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Recent research on hardware neural network

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An artificial neural network (ANN) is a computational model inspired by neo-cortex of human brain that is capable of solving a variety of problems in recognition, prediction, optimization, and control. It can be also described as a network of synaptically connected neurons that can create, modify, and preserve information through sequential learning procedures. Recently, hardware implementation of artificial neural network called Hardware Neural Network (HNN) is gaining popularity due to its potential usability for industrial applications requiring recognition, optimization, and prediction using complex data sets. However, hardware implementing issues need to be solved for the widespread of HNN. In this presentation, I will summarize recent efforts of HNN implementations with pros and cons of each approach.

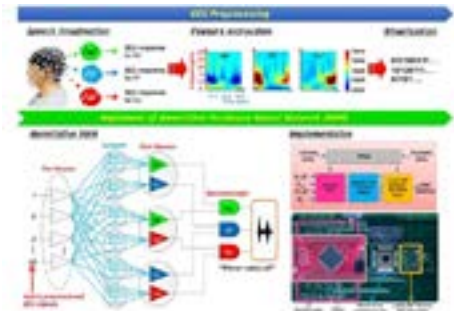


Figure: EEG preprocessing pattern recognition.

Recent Publications

1. Inbarasan Muniraj, Changliang Guo, Ra'ed Malallah, James Ryle, John J Healy, Byung Geun Lee and John T Sheridan (2017) Low photon count based digital holography for quadratic phase cryptography. *Optics Letters* 42(14):2774-2777.
2. Sangsu Park, Myonglae Chu, Jongin Kim, Jinwoo Noh, Moongu Jeon, Byoung Hun Lee, Hyunsang Hwang, Boreom Lee and Byung Geun Lee (2015) Electronic system with memristive synapses for pattern recognition. *Scientific Reports* 5:10123.
3. Nitin Rawat, In Chul Hwang, Yishi Shi and Byung Geun Lee (2015) Optical image encryption via photon-counting and compressive sensing based ptychography. *Journal of Optics* 17(6).
4. Myonglae Chu, Sangsu Park, Hyunsang Hwang, Byoungho Kim, Moongu Jeon and Byung Geun Lee (2015) Neuromorphic hardware system for visual pattern recognition with memristor array and CMOS neuron. *IEEE Transactions Industrial Electronics* 62(4):2410-2419.
5. Sheri A M, Hyunsang Hwang, Moongu Jeon and Byung Geun Lee (2014) Neuromorphic character recognition system with two PCMO memristors as a synapse. *IEEE Transactions on Industrial Electronics* 61(6):2933-2941.

Biography

Byung Geun Lee received the BS degree in Electrical Engineering from Korea University, Seoul, South Korea, in 2000 the MS and PhD degrees in Electrical and Computer Engineering from the University of Texas at Austin, in 2004 and 2007, respectively. From 2008 to 2010, he was a Senior Design Engineer at Qualcomm Inc., San Diego, CA, USA, where he had been involved in the development of mixed-signal ICs. Since 2010, he has been with the Gwangju Institute of Science and Technology. He is currently an associate professor with the school of electrical and computer science. His research interests include high-speed data converter, CMOS image sensor, and neuromorphic system developments.

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