Research Seminar

Towards Next-Generation Auditory Information Processing: A Neuromorphic Approach

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Abstract

Hearing is a vivid part of our conscious lives. Driven by recent advances in artificial intelligence (AI), the capability of machine hearing systems has improved by leaps and bounds over the last decade. The increased capability also comes along with challenges to efficiently, rapidly, and reliably process sound signals. With an ever-growing demand for human-computer auditory interfaces, these challenges are expected to be exacerbated. Throughout the history of machine hearing research, neuroscience has played a pivotal role by offering a bountiful source of inspiration for novel acoustic features, algorithms, and computational models. To achieve more capable, efficient, and reliable machine hearing systems, it calls for continuously exchanging ideas between the fields of neuroscience and AI.

By harnessing the findings and insights from neuroscience studies, the interdisciplinary neuromorphic computing research offers immense opportunities for building brain-inspired auditory systems for machine hearing. In this talk, I will present my recent research outcomes on neuromorphic auditory information processing that is grounded on the brain-inspired spiking neural networks (SNNs). In particular, I will present the technology breakthroughs in: 1) auditory neural codes that can efficiently and effectively encode sound signals; 2) learning algorithms that support rapid and efficient pattern recognition using SNNs; 3) task-specific neural architectures that grounded on the pre-existing neural structures; 4) in-memory computing architectures based on the non-volatile memory devices and optical devices. I will conclude the talk by sharing my long-term vision of developing low-power, reliable, adaptive, and explainable neuromorphic cognitive machines.

About the Speaker

Dr Jibin Wu is currently a Research Scientist at Sea AI Lab (SAIL). He received Bachelor degree in Electrical Engineering (Highest Distinction) and Ph.D. degree from National University of Singapore (NUS) in 2016 and 2020, respectively. His work focuses on developing spiking neural network learning algorithms, auditory neural codes, brain-inspired computational models, and in-memory neuromorphic computing architectures for auditory information processing. He has been awarded NUS President's Graduate Fellowship, Zhejiang Lab' International Talent Fund for Young Professionals, and Travel Grant to 2nd Annual EPFL Engineering Ph.D. Summit. He had lead NUS student teams participating in the 2018 and 2019 International Collegiate Competition for Brain-inspired Computing and won the first and second prize, respectively.

Seats are limited!