

FROM FREE TEXT TO STRUCTURED INFORMATION IN SLEEP DESCRIPTION ANALYSIS USING DEEP LEARNING NETWORKS

*Heereen Shim, Stijn Luca, Dietwig Lowet and Bart Vanrumste**

*corresponding author

Campus Groep T, e-Media Research Lab

KU Leuven

Leuven, Belgium

ABSTRACT

Human activity recognition and vital sign monitoring play a significant role in tailoring personal health. However, some aspects are difficult to be measured by sensors, such as problems, satisfaction, or wellbeing. One possible solution is to use direct feedback from the user via voice or text input. We propose deep neural networks based sleep description analysis to extract structured information relevant for sleep quality from unstructured free-text input data. In this study, we present two types of sequential deep neural network architectures. Word-level sequential neural network final classification layer for multi-label topic classification achieves 97.8% of accuracy on custom sleep description dataset collected via Mturk service. Character-level sequence-to-sequence model consisting of encoder and decoder networks for timestamp extraction shows 92 % of accuracy on generated timestamps dataset. Experimental results suggest that word-level features can be used for extracting semantic information and character-level features can be used for extracting numeric information from the free-text data. Also, the results highlight that the deep neural network models are robust to unusual expressions and misspelled words compared to rule-based model and the performances are highly dependent on embedding layers.