Visualizing Emotions in Movies

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Abstract

This paper focuses on the benefits of visualizations in analyzing emotions. Visualizations can give people an overview of how they are feeling or they can give people real-time information on their emotions at a particular time. Either way, if done correctly, visualizations can help distinguish between the emotions felt during an event. In this paper we concentrate on how movies make people feel and how we can show these feelings through visualizations. Films are meant to evoke emotions so know emotions are present while watching movies, so my emotion detector detects people's emotions and displays visualizations based on what was captured.

Author Keywords

Emotions; detect; bubble chart; line graph; visualizations; movies

Introduction

Trying to choose what movie to watch on a Friday night when you open your Netflix account can take up so much time. If we knew what a movie made other people feel it might help speed up the process. But how do we know what a movie made other feel unless we

ask them? By using visualizations, we can get an idea of how much a movie made someone laugh, cry, or scream in fear. This is the motivation behind the work in this paper, to make it easier for people to understand how funny or scary a movie actually is. I am able to show this using a bubble chart and a line graph that displays how someone felt while watching a specific movie.

Movies are designed to make people feel, whether that is to feel good, sad, or feel scared, it does not matter as long as something is felt. When deciding what movie to watch, often we choose based on how we want to feel. Sometimes we are in the mood for a happy, feel good movie, other times we want something that will heighten our adrenaline. We can only know what movies will actually give the effect we want when we already have seen the film so we know what feelings it will evoke. When we want to watch something new, we do not know how it will make us feel. The only way to find out is perhaps by reading reviews or asking friends who have already seen it. The work presented in this paper suggests another way to retain this information. If services like Netflix had an extra component, like visualizations, that allowed people to see how the movie made others feel, they would be able to get a better understanding of which movie would have what they want.

My contributions include:

- Capturing people's emotions while watching a film
- Displaying those emotions captured on a line graph, in addition to a bubble chart
- Determining which visualization is more effective in showing people what emotions were felt

Related Work

This work is not the only one to acknowledge how much emotion is trapped in movies. Other works have discussed how emotions can be used to classify movies. A film browser based on emotions has been worked on [1]. Nadeem Badar and others worked on a system that takes online reviews and explores the emotions of the reviews and compares them with the actual emotions felt during a movie. Their work is focused on reviews of movies while mine is geared towards just emotions during movies. But Badar's work did give me inspiration to create something that can be used to make it easier to browse movies. eRS is another system created to focus on emotions in movies. This one was done by Joel Dumoulin and models emotions felt by movies and creates the emotional datasets [2]. Their contributions are very different than the work of this paper, because our focus is not on how to extract these emotions while watching movies, but how to analyze that information afterwards, while Dumoulin deals with both ideas. Another work that helped inspire to use visualizations with emotions, was Lane Harrison's work on affective priming and how that affects analyzing visuals [3]. This helped gear the work towards the direction of determining which visuals are more effective. Other related work has to do with the actual implementation. Affectiva, the service used in this work to detect the emotions, created a YouTube demo in which users can watch ads on YouTube and it shows in real time, a line graph showing which emotions are present while watching the ad. Figure 1 shows a screenshot of the Affective YouTube demo being used. Although their

main goal is to show the effectiveness of ads, it still is very similar to the work being done here. But whereas the YouTube demo shows emotions in real time, this application shows the emotional responses after watching the movie. There is also more work done with determining how specific visualizations are compared to others, where the demo doesn't do any work with extra visualizations.
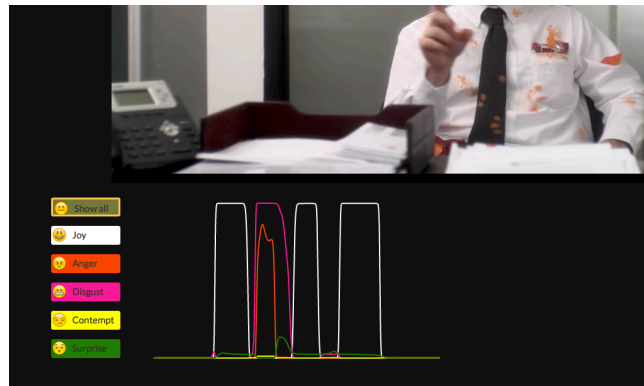

Figure 1: Affectiva's YouTube Demo. Allows you to watch ads and displays your emotions in real time.

