COSC 89: Datascapes Final Project – MoodifAI

Kevin Guh

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Abstract

MoodifAI is a web-based application that "sonifies your news feed" to allow one to experience the emotions expressed in his/her Twitter feed through music. This project utilizes various mappings including that between visual and auditory perception and emotion as well as intermediate mappings between human emotion and mathematical structure using the Pleasure-Arousal-Dominance model of emotion (Mehrabian 1996) and natural language processing/k-means clustering algorithms (Park et al. 2011). Ultimately, my investment in this project is part of a greater personal exploration of the intersection between the arts and sciences, or framed in another way, the relation between the internal and the external worlds.

Interpretative Significance

A central theme of our discussions in Datascapes has been on the relationship between art and science, and how interplay between the two can lead to new realizations and creations. I took these discussions to heart whilst experimenting with project ideas and as a computer scientist, I was also deeply interested in the concept of perception – what share of our perceptions are mental constructs as opposed to

raw sensory information, and how does perception through human sensory organs differ from that via the mathematical algorithms of machines? Through various iterations, I arrived at the idea underlying MoodifAI of creating an algorithm to determine the dominant emotion of a set of Tweets and subsequently relaying this emotion back to the user via music provided by the Spotify/EchoNest API. In doing so, I allow the user to "see through the eyes of the machine" in a sense; the user is able to conjure emotion themselves from just reading the Tweets or by just listening to the music, but by listening to the music selected by my algorithm while reading the original Tweets, the user is able to evaluate the emotions they expect to feel against those determined by the machine (calling into mind Gregory Bateson's paper on the epistemic value of observing differences between entities). While the general field of artificial intelligence has very much yet to perfect the art of quantifying emotion, the intent of MoodifAI is ultimately to compare emotions as identified by humans with that of machines in an aesthetically engaging fashion.

Design and Implementation

From a technical perspective, MoodifAI can be decomposed into three primary components: a data scraper, a processing algorithm, and a user-facing interface. The data scraper implements the OAuth2.0 protocol to collect Tweets from a user's timeline which is subsequently parsed and and cleaned into a "bag of words" for further analysis by the processing algorithm. The processing algorithm itself is a two-stage process; in the first stage, I using Mehrabian's (1996) Pleasure-Arousal-Dominance (PAD) model of emotion to assign the algorithm affective ratings for a dictionary of 13,915 English language words (Warriner et al. 2013), creating a 3-dimensional vector in Euclidean space corresponding to each of the dimensions of Mehrabian's model. My algorithm is also assigned a dictionary of 6 emotions

(happy, trippy, disturbing, angry, eerie, sad) mapped to their respective affective ratings as presented by Park et al. (2011) via k-means clustering.

In the second stage of the algorithm, each instance in the "bag of words" generated from the data scraper is checked for a match in the dictionary of affective words; the total score of all the affective scores are averaged at the end to determine the average affective rating for the Twitter feed. Finally, I classify the dominant emotion of the set of original Tweets as the emotion whose PAD rating has the minimum Euclidean distance from that for the Twitter feed, which is then used to extract a playlist of songs through the Spotify/EchoNest API.

The set of original tweets as well as the final music playlist are presented to the user via a web application, which can be found at moodifAI.herokuapp.com. This allows for the side-by-side comparison of user-identified emotions in the Tweets against those of the machine described in the Interpretative Significance section.

Data Sources

The data for my project was drawn from different sources for different componentes. With regards to the training dataset, the set of affective scores for English words was taken from Warriner et al.'s (2013) publicly accessible dataset while the affective scores for emotional cluster centroids were taken from Park et al.'s (2011) paper. The live data on which the algorithm runs is in turn drawn from the Twitter API using the OAuth2.0 protocol. Finally, music playlist data is accessed via the Spotify/EchoNest REST API.

References

[1] Healey, Christopher G. "Visualizing Twitter Sentiment." Web, last accessed 14 March 2016. http://www.csc.ncsu.edu/faculty/healey/tweet_viz/

[2] Mehrabian, Albert. 1996. "Pleasure-Arousal-Dominance: A General Framework for Describing and Measuring Individual Differences in Temperament." *Current Psychology, Winter 1996.*

[3] Park, Jeong Woo, Woo Hyum Kim, Won Hyon Lee, Ju Chang Kim, Myung Jin Chung. 2011. "How to Completely Use the PAD Space for Socially Interactive Robots." *Proceedings of the 2011 IEEE International Conference on Robotics and Biomimetics.*

[4] Warriner, Amy Beth, Kuperman, Victor, and Brysbaert, Marc (2013). "Norms of valence, arousal, and dominance for 13,915 English lemmas." *Behavior Research Methods*, 45, 1191-1207.

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