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PRESENT

DEEP LEARNING AND NEUROMORPHIC COMPUTING – TECHNOLOGY, HARDWARE AND IMPLEMENTATION

BY

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Abstract: Following the technological advances in high performance computational systems and the fast growth of data acquisition, machine learning, especially deep learning, has had remarkable success in many research areas and applications. Such a success, to a great extent, is enabled by developing large-scale deep neural networks (DNN) that learn from a huge volume of data. The deployment of such a model, however, is both computationally intensive and memory intensive. Although hardware acceleration for neural networks has been extensively studied, the progress of hardware development still falls far behind the upscaling of DNN models at the software level. We envision that hardware/software co-design for performance acceleration of deep neural networks is necessary. In this presentation, I will begin with trends in machine learning research in both academia and industry, followed by describing our work on executing sparse and low-precision neural networks, as well as discussing our research on memristor-based computing engines.

Biography: Dr. Hai "Helen" Li is a Clare Boothe Luce Associate Professor with the Department of Electrical and Computer Engineering at Duke University. She received her B.S and M.S. from Tsinghua University and Ph.D. from Purdue University. At Duke, she co-directs the Duke University Center for Computational Evolutionary Intelligence. Her research interests include machine learning acceleration and security, neuromorphic circuit and systems for brain-inspired computing, conventional and emerging memory design and architecture, and software and hardware co-design. She received the NSF CAREER Award (2012), the DARPA Young Faculty Award (2013), TUM-IAS Hans Fisher Fellowship from Germany (2017), seven best paper awards, and another eight best paper nominations. Dr. Li is a fellow of the IEEE and a distinguished member of the ACM. For more information, please refer to her webpage at http://cei.pratt.duke.edu/.

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