

HCI Perspectives on Emerging Emotion Self-report Acquisition Techniques

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In this position paper, we outline our research challenges in emotion Human-Computer Interaction (HCI), and zoom in on a case study of how developing real-time and continuous emotion self-report acquisition techniques necessitates HCI perspectives.

CCS Concepts: • **Human-centered computing** → **Human computer interaction (HCI)**.

Additional Key Words and Phrases: HCI, emotion, affect, self-reports

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1 RESEARCH CHALLENGES IN EMOTION HCI

Human emotion (or affective states) can be seen as mental and physical states that touch every aspect of human life throughout every moment, and are an integral part of human cognition, behavior, and social interaction. One can ask: to what extent are HCI perspectives necessary for advancing research in technology and emotion? Within HCI, the focus on "human interaction with machines" takes a central role, and despite the multitude of facets by which emotion has historically been investigated (whether in Psychology, Design, Clinical Research, or Affective Computing), there are flourishing areas of research that we believe HCI can provide valuable contributions for.

Within our Distributed & Interactive Systems research group, we try to tackle three core challenges related to human affect, where the first and third draw directly from HCI research: (a) **Data Acquisition**: How can we develop systems that enable us to precisely and unobtrusively annotate our affective and behavioral states? (b) **Machine Understanding**: How can we develop systems that can sense, recognize, and react to our affective and behavioral states? (c) **Sensory and Perceptual Augmentation**: How can we develop systems that can augment our physical / virtual bodies and sensory perception to enhance our affective states and interactions? From these challenges, we see a number of relevant research areas by which we believe HCI as a field is uniquely positioned to address:

- (1) Usable techniques for collecting real-time and continuous emotion self-reports (e.g., mobile [7] or 360° VR [5]).
- (2) Novel techniques for visualizing emotion states and/or biosignals (e.g., in social VR entertainment [4]).
- (3) Multi-sensory stimulation technologies for modifying affective perceptions (e.g., wearable thermal affective displays [1]).

2 CASE STUDY: REAL-TIME, CONTINUOUS EMOTION SELF-REPORT ACQUISITION TECHNIQUES

For this position paper, let us consider the challenges of temporal resolution when labelling our emotions (whether for clinical purposes or for training ML algorithms): even though emotions, whether micro-expressions or bodily

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53 changes, are in continuous flux and can be measured, self-reports do not have the same temporal resolution. Several
54 factors contribute to this temporal resolution mismatch: different awareness (interoception) levels across individuals
55 [2]; non-linearity in time perception [6]; and how emotions themselves alter time perception [3]. To this end, we have
56 adopted a range of methods when designing and evaluating our real-time and continuous emotion label acquisition
57 techniques across mobile [7] and 360° VR environments [5]. These include co-designing with experts, physiological
58 sensing, device input ergonomic design, usability testing, subjective UX measurement, human activity recognition, as
59 well as image and video analysis.
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62 Such methods for example involve careful consideration of perceptual Field of View (FOV) limitations constrained
63 by the device display and human peripheral attention, or the inherent cognitive and motor processing delays in users
64 reflecting on (i.e, emotion state appraisal) and using an input device to label one's emotional state. All these considerations
65 are moreover tied with the choice of (computational) emotion representation model a researcher subscribes to, where
66 at some level one needs to minimally consider the impact of discrete versus dimensional emotion models on user
67 perceptions and subsequent self-reports. Given the foregoing, we believe that multi-faceted considerations of the user,
68 as is common in HCI research, are necessary (and at times perhaps sufficient) for methodically advancing research on
69 the computational capture, machine recognition, and visualization of human emotion.
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104