Title: Recurrent Neural Network: Detecting Sleep Respiratory Events in Electroencephalography

Ao Li[1], Stuart F. Quan[3], Siteng Chen[1], Linda S. Powers[1, 2], Janet M. Roveda[1, 2],

[1]Department of Electrical and Computer Engineering, University of Arizona, Tucson, USA
[2]Department of Biomedical Engineering, University of Arizona, Tucson, USA
[3]Division of Sleep and Circadian Disorders, Brigham and Women's Hospital, Harvard Medical School, Boston, USA

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I. Abstract Body (up to 250 words)

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 multiple sensors. HST is logistically easier, but patients still need to wear several different types of sensors while asleep at night. Reducing 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 analysis. 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 other. 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 waveforms 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.

II. Image:



Figure 1. A 30 Seconds EEG Waveform

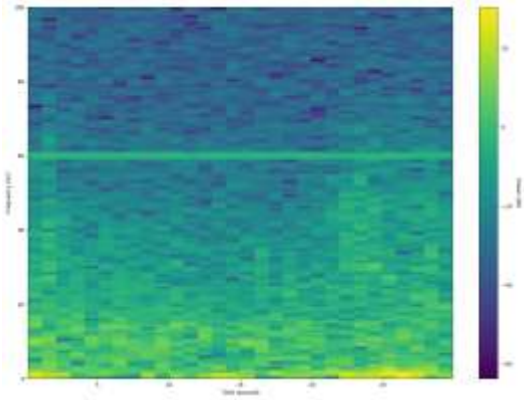


Figure 2. A 30 Seconds EEG Spectrogram

III. Biography:

Ao Li is currently a Ph.D. candidate in the Department of Electrical and Computer Engineering and a Research Assistant in the Department of Electrical and Computer Engineering at the University of Arizona. He received his M.S. degree in Electrical and Computer Engineering from the University of Arizona in 2016. His previous experiences include machine learning, data mining, sleep medicine, and Internet of Things (IoT) technology.

IV. Presenting author details



Full Name: Janet Roveda
Contact number: (520)2473453
Twitter account:
Linked In account:
Session name/ number:
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