

# Emotion through Intel RealSense

CS2951K Final Project Proposal

Ning Hou (nhou), Lee Painton, Eric Rosen

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## 1 Research question

Affect display is the combination of facial, gestural and vocal cues by which persons consciously or unconsciously communicate emotion. Cues such as facial expression, vocal prosody and gestural display are all modes by which the affective state of an individual can be inferred. We are interested in exploring the efficacy of a multimodal Bayes filter when used to filter combined input from various modes into a probability whether a given subject is confused or not. By confusion we mean the common definition where, given a situation, a person either understands it or is confused. It is our contention that a multimodal approach will be much more effective than a single mode by itself.

## 2 Significance

Reliably determining user affect is an open problem in HCI and part of a field called affective computing. The development of affect sensitive intelligent agents would computers to interact more effectively with humans in tasks where emotion has an impact, learning or driving for example. Confusion is especially significant during these tasks as it can actively interfere, or even be dangerous in the case of tasks such as driving. Confusion serves intuitively as a natural perceptual feedback representing the efficacy of an intelligent agents communication attempts and could be incorporated as part of the reward function in a learning agent. It is our more immediate hope that we can utilize work in this project to make Baxter aware of confusion in subjects with whom he is interacting.

### 3 Methodology

We plan to formulate the problem at the highest level as a multimodal Bayes filter which returns a distribution on  $P(confused|U)$  where  $U$  is an evidence set of affective cues. We plan initially focus on facial expression data, but given a relatively low accuracy reported from isolating modes (cite here) we feel it will be important to combine data from as many cues as possible. Our corporae will be gathered by means of an automated quiz where a user sits down in front of a RealSense enabled computer and takes a short quiz of 10 questions designed to elicit both confusion and certainty. After the quiz the subject will be asked to rate their experience with each question on a scale so as to establish a baseline from which we can derive ground truth. Data from the RealSense device and end surveys will be recorded into a database during these quizzes.

### 4 Results

Data from testing will be processed through the Bayes filter with different combinations of modes active. This will be compared against our collected ground truth data for each subject as a way of determining accuracy of the results.

(table here)

### 5 Related Work

Kapoor et al [1] describes a theoretic framework used to describe affective states. Our work borrows from this idea but is generalized rather than focused on the activity of learning.

## 6 Schedule

Date	TODO
2/26 - 3/5	Finalize theoretic framework and experiment design
3/6 - 3/12	Program initial models and test with false data
3/13 - 3/19	Design interview script and post interview survey, find interview subjects and schedule
3/20 - 3/26	Have at least 10 subjects interviewed with collected data or move to backup plan
3/27 - 4/2	Test data on models and compare
4/2 - 4/7	Checkpoint presentation
4/8 - 4/14	Collect more data as needed; tweak models
4/15 - 4/21	Prepare results
4/23 - 4/28	Final presentation

## 7 Responsibilities

Everyone will have involvement with all parts of the project. We will assign work based on what is needed to meet milestones.

## References

- [1] Ashish Kapoor, Selene Mota, and Rosalind W Picard. Towards a learning companion that recognizes affect. In *AAAI Fall symposium*, pages 2–4, 2001.