

# Capturing Emotion and Mood: An Analysis of Cinematic Color and Light

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## Introduction

As movie enthusiasts and computer science majors, we seek to find a way to coverage these two interests. This project offers the opportunity to analyze movies in a new light. We hope to conceptualize and quantize the mood of cinema through color evaluation. Through this lense, we hope to shine a light on common cinematographic elements between film genres, cultures, and target age groups. To do this analysis, we intend to aggregate each individual frame of the movie into a single image that we can then perform multiple functions on to see if it has any commonalities with films in its genre or other peer group. Some of the elements that may be tested, as will be better explained later in this paper, are image symmetry, locationality of colors, brightness, and general color preference. This will allow a more in depth analysis by what makes a movie cater to a particular group or evoke a certain feeling.

## Methods

We collected multiple movie trailers from youtube.com. Movies were selected by the author's familiarity with a film and their belief of its representation of a genre. While not perfectly random, we believe that this method allowed us to select more representative films than a random selection would do and eliminate edge cases. Some edge cases were films such as "Monster House" & "Coraline", where they are children's animated movies, but also horror movies. This was done to limit data crossover, where the films would have elements of both genres, corrupting the final data of either genre. Black and white films were also excluded, as were trailers of movies already selected, (i.e. we would not pick 2 trailers for "Halloween 2"). This was done to allow for better color variation. Most film trailers were roughly 2 minutes in length after cropping with small amounts of variation. We decided that this variation in length was acceptable as the film trailers would be forming a single image to represent the movie in

overall tone and thus small differences in length would be a non-issue and standardizing the length could result in loss of overall trailer tone.

We then processed the movies, cropping out the opening title sequence and the ending title sequence. This was done so as to reduce the amount of screen transitions, where the fades and cuts to perfectly black for a few seconds after it displays a logo. We found including these sections significantly darkened an image and damaged the quality of the data we were trying to gather.

After the videos were properly cropped, they were run through our image aggregator. This aggregator took every individual frame of a movie, added them together, and then divide by the sum of the number of frames. This could be represented by the equation:

$$B = \frac{1}{n} \sum_{i=1}^{n-1} A_i$$

where  $A_i$  is a unique frame,  $n$  is the number of frames, and  $B$  is the total image. Thus, each frame was overlaid on top of each other and averaged to create a single image representing the entire film trailer. An example of this can be seen in Figure 1, where the trailer for the film “The Nun” was run through the aggregator.

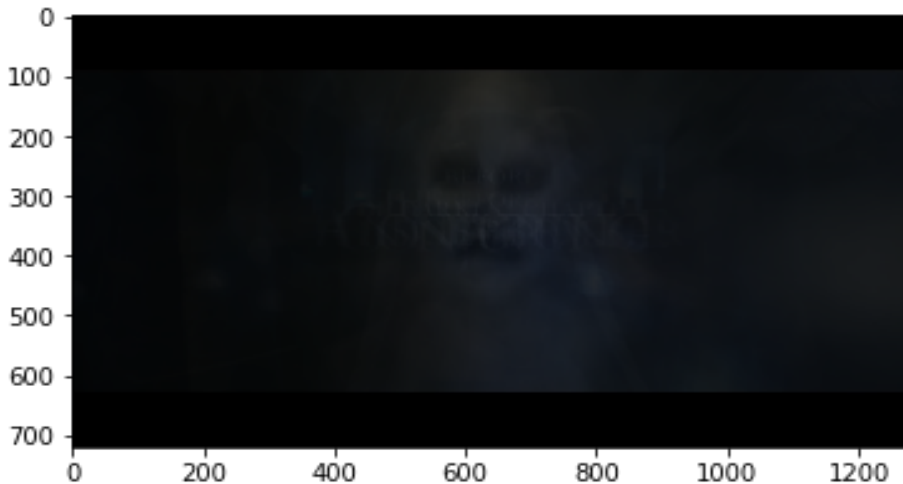
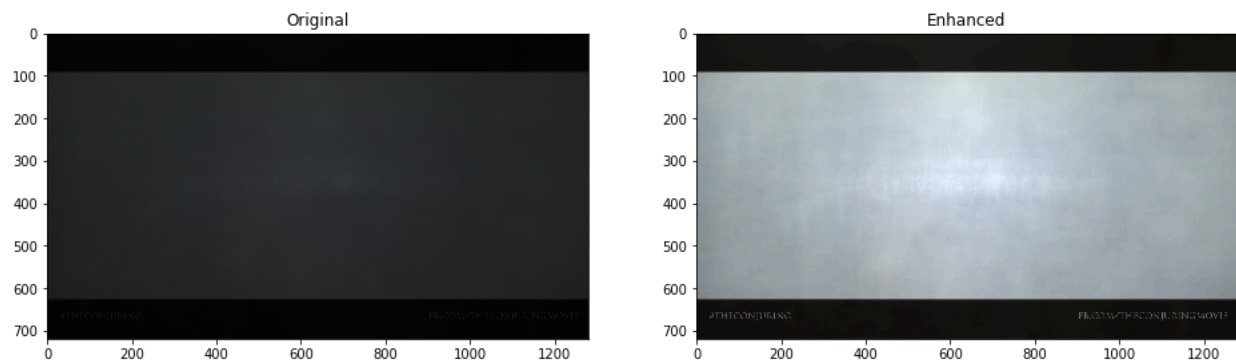


