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Recurrent neural network: Detecting sleep respiratory events in electroencephalography

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Currently, sleep medicine physicians use a polysomnogram (PSG) or home sleep test (HST) to diagnose patients with sleep-disordered breathing (SDB). A PSG is complex and burdensome; patients need to spend at least one night in a sleep lab with multi-ple sensors. HST is logistically easier, but patients still need to wear several different types of sensors while asleep at night. Re-ducing the complexity of sleep-disordered-breathing diagnoses is an emerging technology. Previous studies have shown that there is strong relationship between sleep disordered breathing and variations in brain electrical activity. Machine learning (ML) based methods have been widely used in biomedical data analy-sis. In recent years, deep learning technology showed impressive ability to analysis time-series signal and image. Deep learning and biomedical data have been coevolving and feeding each oth-er. In this study, we investigated the ability of a recurrent neural network based algorithm with spectrogram technology to detect respiratory events during sleep from electroencephalographic (EEG) waveforms. This algorithm aims to decode EEG wave-forms to detect respiratory patterns during sleep. It will advance the understanding of brain activity during SDB and may be the foundation for a simpler method to diagnose SDB.

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