Clinical Psychoinformatics Approaches for Improving Quality of Life

Tetsuya Yamamoto, PhD

Graduate School of Technology, Industrial and Social Sciences, Tokushima University, Japan

The recording of information concerning people's lives (i.e., creating a lifelog) through various technologies, including wearable devices, has been attracting a lot of attention (Marzano et al., 2015). These approaches enable us to obtain real-time behavioral, physiological, and psychosocial data with the potential to improve the quality of life. However, this complex and multimodal data is voluminous. It is, therefore, essential to develop a method to extract this valuable information. Here, we propose novel clinical psychoinformatics approaches that could enable us to utilize a latent pattern of our daily lives to explore complex lifelog data that could help in understanding one's lifestyle and improve the quality of life.

We conducted three studies to verify the accuracy and availability of our proposed method: the prediction of daily emotions (happiness, study 1), understanding a lifestyle that could lead to physical symptoms (headache, study 2), and the detection of psychological symptoms (depression recurrence, study 3). We selected 56 attributes (lifelog items) comprising mood experiences, cognitive and behavioral experiences, physical symptoms, lifestyle characteristics, and life events. The participants recorded lifelog items over a period of time (2~10 months) using two iPhone applications and one smartwatch. We analyzed the lifelog data via several machine learning algorithms (e.g., nonparametric Bayesian co-clustering ensembles).

Our results showed that the degree of happiness was predicted with an accuracy rate of 83% (study 1) and the adaptive lifestyle to prevent a headache were indicated (study 2). Furthermore, the attributes we used had an overall prediction accuracy of 90.3% for increase in depression recurrence risk; we, therefore, suggested some preferred strategies for the prevention of depression (study 3).

These results suggest that our approaches can predict the behaviors that affect individuals' mood and symptoms in their daily lives. Additionally, these approaches can easily integrate multimodal data from an easy-to-use app, and help increase awareness of individual lifestyles. Thus, our technique could facilitate behavioral change in order to effectively lead to better quality of life.

In this talk, we will discuss the usability, clinical applicability, and the limitations of our approaches. Furthermore, we will highlight the future directions of technology-based interventions for health-related behavior change.

References

Marzano, L., et al. (2015). The application of mHealth to mental health: opportunities and challenges. *Lancet Psychiatry*, **2**, 942-948.

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