Overview of Affect-Aware Computing

**Introduction**

Emotions play an important role in everyday life and impact how we connect to one another, make decisions, and our well-being (Cherry, 2020). There are five affective phenomena, according to the *Handbook of Affective Sciences* (Davidson et al., 2002):

1. emotion (specific states that are connected to stimuli and are time-bound),
2. feelings,
3. mood (diffuse states)
4. attitudes, and
5. affective style (emotion regulation).

We each have our subjective view of our emotions and the emotions of other people. Our emotions and responses to other people's emotions are influenced by the social context - who we are with, what the social norms are around expressing emotions, what we are currently doing, etc. (Barrett, 2017).

**Affect-Aware Computing**

We are using the term “affect-aware computing” to encompass technologies designed to account for users' emotions, moods, and other affective phenomena in the user experience. This technology goes beyond technology's incidental impact on emotions, such as the phenomenon of social contagion on social media. Instead, affect-aware computing is explicitly affect-aware, affect-mimicking, or affect-altering in its goals. The field of Affective Computing “relates to, arises from, or influences emotions” (Picard, 1995, p. 1). For example:

* wearable devices that sense a person’s emotional states (e.g., Feel from Sentio Solutions, 2020),
* automobiles designed to support safe driving by tracking and respond to the emotions of drivers (Elgan, 2019), and
* chatbots that promote well-being and self-compassion (e.g., Lee et al., 2019).
* Amazon’s reported emotion-detection wearable (PC Magazine, 2020).

These products and features have various goals, including informing users of their emotional states, supporting reflection of emotions at play during an interpersonal conflict, or role-modeling emotions. Some of technologies gather affect information via explicit user input (e.g., emojis, daily mood journals). On the other hand, some of these technologies gather affect data through implicit and passive means. These latter technologies are based on the premise that our bodies reliably produce biometric signals, verbal signals (e.g., voice intonation) and non-verbal cues (e.g., facial expressions) that correspond to universal emotions. Technologists can create affective computing systems using cloud-based emotion recognition services offered by platforms. For example, Google’s Vision API processes images to detect faces, landmarks, and objects (Google Cloud Vision API, 2020). This API calculates likelihood ratings for emotional states (joy, sorrow, anger, and surprise). Another example is Microsoft’s Cognitive Services, which provides an Emotion API for perceived facial expressions for six emotional states (anger, contempt, disgust, fear, happiness, neutral, sadness, and surprise) and a corresponding confidence level (Microsoft Emotion Class, 2020).

**Explorations in Affective Computing Technology**

Affective computing could explore the ways in which emotions are connected to:

1. One's own interpretation of our emotions (that may not map neatly to biometrics and verbal and non-verbal cues)

2. Sensations we feel, which can include our internal senses (e.g., our "gut feeling", a sense of being lost) and feelings of comfort/discomfort in our environment.

3. Perceiving and interpreting the emotions of those around us, such as ambient displays for teams that display mood (e.g., MoodLight from Snyder et al., 2015),

4. Expectations of emotional behavior and expression based on social norms

**Framing Affect-Aware Computing Research and Design**

Affective computing is a rich area for research and design; however, it is also an area that can cause harm to the personal and sensitive nature of emotion-related scenarios and data. It is critical that researchers and designers of affective computing consider the ethics and equity of our research methods and technology implementations. For example, Facebook has been criticized for using emotion data for marketing purposes such as personalized ads and news feeds (Handley, 2017).

As we explore Affective Computing in class, we will consider the value and potential harms of these emerging technologies, especially as perceived by current and potential end users of affective computing.

**Additional Resources:**

* [MIT Affective Computing Research Group](https://www.media.mit.edu/groups/affective-computing/overview/)
* [Sampling of Affective Computing research areas and technology from ScienceDirect](https://www-sciencedirect-com.offcampus.lib.washington.edu/topics/computer-science/affective-computing)

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