

Convolution Neural Network Based on Hypnogram of Sleep Stages to Predict Dosages and Types of Hypnotic Drugs for Insomnia

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Abstract : Background: The results of previous studies compared the benefits and risks of receiving insomnia medication. However, the effects between hypnotic drugs used and enhancement of sleep quality were still unclear. Objective: The aim of this study is to establish a prediction model for hypnotic drugs' dosage used for insomnia subjects and associated the relationship between sleep stage ratio change and drug types. Methodologies: According to American Academy of Sleep Medicine (AASM) guideline, sleep stages were classified and transformed to hypnogram via the polysomnography (PSG) in a hospital in New Taipei City (Taiwan). The subjects with diagnosis for insomnia without receiving hypnotic drugs treatment were be set as the comparison group. Conversely, hypnotic drugs dosage within the past three months was obtained from the clinical registration for each subject. Furthermore, the collecting subjects were divided into two groups for training and testing. After training convolution neuron network (CNN) to predict types of hypnotics used and dosages are taken, the test group was used to evaluate the accuracy of classification. Results: We recruited 76 subjects in this study, who had been done PSG for transforming hypnogram from their sleep stages. The accuracy of dosages obtained from confusion matrix on the test group by CNN is 81.94%, and accuracy of hypnotic drug types used is 74.22%. Moreover, the subjects with high ratio of wake stage were correctly classified as requiring medical treatment. Conclusion: CNN with hypnogram was potentially used for adjusting the dosage of hypnotic drugs and providing subjects to pre-screening the types of hypnotic drugs taken.

Keywords : convolution neuron network, hypnotic drugs, insomnia, polysomnography

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