Pilot Study

In the pilot study, the main thing tested was the detector. Making sure the emotion detector site worked as expected and the visualizations showed up after watching a movie clip. Everything went pretty smoothly, but the main contribution of the pilot study was what clips resulted in enough emotional response to actually get a visual that gave insight to the

emotions. I was able to select the right clips to use in the actual user study, making the process smoother. Once the data is collected for each genre of movie I am able to create quizzes to determine if a visual gives the right insight to what emotions were felt during the clip of s specific movie genre.

Method

Calculations

The facial recognition was detected using Affectiva's web SDK. This was embedded into the site. Figure 2 shows how the site captures facial expressions. The visualizations were made using d3, JavaScript library. The data for the visualizations were taken from the Affectiva SDK. For every timestamp we are also given values for the different emotions like joy, sadness, surprise, disgust, among others. For the line chart I took a timestamp and the value at that timestamp for each emotion and put it into an array of objects. This data was able to be converted into the line graph. The bubble chart uses percentages to generate the bubbles. For every emotion that was felt we show the percentage of that emotion compared to the other emotions felt. The data was filtered to take out any emotions whose total values came out to zero. Then the values that were not zero were added together to get a total emotion value and that was used to calculate the percentages of each emotion. This was then used to complete the bubble chart.

User Study

Participants were asked to watch clips of different movies pertaining to different genres and take surveys. Two comedies, two dramas, and one horror movie was selected. I had one participant watch the clips and got the visualizations from their reaction to the movies. Once I received all the data for each movie I was able to make surveys for each visualization. I made two surveys, one with the line graph visuals and one with bubble charts, showing emotions felt for each movie. Each question solely has the visualization of emotions felt and four different users were asked to identify if that visualization was generated from watching a comedy, drama, horror/thriller, or an action movie. They also had the option to choose if they are not sure. There were 5 questions to each survey and participants were timed while taking the surveys to see how long it took them to figure out their answers.

Results

The immediate result was that the bubble chart quiz took participants less time to complete than the line charts. After conducting a T-test we see how significant this difference is. For a one-tail, the P value is 0.028 which means our results were significantly different in the amount of time it took participants to complete the surveys. But for two-tail, our P value is 0.057, just above the significance level. Only four users participated in the surveys, so these results are promising. If done

on more people, we might have been able to see a bigger difference in time which indicates the bubble chart is indeed faster to interpret. There were participants who mentioned the bubble charts were easier to figure out. See figure 3 to compare how long it took participants to complete their answers. The bubble chart also got slightly better results than the line chart. Three out of the five questions were answered correctly by all participants, while the line graphs only generated two fully correct answers. Figure 4 shows more information about how participants interpreted the graph and chart for a specific movie. Something interesting from the surveys was that not one of the four participants who took the surveys got all answers correct for either the bubble chart or the line graphs.
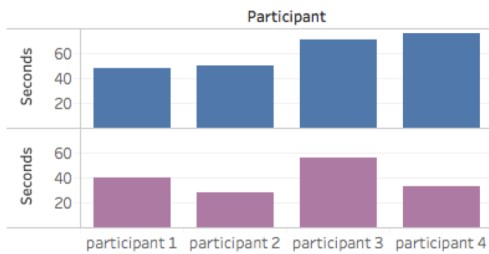

Figure 3: Shows how many seconds it took each participant to complete the survey. The top blue bars represent line graph data and the bottom purple represents bubble chart.
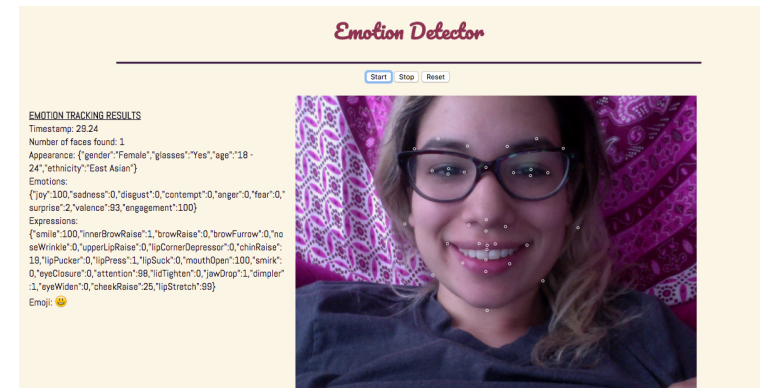

