Dongdong Zhou

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Education

2019.03∼present, Ph.D. Mathematical Information Technology, Faculty of Information Technology, University of Jyväskylä, Finland.
Supervisor: Prof. Lauri Kettunen, Prof. Zheng Chang, Associate Prof. Qi Xu and Prof. Fengyu Cong.
Thesis: Automatic Sleep Stage Classification with Single Channle EEG

2015.09∼2018.06, M.E. Biomedical Engineering, School of Biomedical Engineering, Faculty of Electronic Information and Electrical Engineering, Dalian University of Technology, China.
Supervisor: Associate Prof. Liping Qi.
Thesis: Surface Electromyography Study on VO_2 Slow Component

2011.09∼2015.06, B.E. Biomedical Engineering, School of Biomedical Engineering, Faculty of Electronic Information and Electrical Engineering, Dalian University of Technology, China.

Research Interest

Current research: Aiming to develop deep learning-based approaches in automatic sleep stage classification tasks (e.g., class imbalance problem, interpretability, rapid sleep stage classification, etc) from single-channel electroencephalogram (EEG) data, which mainly concerned on:
1. EEG/EMG, etc.
2. Time-frequency analysis: Wavelet transform, short-time Fourier transform (STFT), etc.
3. Deep learning methods: Convolutional Neural Network (CNN), Long Short-Term Memory (LSTM), Transformer, etc.
4. Model interpretability: Layer-wise Relevance Propagation,etc.
5. Class imbalance problem: Data augmentation, etc

Publications

Journal

(1). **Dongdong Zhou**, Qi Xu, Jian Wang, Hongming Xu, Lauri Kettunen, Zheng Chang, and Fengyu Cong (2022). Alleviating Class Imbalance Problem in Automatic Sleep Stage Classification. IEEE Transactions on Instrumentation and Measurement, 71, 1-12. DOI: 10.1109/TIM.2022.3191710.

(2). **Dongdong Zhou**, Jian Wang, Guoqiang Hu, Jiacheng Zhang, Fan Li, Rui Yan, Lauri Kettunen, Zheng Chang, Qi Xu, and Fengyu Cong (2022). SingleChannelNet: A model for automatic sleep stage classification with raw single-channel EEG. Biomedical Signal Processing and Control, 75, 103592. DOI: 10.1016/j.bspc.2022.103592.

(3). Rui Yan, Fan Li, **Dongdong Zhou**, Tapani Ristaniemi and Fengyu Cong (2021). Automatic sleep scoring: A deep learning architecture for multi-modality time series, Journal of Neuroscience Methods, 348, 108971. DOI: 10.1016/j.jneumeth.2020.108971.

(4). Liping Qi, Shuo Guan, **Dongdong Zhou**, Fengshan Gao and Liqing Liu (2021). The influence of muscle fiber type on slow component of oxygen uptake kinetics, Proceedings of the Institution

of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science, 235(2), 471-478. DOI: 10.1177/0954406220940335.

(5). Liping Qi, Xiaochi Ma, **Dongdong Zhou**, Shuo Guan, Fengshan Gao and Peixin Cong (2019). Wavelet and principal component analysis of electromyographic activity and slow component of oxygen uptake during heavy and severe cycling exercise, Applied Physiology, Nutrition, and Metabolism. 45(2): 187-192. DOI: 10.1139/apnm-2019-0037.

Conference

(1). Qi Xu*, **Dongdong Zhou***, Jian Wang, Jiangrong Shen, Lauri Kettunen, and Fengyu Cong (2022). Convolutional Neural Network Based Sleep Stage Classification with Class Imbalance, In 2022 International Joint Conference on Neural Networks (IJCNN 2022). 1-6. DOI: 10.1109/IJCNN55064.2022.9892741. Co first author.

(2). **Dongdong Zhou**, Qi Xu, Jian Wang, Jiacheng Zhang, Guoqiang Hu, Lauri Kettunen, Zheng Chang, and Fengyu Cong (2021). LightSleepNet: A Lightweight Deep Model for Rapid Sleep Stage Classification with Spectrograms, In 2021 43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC), 43-46. DOI: 10.1109/EMBC46164.2021.9629878.

(3). Rui Yan, Fan Li, **Dongdong Zhou**, Tapani Ristaniemi and Fengyu Cong (2020). A Deep Learning Model for Automatic Sleep Scoring using Multimodality Time Series, In 28th European Signal Processing Conference (EUSIPCO), 1090-1094. DOI: 10.23919/Eusipco47968.2020.9287518.

Manuscripts in Progress

(1). **Dongdong Zhou**, Qi Xu, Jiacheng Zhang, Lei Wu, Lauri Kettunen, Zheng Chang and Fengyu Cong. Interpretable Sleep Stage Classification Based on Layer-wise Relevance Propagation. **Submitted to IEEE Transactions on Cognitive and Developmental Systems**.

Academic activities

The 7th Annual Research Seminar of CIBR. December 11, 2019. Jyväskylä, Finland

MEG Nord 2019, May 8 ∼ 10, 2019. Jyväskylä, Finland.

The 43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC2021), November 1∼5, 2021, virtually.

2022 International Joint Conference on Neural Networks (IJCNN2022), July 18∼23, 2022, Padua, Italy.

Research funding

Chinese Government Scholarship, from China Scholarship Council, 2019.02 ∼2023.01 (1350Euros/month).