Figure 1. Video agregate of the trailer for “The Nun”. Pulled from the youtube.com video “THE NUN - Official Teaser Trailer [HD]”

After aggregation, movies were then sorted into their genres and the final accumulated products for each genre were combined into a single image. This genre aggregate was then processed in a variety of ways.

## Results

### Horror Movies



Note the tendency of horror movies to be incredibly dark. The enhancement on the right was done by increasing the brightness of the original image by a factor of 5. After Enhancement, it is also clear to see the tendency to have a very bright center surrounded by darkness. This contrast allows for the main characters to be seen and villains to sneak in the sides, suddenly appearing and disappearing for dramatic effect. Some of these were things such as a slow pan with the character in the middle and the villain appearing over the shoulder or in a reflection. Others were things such as a sudden entrance of a spectral hand or a quick attack from a ghost. Note also the bright words that are often shown in horror movies and how they also are centered in with dark backgrounds. This shows horror movie trailer's desire to keep the viewer's eyes in the middle of the frame so as to sneak in the aforementioned surprises.

## Children's Cartoons

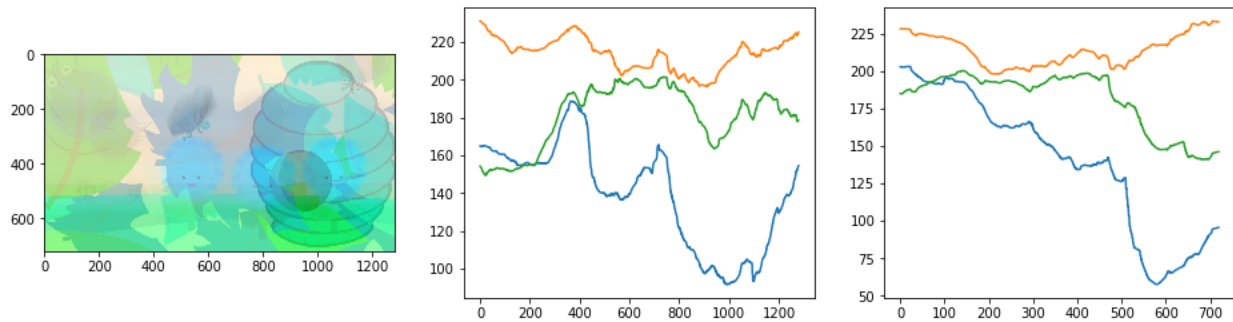


Figure 2. Video aggregate of the "Baby Sensory". Pulled from youtube.com video "Baby Sensory- Color Animation (Infant Sensory)"

