"Some emotions don't make a lot of noise. It's hard to hear pride. Caring is real faint - like a heartbeat. And pure love why, some days it's so quiet, you don't even know it's there."- E. Bombeck

Real life affective states felt by real people are complex. It would be so much easier for us, scientists, if they were describable simply by the six prototypical categories of Ekman (anger, disgust, fear, happiness, sadness, and surprise), but they are not. For instance, the first and simplest affective state, which we discover in childhood, is curiosity. When does an automatic affect recogniser need to model curiosity, and how? The affective state regret lacks immediacy, and mostly comes upon reflection. Should affect interfaces model regret? More specifically, why do we researchers feel the need to sense affect at all, what models, expressions and affective states should we focus on, in which context, and how can we do all these?

The best way to seek answers to these questions, and provide an insight as to where affective computing field stands today, is to look at its past and present, and carry forward the knowledge and experience acquired into the future. One of the more recent answers to the question of why we need to sense affect came in the early 1990s, when Mayer and Salovey published a series of papers on emotional intelligence suggesting that the capacity to perceive and understand emotions define a new variable in personality. Goleman introduced the notion of emotional intelligence or Emotional Quotient (EQ) in his 1995 best-selling book by discussing why EQ mattered more than Intelligence Quotient (IQ). Goleman drew together research in neurophysiology, psychology and cognitive science. Other scientist also provided evidence that emotions were tightly coupled with all functions we, humans, are engaged with: attention, perception, learning, reasoning, decision making, planning, action selection, memory storage and retrieval. Following these, Rosalind Picard's award-winning book, Affective Computing, was published in 1997, laying the groundwork for giving machines the skills of EQ. The book triggered an explosion of interest in the emotional side of computers and their users, and a new research area called affective computing emerged.

When it comes to what to model and sense (which affective states, in which context), affective computing has advocated the idea that it might not be essential for machines to posses all the emotional intelligence and skills humans do. Humans need to operate in all possible situations and develop an adaptive behaviour; machines instead can be highly profiled for a specific purpose, scenario, user, etc. For example, the computer inside an automatic teller machine probably does not need to recognize the affective states of a human. However, in other applications (e.g., effective tutoring systems, clinical settings, and monitoring user's stress level) where computers take on a social role such as an instructor or helper, recognizing users' affective states may enhance the computers' functionality.

In order to achieve such level of functionality, the initial focus of affective computing was on the recognition of prototypical emotions from acted (posed) data and a single sensorial source (modality). However, as natural human-human interaction is multimodal, the single sensory observations are often ambiguous, uncertain, and incomplete. Therefore, in the late 1990s computer scientists started using multiple modalities for recognition of affective states. The initial interest was on fusing visual (facial expressions) and audio (acoustic signals) data. The results were promising, using multiple modalities improved the overall recognition accuracy helping the systems function in a more efficient and reliable way. Starting from the work of Picard in the late 1990s, interest in detecting emotions from physiological (bio) signals emerged.

The final stage affective computing has reached today is, combining multiple cues and modalities for sensing and recognition, and moving from acted (posed) data, idealised conditions and users towards real data, real life, and real people. The attempt of making affect technology tangible for the real world and the real people is closely linked to Ray Kurzweil's prophecy. Kurzweil predicted that by 2030 we can purchase for 1000 USD the equivalent information processing capacity of one human brain, and by 2060 digital computing will equal the processing capacity of all the human brains on the earth. If computing capacity continues to increase; further advances in high resolution digital imaging, compression algorithms and random access mass storage is achieved; broadband/wired/wireless communication is available worldwide; size, cost, and power consumption of computational/communications hardware continue to decrease; portable power generation/storage advancement continue, then computers will become much more connected to people (and vice versa) than they already are today.

Coupling the new horizons reached in technology and cognitive sciences, the focus of affective computing research is gradually moving from just developing more efficient and effective automated techniques to concentrating on more context-/culture-/user-related aspects (who the user is, where she is, what her current task is, and when the observed behaviour has been shown). In this transitional process, affective computing research is constantly attempting to bridge technology and humans not only for more natural human-computer interaction (HCI) but also for improved human-human interaction by becoming curious on how real-life conditions, tasks, and relationships affect humans, and whether and how the field can positively impact these (e.g., affect sensing for autism).

This book contributes to answering such why, what, and how questions by providing an overview of frameworks and models of affect, highlighting the present and future of affect sensing and recognition, and looking at affect in HCI context. Each section explores the give and take of various aspects, from foundations and background of affect in cognition (Section 1) to theoretical models of affect (Section 2), and how these are used in order to create automatic affect recognisers based on verbal and nonverbal signals (Sections 3 & 4), and how created automatic systems have influenced HCI to date (Section 5). The book concludes with an extremely interesting philosophical discussion on whether it is possible and desirable to create machines that work exactly like humans do.

Evolutionary theory hypothesises that specific expressive behaviours were selected over the course of human evolution because they had adaptive value in social relationships. This hypothesis suggest that the evolution and future of affective computing is, indeed, an ongoing wondrous journey where machines (computers) meet humans, and where key issues and themes of affective communication, such as context, emotion colouring, multimodality, back-channelling, intensity, duration, continuity, and sustainability, evolve over the course of time, and over the course of that encounter. The authors and readers of this book thus become a part of this wondrous journey.

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