

# AFFECTIVE COMPUTING

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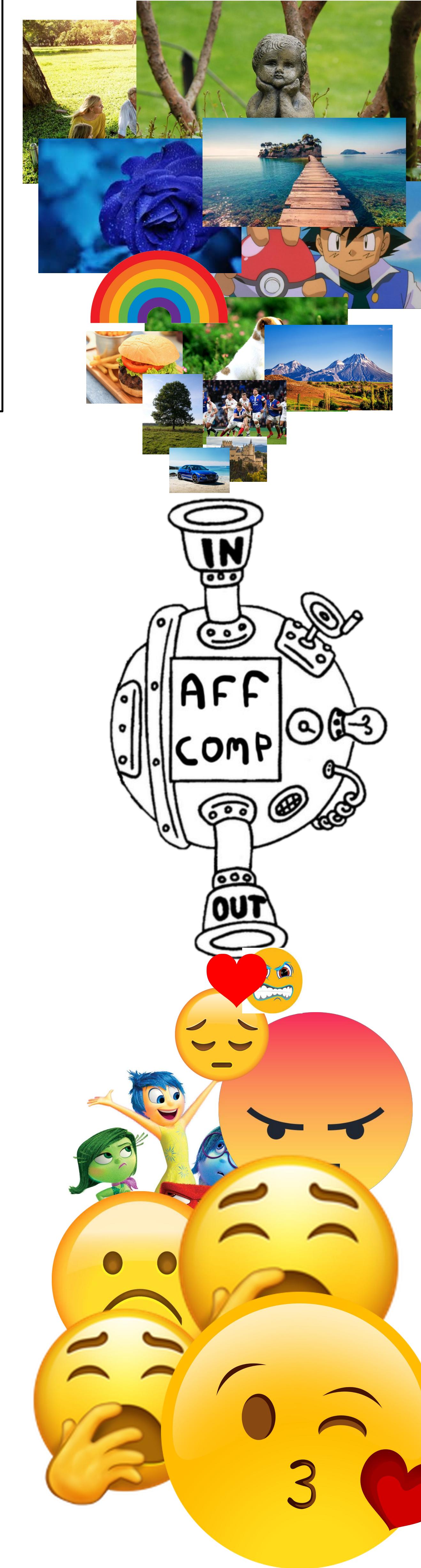
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CSE Capstone Project 2019

## Abstract

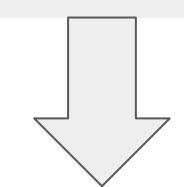
Recent developments in machine learning and natural language parsing have allowed for investigations into deeper parts of human life, like emotions. Our goal is to create rudimentary emotional artificial intelligence that will behave like an “affective computer” by being able to predict common emotional responses to different visual stimuli.



## Solution Flowchart

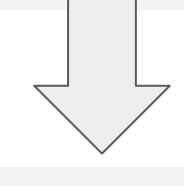
### Data Collection:

Scrape over 13,000 reddit posts from different image appreciation subreddits, collecting over 600,000 comments.



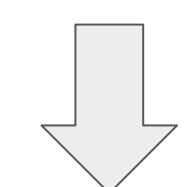
### Filter out noise:

Using keyword matching and a natural language parser, we identified and kept only sentimental images and comments, increasing quality of data and scalability.



### Process Data:

Using the comments as data markers for a particular image we began parsing individual comments into different emotions. We used both a natural language sentiment analyzer and human annotation through crowdsourcing.



### Build Model:

Once we have a collection of images with different emotional probability distributions, we can determine a new image's sentiment by calculating the image feature vectors of the input and annotated images, and create a emotional probability for the input by combining the emotions of the top 3 most similar images by weight of their similarity.