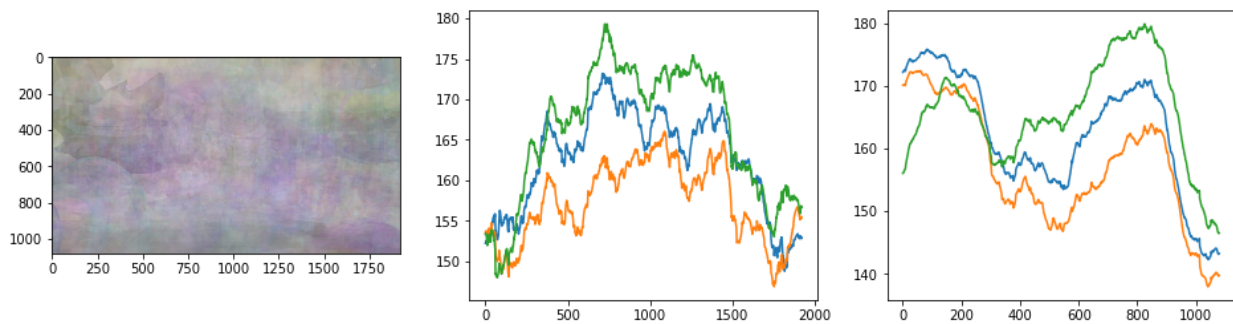


Figure 3. Video Aggregate of the "My Little Pony: The Movie". Taken from youtube.com video "My Little Pony: The Movie - Ponies Got the Beat Official Trailer #2"

In the case of cartoons for children we also noticed different trends based on the age of the children the cartoon is targeted to. For example, the frames in the cartoons targeted for toddlers have generally less objects and the frames tended to repeat themselves. As a result, it can be noticed in the Figure 2 above that adding up all the frames results in a final image with objects that can still be clearly perceived, such as the honey bee hive, the tree trunk or the leaves. The reason for that is to help toddlers maintain the focus on the centers of interest in the story and also to encourage visual development and stimulation.

On the other hand, the movie "My Little Pony" was targeted to older children and therefore the complexity of the frames in terms of objects and colors increased. As a result, the aggregate

image is smoother and no particular objects can be recognized, as noticed in Figure 3. Similarly, the movie uses predominantly bright colors like pink, blue and yellow to appeal to children.

Overall, all the Disney movies and cartoons for children analyzed showed a pattern of having predominantly lighter and brighter colors compared to the horror movies we looked at, as we initially predicted.

## **Schedule**

### Original Schedule:

Sprint 1 - October 20th: Set up initial analyzer and begin testing different methods of analysis. By the end, have selected a final method of analysis.

Sprint 1 - November 5th: Finalize analyzer and begin gathering data on multiple movies.

Sprint 3 - November 19th: Comb through movies searching for commonalities among themes and ratings.

Final Presentation - December 4th or 6th

### Revised Schedule:

Due to extenuating circumstances, we had to push the project back by two weeks and instead of having three sprints, we had two.

Sprint 1 - Creating single movie aggregator

Sprint 2 - An aggregator that can take several movies at a time together as well as data collection on several different films

Final Presentation - December 6th

## **Issues**

An issue we faced was performing analysis on full movies. Complete movies were difficult to run analysis on for their large length and the amount of data we needed to store and then run tests against. We decided to mitigate this problem by operating our program on Movie Trailers, that way we can still see differences between the distinct genres.

Another issue we encountered was, after our first analysis of the trailers, we were left with just a gray image. To fix this, we enhanced the images through flattening. We also had problems formatting the videos: when running our analysis on the trailers, we realized that if all the videos were not in the same format, we were unable to process the them.

## **Future**

If we had more time for this project, we would have made a full website with several different options for the user. At the top of the website, there would be preprocessed movies of distinct genres to display the difference in color patterns to give the user an idea of what the website is used for. The user would be able submit a YouTube url of a movie or video and then the website would produce an image. The website would also produce some statistics about the image, such as the image's symmetry, diversity of color, if any areas have a large amount of a particular color, and general brightness of the image. A specific analysis we would perform is on the differences in color at the beginning of movie compared to at the end. For example, horror movies tend to be very bright in the beginning, and then get darker throughout the film.

For now we only looked at two movie genres: horror and children cartoons but we are also planning on extending the list to multiple genres and further look into the differences between them.

## References

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