Deep convolutional neural networks for interpretable analysis of EEG sleep stage scoring

Sleep studies are important for diagnosing sleep disorders such as insomnia, narcolepsy or sleep apnea. They rely on manual scoring of sleep stages from raw polysomnography signals, which is a tedious visual task requiring the workload of highly trained professionals. Consequently, research efforts to pursue for an automatic stage scoring based on machine learning techniques have been carried out over the last years. In this work, we resort to multitaper spectral analysis to create visually interpretable images of sleep patterns from EEG signals as inputs to a deep convolutional network trained to solve visual recognition tasks. As a working example of transfer learning, a system able to accurately classify sleep stages in new unseen patients is presented. Evaluations in a widely-used publicly available dataset favourably compare to state-of-the-art results, while providing a framework for visual interpretation of outcomes.