APSIPA Transactions on Signal and Information Processing, 2022, 11, e21

Editorial

Editorial for the Special Issue on Information Processing for Understanding Human Attentional and Affective States

Junichiro Yoshimoto[1] and Unaizah Obaidellah[2]

[1] *Fujita Health University, Toyoake, Aichi 470-1192, Japan; junichiro.yoshimoto@fujita-hu.ac.jp*
[2] *Universiti Malaya, 50603 Kuala Lumpur, Malaysia; unaizah@um.edu.my*

Human bodies are extraordinarily complex systems. Their cognitive states can be observed objectively via physiological signals such as eye-movements and subjectively via self-rated opinions. Additionally, biomarkers are key to determining signs of a disease or a condition. This could relate to the affective states of an individual, which describe the experience of their underlying emotional and mood states. The implications of a disease or condition serve an important role in regulating cognition, behaviour, and social interactions. Recent technological advancements in Artificial Intelligence and Data Science have entailed the development of various tools and methods to characterize complex rhythms that are observed in physiological systems.

This special issue focuses on a variety of aspects relevant to processing data on human attention and affective states, mainly as an extension of the organized session on "Information Processing for Understanding Human Attentional and Affective States" of the APSIPA ASC 2020 conference. This special issue comprises a collection of six excellent articles that were reviewed and highly recommended by the editors and reviewers.

The first paper is "Social rhythms measured via social media use for predicting psychiatric symptoms," authored by Kenji Yokotani and Masanori Takano. This study assessed temporal patterns of social activities relevant to mood, identified as social rhythms via social media, and predicted users' psychiatric symptoms through their social rhythms. The study analysed users'

ISSN 2048-7703; DOI 10.1561/116.00000100

communication data and self-rated questionnaires of the Pigg Party, a popular Japanese avatar application. Their results showed that suitable regular use of social media could improve users' social rhythm and thereby emotional disturbance.

The second paper is "Is self-rated confidence a predictor for performance in Programming Comprehension Tasks?" authored by Christine Lourrine S. Tablatin and Maria Mercedes T. Rodrigo. The paper is another program comprehension study that uses the scanpath trend analysis (STA) algorithm to identify common code reading strategies among high- and low-performing students from the eye gaze data of a debugging task. The results showed that different code reading patterns are observed depending on the students' expertise level. While the high-performing students demonstrated both bottom-up and top-down reading strategies depending on task complexities, the low-performing students revealed inconsistent code reading patterns, suggesting a less obvious code reading strategy.

The third paper is "Identifying code reading strategies in debugging using STA with a Tolerance Algorithm," authored by Zubair Ahsan, Unaizah Obaidellah, and Mahmoud Danaee. The paper investigates the effect of confidence levels among high- and low-performering novice programmers as they attempted familiar programming questions. Their results showed that the participants rated themselves highly confident regardless of their expertise levels, and confidence levels do not affect the performance levels of the participants. Additionally, a machine learning classification analysis showed potential based on the performance and confidence levels data.

The fourth paper is "Predicting pair success in a pair programming eye tracking experiment using cross-recurrence quantification analysis," authored by Maureen M. Villamor and Maria Mercedes T. Rodrigo. The paper addresses cognitive and attentional signatures related to task performance in pair programming for collaborative learning. To this end, the study used eye-tracking methodologies and cross-recurrence quantification analysis. By developing a machine learning model for predicting pair success, they found that the pairs' proficiency level and degree of acquaintanceship could be significant predictors for task performance in pair programming.

The fifth paper is "Maximum credibility voting (MCV) – An integrative approach for accurate diagnosis of major depressive disorder from clinically readily available data," authored by Ezekiel Adriel D. Lagmay and Maria Mercedes T. Rodrigo. Identification of AOIs is critical to realize an unbiased and objective assessment of eye tracking experiments as performed in the previous papers. This paper addresses this issue and proposes a practical solution to automatically estimate AOI bounding boxes.

The sixth paper is "Enhanced automatic areas of interest (AOI) bounding boxes estimation algorithm for dynamic eye-tracking stimuli," authored by Yu Shimizu and others. For a long time, the diagnosis of mental depression

relied on interviews by doctors due to the low diagnostic accuracy of clinically readily available biomarkers. This study developed a statistical method named "Maximum credibility voting" to integrate potential biomarkers measured by difference modalities for improving diagnostic accuracy.

A message common to all the papers is that information technology is crucial for promoting innovative science, whether it is a natural, social, educational, or medical science. We hope that this special issue will be a landmark for the readers to create a new bridge between information science and emerging research fields. Finally, we would like to thank all reviewers for their devoted cooperation and constructive feedback.

Acknowledgements

This special issue was partially supported by JST-Mirai Program Grant Number JPMJMI20D6, Japan. Also, we would like to thank Editage (www.editage.com) for English language editing.

Guest Editors of the special issue:

Dr. Junichiro Yoshimoto
Fujita Health University, Japan

Dr. Takatomi Kubo
Nara Institute of Science and Technology, Japan

Dr. Unaizah Obaidellah
University of Malaya, Malaysia

Dr. Kenji Yokotani
Tokushima University, Japan

Dr. Kentaro Katahira
Nagoya University, Japan

Dr. Yuki Maruno
Kyoto Women's University, Japan