**Institute of Theoretical Computer Science**
Faculty of Computer Science
and Biomedical Engineering

Graz University of Technology

# Bachelor's Thesis/Master's Project in Machine Learning and Neuromorphic Computing at the Institute of Theoretical Computer Science (IGI)

We are looking for a highly motivated and capable student to participate in our research on Machine Learning and brain-derived paradigms for computing and learning, which are currently very active fields.

As part of this project, you can become an expert for highly optimized machine learning solutions, aiming to exploit the massive parallelism offered by graphical processing units (GPUs). In particular, you will engage in extending current high-level frameworks for Machine Learning, such as Tensorflow, in order to exploit properties of biologically inspired neurons to significantly speed up simulations.

Biologically inspired neurons are typically modelled to communicate with each other only by means of all or nothing events, so-called "spikes". Hence, a goal is to create optimized GPU implementations for Tensorflow that can exploit the nature of these binary spikes. This requires analysing the involved computations, understanding of GPU programs for matrix multiplication and finally optimizing them for spikes, while still allowing for convenient integration in Tensorflow.

Start: as soon as possible (due to the current lockdown situation, initial communication via e-mail and video chat is possible)

Please contact Franz Scherr for further information: franz.scherr@igi.tugraz.at