Machine Learning in Brain-Computer Interfaces

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ABSTRACT: A brain-computer interface (BCI) enables a user to communicate with a computer directly using brain signals. Electroencephalograms (EEGs) used in BCIs are weak, easily contaminated by interference and noise, non-stationary for the same subject, and varying across different subjects and sessions. Thus, sophisticated machine learning approaches are needed for accurate and reliable EEG-based BCIs. This talk will introduce the basic concepts of BCIs, review the latest progress, and describe several newly proposed machine learning approaches for BCIs.

BIOGRAPHY: Dongrui Wu 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 2005, and a PhD in Electrical Engineering from the University of Southern California, Los Angeles, CA, in 2009. He is now a 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's research interests include affective computing, brain-computer interface, computational intelligence, and machine learning. He has more than 150 publications (6,600+ Google Scholar citations; h=39), including a book "Perceptual Computing" (Wiley-IEEE Press, 2010), and five US patents. 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 North American Fuzzy Information Processing Society (NAFIPS) Early Career Award in 2014, the IEEE Systems, Man and Cybernetics (SMC) Society Early Career Award in 2017, and the IEEE SMC Society Best Associate Editor Award in 2018. He was a selected participant of the Heidelberg Laureate Forum in 2013, the US National Academies Keck Futures Initiative (NAKFI) in 2015, and the US National Academy of Engineering German-American Frontiers of Engineering (GAFOE) in 2015. His team won the First Prize of the China Brain-Computer Interface Competition in 2019.

Prof. Wu is an Associate Editor of the IEEE Transactions on Fuzzy Systems (2011-2018;2020-), the IEEE Transactions on Human-Machine Systems (since 2014), the IEEE Computational Intelligence Magazine (since 2017), and the IEEE Transactions on Neural Systems and Rehabilitation Engineering (since 2019).

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