

New deep learning model can accurately identify sleep stages

February 3 2020



Credit: CC0 Public Domain

A new deep learning model developed by researchers at the University of Eastern Finland can identify sleep stages as accurately as an experienced physician. This opens up new avenues for the diagnostics

and treatment of sleep disorders, including obstructive sleep apnea.

Obstructive sleep apnea (OSA) is a nocturnal breathing disorder that causes a major burden on public health care systems and national economies. It is estimated that up to one billion people worldwide suffer from obstructive sleep apnea, and the number is expected to grow due to population aging and increased prevalence of obesity. When untreated, OSA increases the risk of cardiovascular diseases and diabetes, among other severe health consequences.

The identification of sleep stages is essential in the diagnostics of sleep disorders, including obstructive sleep apnea. Traditionally, sleep is manually classified into five stages, which are wake, [rapid eye movement](#) (REM) sleep and three stages of non-REM sleep. However, manual scoring of sleep stages is time-consuming, subjective and costly.

To overcome these challenges, researchers at the University of Eastern Finland used polysomnographic recording data from healthy individuals and individuals with suspected OSA to develop an accurate [deep learning](#) model for automatic classification of sleep stages. In addition, they wanted to find out how the severity of OSA affects classification accuracy.

In healthy individuals, the model was able to identify sleep stages with an 83.7% accuracy when using a single frontal electroencephalography channel (EEG), and with an 83.9% accuracy when supplemented with electrooculogram (EOG). In patients with suspected OSA, the model achieved accuracies of 82.9% (single EEG channel) and 83.8% (EEG and EOG channels). The single-channel accuracies ranged from 84.5% for individuals without OSA to 76.5% for severe OSA patients. The accuracies achieved by the model are equivalent to the correspondence between experienced physicians performing manual sleep scoring. However, the [model](#) has the benefit of being systematic and always

following the same protocol, and conducting the scoring in a matter of seconds.

According to the researchers, deep learning enables automatic sleep staging for suspected OSA patients with a high [accuracy](#). The study was published in *IEEE Journal of Biomedical and Health Informatics*.

More information: Henri Korkalainen et al. Accurate Deep Learning-Based Sleep Staging in a Clinical Population with Suspected Obstructive Sleep Apnea, *IEEE Journal of Biomedical and Health Informatics* (2019). [DOI: 10.1109/JBHI.2019.2951346](https://doi.org/10.1109/JBHI.2019.2951346)

Provided by University of Eastern Finland

Citation: New deep learning model can accurately identify sleep stages (2020, February 3) retrieved 17 June 2024 from <https://techxplore.com/news/2020-02-deep-accurately-stages.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.