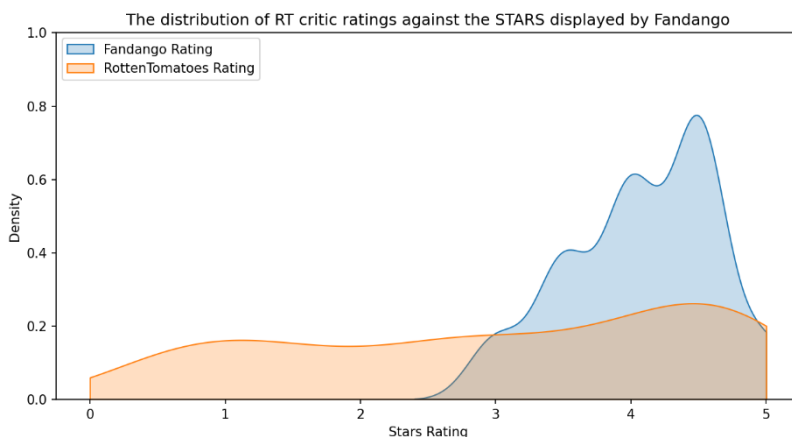
We can see that the curve for **Fandango Rating** and curve for **Fandango User Rating** peaks out at much higher and shows many more movies being rated between 4/5 stars rating.

We can see that **IMDb** seems to almost normalize around 3/3.5 stars rating, while the rest look like almost uniform compared to the stars.

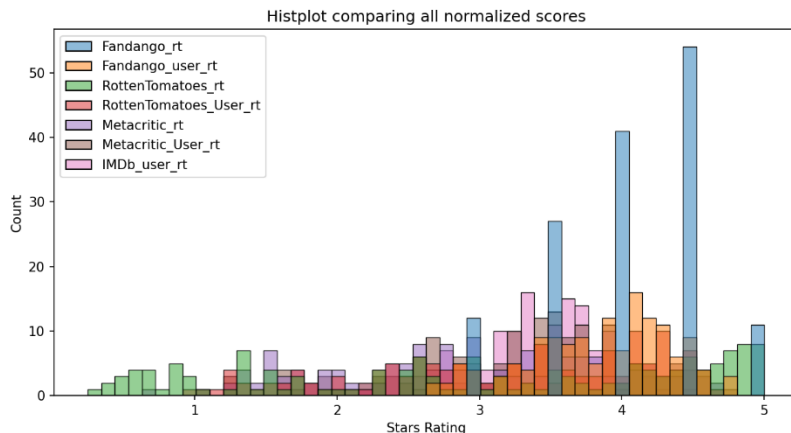
This is essentially proof that Fandango are just way out of norm for some these movies.

Clearly Fandango has an uneven distribution.

Also we can look at RT critics and see that they have the most uniform distribution.



RT critics more or less score movies uniformly, they do tend to score more movies well (so there is more 3/4/5 stars movie). However, Fandango is just extremely unlikely to even score anything below

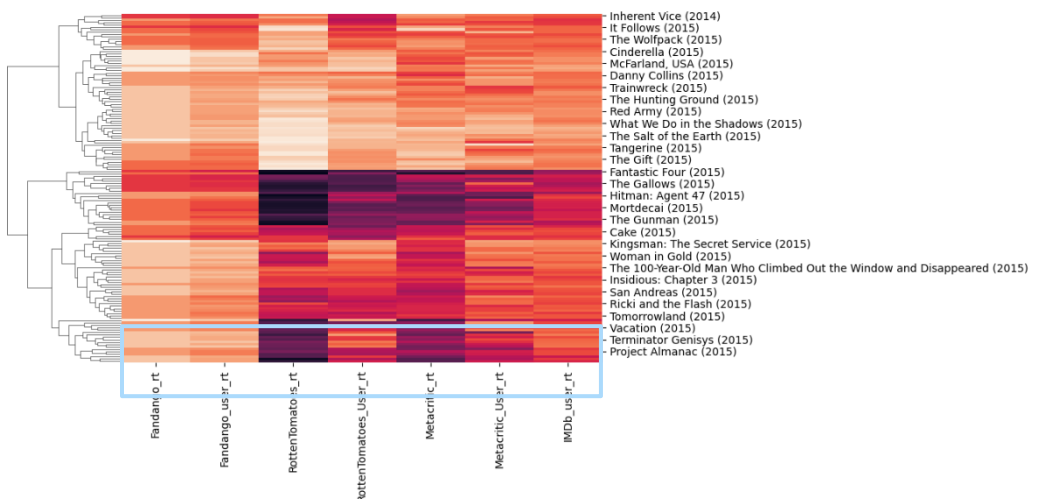


3 stars rating, which implies there are no bad movies

Also, from this plot we can see high spikes from Fandango rating vs everything else- this truly implies that we there are much higher star ratings from Fandango because all these have the same number of movies so theoretically, they should all be showing more or less the same distribution.

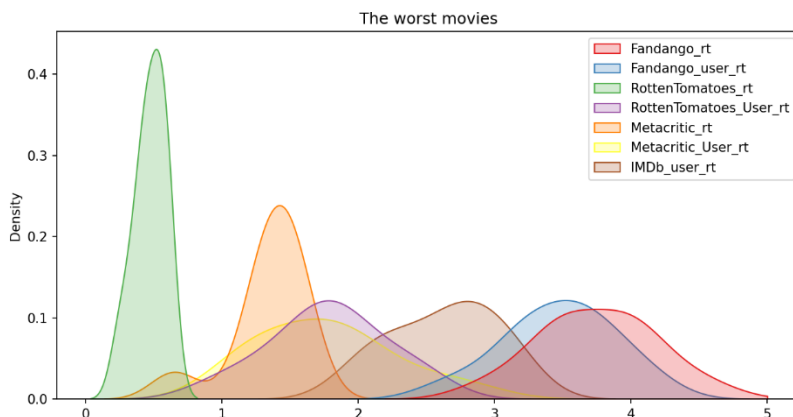
Let's talk about the worst movies rated scores- we can look at the cluster map above (the cluster map is clustering movies together based off their ratings across all sites, that means that very likely, if the movie is really bad, that more sites are going to rate it poorly).

Bad rating has a darker color and good movies have a very light color, so we can see that RT critics tend to be the harshest, where Fandango is really bright.



But what should really stand out is that in the middle, we can see the worst movies (all very dark) and the Fandango rating is still not even close to this rating movies as poorly as things like RT and Metacritic. This is another visual example of just how much Fandango is pushing up the rating for these movies.

Clearly Fandango is rating movies higher than other sites, especially considering that it is then displaying a rounded-up version of rating.



In this plot above (the worst movies) we can see that RT critics are really harsh on these movies.

Not a single one of the movies are getting more than 1 star (by RT critics) or do not pass the 2 stars by Metacritics.

And yet, the distribution for Fandango scores is center around 3.5/4!

And these are the top 10 worst movies. Fandango is still showing them as kind of OK or average.

Notice the biggest offender, "Taken 3" Fandango is displaying 4.5 stars on their site for a movie with an average rating of 1.86 across the other platforms!

Link to [GitHub](#) (If you want to see the code written)

