SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
Faculty of Engineering
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Area: Signal Analysis & Machine Intelligence

Host: Prof Li Haizhou

TOPIC	**:**	**Exploiting Input Timing Information and Sparsity in Deep Neural Networks**
SPEAKER	**:**	**Prof Shih-Chii Liu,** **University of Zurich and ETH Zurich**
DATE	**:**	**21 February 2018, Wednesday**
TIME	**:**	**10am to 11am**
VENUE	**:**	**EA-06-05, Engineering Block EA, Faculty of Engineering, NUS**

ABSTRACT

Bio-inspired features such as the use of asynchronous timing and temporal sparsity are usually not considered during training of deep networks. In this talk, I present a variant of the Long-Short Term Memory (LSTM) neuron used in Recurrent Neural Networks (RNNs) for learning temporal sequences. The **Phased LSTM** model adds a time gate to the LSTM cell. This time gate is driven by a slow sinusoidal signal and only allows the neuron to be updated only when the gate is open. The update is also dependent on the timing of the inputs. This model speeds up training by at least 3X on tasks that require memory over long sequences and can be used with event-driven sensors. I also describe the **Delta RNN** model, a RNN model which saves computes by performing updates only when the changes in activation of the neurons in an RNN layer cross a preset threshold, thereby saving computes by at least 5X on large speech datasets in the machine learning community.

I will also describe an implementation of NullHop, our hardware convolutional neural network accelerator that exploits sparsity in activation to make inference faster and power efficiency higher by at least 300%.

BIOGRAPHY

Shih-Chii Liu co-leads the Sensors group (http://sensors.ini.uzh.ch) at the Institute of Neuroinformatics, University of Zurich and ETH Zurich. She received the B. S. degree in electrical engineering from MIT and the Ph.D. degree in the Computation and Neural Systems program from the California Institute of Technology.

She worked at various companies including Gould American Microsystems, LSI Logic, and Rockwell International Research Labs. Her research interests include low-power neuromorphic auditory sensors and processors; and VLSI event-driven bio-inspired processing circuits, event-driven algorithms, and deep neural networks.

Dr Liu is past Chair of the IEEE CAS Sensory Systems and Neural Systems and Applications Technical Committees. She is current Chair of the IEEE Swiss CAS/ED Society and an associate editor of the IEEE Transactions of Biomedical Circuits and Systems and Neural Networks journal.

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