Affective Computing for Mental Wellbeing

Challenges, Opportunities, and Promising Synergies

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Affective Computing for Mental Wellbeing: Challenges, Opportunities, and Promising Synergies

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Abstract—This paper provides an overview of the Workshop on Affective Computing for Mental Wellbeing (mWELL) hosted at the 11th International Conference on Affective Computing and Intelligent Interaction (ACII) in 2023. The workshop aims to bring together researchers, practitioners, and experts from multiple disciplines, to explore how affective computing can contribute to addressing mental health challenges and promoting mental wellbeing, identify key challenges and solutions, and find the most appropriate ways to move the field forward. The paper highlights the workshop's motivation, objectives, and the contributions made by the participants.

Index Terms—Affective Computing, Mental Health.

I. MOTIVATION

The burden of mental health disorders, such as depression, anxiety, and stress-related conditions, poses significant challenges to individuals, communities, and healthcare systems worldwide. In 2019, 301 million people were living with an anxiety disorder, and 280 million people were living with depression [1]. According to the World Health Organization, two-thirds of the people struggling with mental conditions do not seek professional help [2]. Aside from social stigma, the ones that do are confronted with limited availability of practitioners, and increasingly so in low and middle-income countries [3]. For those that do, the success rate of therapies remains limited. For example, despite considerable progress, the treatment of anxiety disorders remains difficult and leads to recovery in only 50%-70% of patients [4]. Against this background, there is a growing need for innovative approaches to support and enhance mental health interventions.

The integration of affective computing holds immense promise for transforming the landscape of mental health care, but there are also many challenges that lie ahead [5]. Affective computing can support several important processes in enhancing and maintaining wellbeing, such as supporting self-awareness by tracking states and behavior using multi-modal cues related to verbal and non-verbal communication, physiology, and activities [6]. At the same time, clinicians can use such objective measures to complement traditional questionnaires and improve diagnosis, as well as in developing personalized interventions based on individuals' affective

states and their unique needs and preferences. XR solutions or m-health apps can be enhanced by becoming more responsive and adaptive, as for example tools to support emotion regulation [7]. Last but not least, such technology can make mental health services more accessible, especially to those facing barriers such as geographic distance, stigma, or lack of resources.

The International Workshop on Affective Computing for Mental Wellbeing (mWELL)[1] aims to bring together researchers in Affective Computing (AC), clinicians in the emerging area of digital mental health and digital psychiatry, developers from industry, and policymakers to discuss what aspects of digital mental health apps and tools can most benefit from AC technologies and existing technologies already incorporating AC, such as embodied conversational agents and affective virtual agents, and affect-adaptive human-machine interaction. Since advances in AC and AI in mental health also raise significant ethical concerns, this workshop aimed to identify and address these emerging issues. Topics include stress recognition and reduction, the therapeutic relationship with technology, and synthetic relationships, among others.

II. EXPECTED OUTCOMES

Bringing together participants from the different communities involved will facilitate:

- a deeper understanding of the challenges and opportunities of employing affective computing for mental wellbeing,
- generating ideas for better diagnosis and treatments by connecting experts on sensing and technical interventions with clinicians
- paving the way towards context-aware and personalized systems by exploring the interdependencies between sensing, interventions, user experience and adoption,
- raising awareness on the careful consideration of ethical issues required, such as privacy, data protection, trust, which are discussed in a special session.

[1]https://mwell.tbm.tudelft.nl/

III. WORKSHOP CONTRIBUTIONS

Nine papers were selected for presentation at the workshop. Several studies have focused on sensing or measuring mental states, behaviors or skills relevant to mental health. [8] proposed an approach that uses context embeddings and an attention based neural network approach to detect perceived stress from EEG recordings. Transfer learning is used to counter problems of small data. [9] provided a novel dataset of distressed and shouted speech, validated via binary and multi-class classifiers. [10] investigated the potential and effectiveness of self-supervised pre-training for well-being tasks, specifically predicting workplace stress and main stressors. Four self-supervised approaches were compared with supervised approaches, and generalization to unseen subjects was investigated. [11] investigated automatic detection of suicidal behaviours using text and metadata analysis. This is a novel modality combination, and the authors contributed a new dataset constructed from real world data for automated suicidal behaviour detection applications. [12] developed the Japanese version of the Social Performance Rating Scale (SPRC), and applied it to social skills training data to measure social communication skills. The scale was validated in experiments with individuals with autism, schizophrenia ad controls.

Other studies have focused on the design and evaluation of mental wellbeing interventions. [13] provided an overview of a series of studies that were conducted to design, implement, and evaluate just-in-time emotional support technologies in the workplace. It addressed both technical challenges (such as the idiosyncratic nature of stress) and ethical issues like data privacy. [14] was a preliminary study using a Wizard of Oz approach to investigate the effects of self-disclosure in chatbots, along a number of dimensions. The study has implications in the design of effective and engaging chatbots and virtual agents in the healthcare domain. [15] explored whether there were any differences in response to mindfulness based stress reduction interventions when delivered by a virtual human, a human teletherapist or a chatbot. In addition to the primary outcome of perceived stress, secondary outcomes of physiological stress indices over sessions, such as mindfulness, homework adherence, and perceived empathy of the agent were evaluated. [16] demonstrated the positive psychological and physiological effects of forest walking compared to city walking, by employing machine learning techniques such as dimensionality reduction and classification when inferential statistical tests were not sufficient.

IV. KEYNOTE SPEAKERS

Keynote speakers from technical and clinical backgrounds were invited:

- Akane Sano, Rice University, Department of Electrical Computer Engineering, Computer Science, and Bioengineering.
- Nicholas Cummins, Department of Biostatistics and Health Informatics at King's College London.

- David D. Luxton, Department of Psychiatry and Behavioral Sciences at the University of Washington School of Medicine, Seattle.
- John Torous, Department of Psychiatry at Beth Israel Deaconess Medical Center (BDIMC), at Harvard Medical School.

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