## Motivation

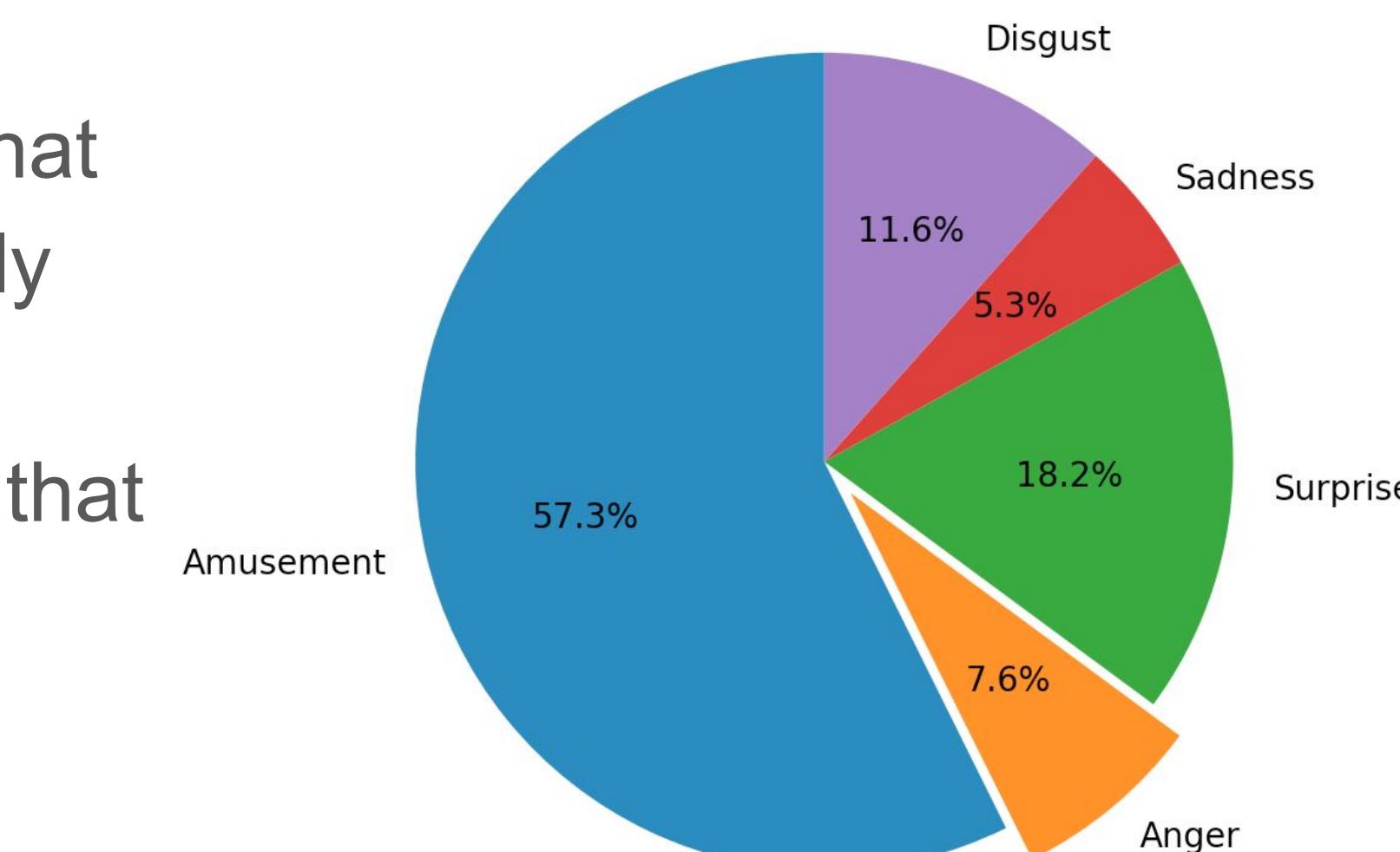
Being able to predict the emotional contents of an image can be very useful. It can help create a safer web for children by blocking explicit photos. It might scan for potentially graphic images for people who are highly sensitive to grotesque things. It would foster a stronger relationship between humans and machines.

## Results and conclusion

After collecting, filtering, and processing all of the data, we were able to build a robust predictive program. The emotional annotation per image was relatively accurate. It was hard to come up with a list of emotions that succinctly described the emotional range of reddit comments (lots of trolling on the internet).

HIT ID ▲	Worker ID	Lifetime Approval Rate	Input.I	Input.C	Input.Url	Input.Comment	Sentiment.Label
3i6NF2WGJJEIV4XZ1B1ZGYTU4055GP	A3JF080J1301XR	0% (0/0)	84lzf	49d58938a7928009a1d53b3dd547493	<a href="https://i.imgur.com/2aUTsav.jpg">https://i.imgur.com/2aUTsav.jpg</a>	Good on you OP! May she be happy forever!	Amusement
3IC0HX7E0FTLGFJ7Y7MZ20CRA0F0EI	A1LXV0C5V4RMSC	0% (0/0)	84lrdq	f2fc6531455d2d9e4a4b275126dac1aa	<a href="https://redd.it/g2jv6w8ywi01.jpg">https://redd.it/g2jv6w8ywi01.jpg</a>	Great job! You got some skills!	Amusement

The distribution of emotions collected showed that the type of comment left by redditors was heavily skewed towards sarcasm and humor. This may also be due to the type of images we collected, that they were more light-hearted and less serious.



The results from our CNN model were promising. We used Pytorch to calculate vectors based on the content of the input image. This meant that we had a database of images with emotional probabilities attached to each, and could then determine a new input image by comparing their image feature vectors. The similarity scores were fairly accurate, with the Pytorch model able to match images with similar objects and tone. Next time, we would collect more images and comments from all social media websites (Twitter, FB) to mitigate the sentimental bias that comes from reddit comments.



Amused  
71.4%

Surprised  
21.4%

Disgust:  
7.2%