Figure 2: The application allows you to press start and it will begin to detect your face and put out values based on your expressions.
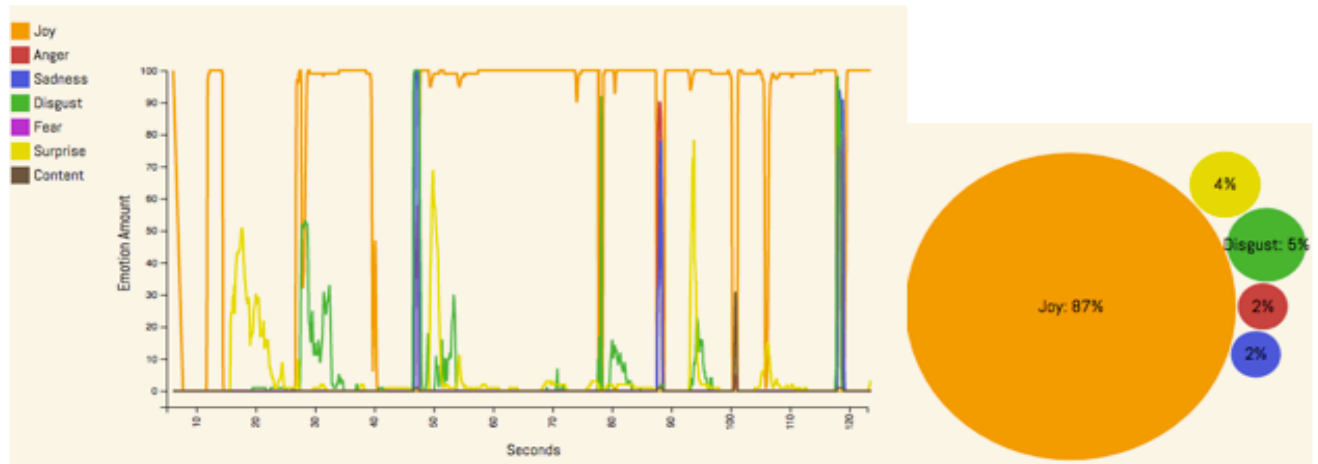
Figure 4: After each movie clip, a line graph and bubble chart is generated like the ones above. These were generated after the user watched a comedy. The pie charts show how the participants classified these visuals. We see that 100% of the participants said this was a comedy when looking at the bubble chart, but for the line graph they thought this was either a horror film or an action movie, no one chose what it actually was.

Discussion

Since no one got 100% correct answers on either of the surveys, there still needs to be some improvement in the visualizations. A good suggestion is to use both visuals next to each other to get a better overview of the emotions. For the future I would have a third survey that shows both the visualizations that were generated with the same movie clip together and see if that helps give people better results. Also, in the surveys people selected action for some of the visuals, but that option was in there even though none of the visualizations came from an action movie. It was interesting to see people use that as a choice. From the genres, comedy and drama was the easiest to distinguish because their emotions were heightened in the visualizations while fear was harder to capture. Another thing, is that I am sure that we would get different results if we used more people to watch clips and capture their emotions because each person's reactions are unique. Maybe other people could get better representations for movies than the ones generated for my test. In future, I would hope to get averages for the emotions felt during movie clips. More accurate result to figure out how well these visualizations are working would be if I had all participants watch the movie clips, save each person's data, calculate the average of everyone's data, and create the visualizations based on that data. This is also closer to what I wanted to achieve in the long run. I want services like Netflix to implement a system like this one that generates emotions for a huge number of people and gets the averages to display visualizations to aid people in helping pick a movie. The visualizations would give watchers a better understanding of the emotions felt during a specific movie. My study figures out what kind of visualization would be best to show. The bubble chart gives more accurate representation of the movies, but it's also possible to use both visualizations to show the emotions.

Conclusion

If Netflix did have a service like this, it would make it much easier to find a movie that you actually enjoy to watch. My work shows that visualizations are a great way to display emotions of a movie.

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