

Accurate, Secure and Privacy-Preserving Brain-Computer Interfaces

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Abstract: Brain-computer interface (BCI) is a direct communication pathway between the brain and an external device. Because of individual differences and non-stationarity of brain signals, a BCI usually needs subject-specific calibration, which is time-consuming and user unfriendly. Sophisticated machine learning approaches can help reduce or even completely eliminate calibrations, improving the utility of BCIs. Recent studies also found that machine learning models in BCIs are vulnerable to adversarial attacks, and brain signals also contain lots of private information, so the security and privacy of BCIs are also important considerations in their commercial applications. This talk will introduce transfer learning approaches for expedite BCI calibration, and their adversarial attack and privacy protection approaches. The ultimate goal is to implement accurate, secure and privacy-preserving BCIs.

Biography:

Dongrui Wu (IEEE Fellow) received a B.E in Automatic Control from the University of Science and Technology of China, Hefei, China, in 2003, an M.Eng in Electrical and Computer Engineering from the National University of Singapore in 2006, and a PhD in Electrical Engineering from the University of Southern California, Los Angeles, CA, in 2009. He is now Professor and Deputy Director of the Key Laboratory of the Ministry of Education for Image Processing and Intelligent Control, School of Artificial Intelligence and Automation, Huazhong University of Science and Technology, Wuhan, China. Prof. Wu is the Editor-in-Chief of IEEE Transactions on Fuzzy Systems.

Prof. Wu's research interests include brain-computer interface, machine learning, computational intelligence, and affective computing. He has more than 200 publications (11000+ Google Scholar citations; h=54), including IEEE TPAMI, Proceedings of the IEEE, National Science Review, etc. He received the IEEE Computational Intelligence Society (CIS) Outstanding PhD Dissertation Award in 2012, the IEEE Transactions on Fuzzy Systems Outstanding Paper Award in 2014, the IEEE Systems, Man and Cybernetics (SMC) Society Early Career Award in 2017, the USERN Prize in Formal Sciences in 2020, the IEEE Transactions on Neural Systems and Rehabilitation Engineering Best Paper Award in 2021, the Chinese Association of Automation Early Career Award in 2021, and the Ministry of Education Young Scientist Award in 2022. His team won the First Prize of the China Brain-Computer Interface Competition in four successive years (2019-2022).