

Exploring Intricate relationship among behavioral, biological, and sleeping dimensions

Sungkyu Park¹, Sang Won Lee², and Meeyoung Cha³

1. Graduate School of Culture Technology, KAIST, South Korea

2. Department of Psychiatry, Kyungpook National University Hospital, South Korea

3. School of Computing, KAIST, South Korea

Sleep disorders like Insomnia have become a major and common health problem in developed countries [1]. To treat sleep disorders, cognitive behavioral therapy (CBT) has shown to quickly ease symptoms compared to drugs [2]. With the latest information technology, it has further become possible to implement CBT not only to offline but also to online circumstances for treating Insomnia. While a few studies have demonstrated online-based CBT models for the public based on rule-based interventions [3], personalized approaches are urgently needed to effectively tackle the problem domain. In order to tailor the sleep intervention programs, we propose to cluster individuals based on Insomnia-related traits. We firstly aim to construct a complex multi-layered network composed by three types of dimension: behavioral (e.g., GPS), biological (e.g., heart rate), and sleeping (e.g., time to go to bed and wake up). Through this paper, we would like to share findings from our on-going research and present data mining methods to find delicate connections among the three studied dimensions. Our findings could bring insights into developing novel methodologies for diagnosing Insomnia and differentiating their root causes.

[1] H. Morphy, et al. Epidemiology of Insomnia: a longitudinal study in a UK population. *Sleep*, 2007.

[2] J. M. Trauer, et al. Cognitive Behavioral Therapy for Chronic Insomnia: A Systematic Review and Meta-analysis. *Annals of Internal Medicine*, 2015.

[3] Ritterband et al. Efficacy of an Internet-Based Behavioral Intervention for Adults with Insomnia. *American Journal of Psychiatry*, 2009.

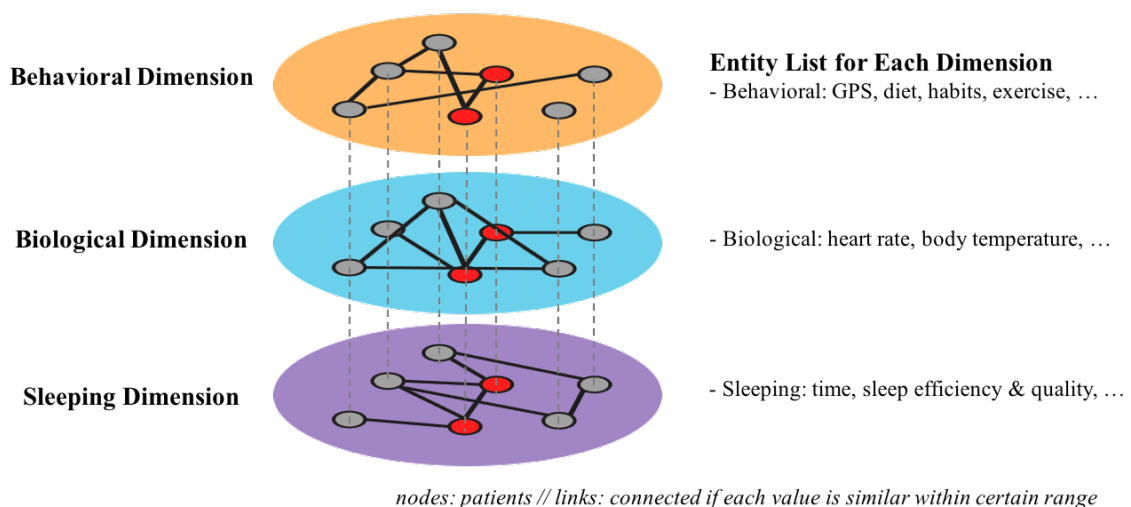


Figure 1. A multi-layered network based on patients' combined Insomnia-related traits