ENB Elite Master Program Neuroengineering (MSNE)
Invited Presentation

Dr. Michael Pfeiffer

Deep Spiking Neural Networks – Low-Latency, Low-Compute Classifiers for Neuromorphic Platforms

Abstract

Spiking neural networks (SNNs) originate from computational neuroscience, but in recent years there has been growing interest in using brain-inspired event-based computing for real-time pattern recognition. In my talk I will present novel approaches that merge ideas from SNNs and Deep Learning, the currently most successful machine learning paradigm for computer vision, speech recognition, and many real-world applications. Deep SNNs are particularly attractive for implementation in neuromorphic hardware platforms, which emulate the operation of spiking neurons in hardware, and achieve significant savings in power and latency over conventional models. New algorithmic insights allow us to reach accuracy levels that match traditional networks, while exploiting the advantages of SNNs. Deep SNNs exhibit a performance-latency tradeoff, which allows them to produce good first guesses very quickly, even before all neurons in the network are updated. I will show recent results that demonstrate how latency and computing costs in Deep SNNs can be reduced significantly, making them attractive models for fast and power-efficient information processing on power-constrained systems.

Biography

Michael Pfeiffer is a research engineer at Robert Bosch Corporate Research, where he investigates Cognitive Systems and Deep Learning. In 2010 he obtained his PhD in mathematics and computer science from Graz University of Technology, Austria, investigating machine learning methods as tools to understand computations in nervous systems. He then joined the Institute of Neuroinformatics at the University of Zurich and ETH Zurich as a postdoc, working on theories of neural computation and learning and neuromorphic computing. In 2012 he became group leader and program coordinator of the MSc in Neural Systems and Computation, an interdisciplinary specialized Master's program combining systems neuroscience, theoretical neuroscience, neurotechnologies, and neuromorphic engineering. He has made substantial contributions towards understanding synaptic plasticity models such as STDP in the framework of machine learning. His work on deep and spiking neural networks has been influential for transferring recent breakthroughs from machine learning onto novel neuromorphic computing platforms.

Time and Venue

Talk is hosted by the Professorship for Neuroscientific System Theory (Prof. Conradt).

Tuesday, December 20th 2016, 11h30

Karlstr. 45, 80333 Munich, Room 2026

All talks in the MSNE Invited Speaker Series are open to students, staff, and members of the public. Attendance is free.
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