A CUDA Implementation of LISSOM

The LISSOM (laterally interconnected synergetically self-organizing map) model is an approach by Miikulainen et al. (Miikkulainen, Bednar, Choe, & Siros, 2005) to construct an abstract model of the brain’s early visual system. The main ability of the LISSOM model is the generation of cortical maps of the sort found in the primary visual cortex, for instance, orientation preference maps and ocular dominance maps.

During the last year NVIDIA came up with a framework, CUDA, for using the incredible power of a normal graphics card for doing scientific computation. Algorithms executed on the graphics card run up to 100 times faster than their corresponding CPU implementations. In our group there already exists a fast CPU based implementation of the LISSOM model. The aim of the thesis is to develop efficient parallel algorithms that implement the LISSOM model on the GPU. Amongst others this includes the design of distributed data structures as well as concepts for minimizing the communication between CPU and GPU. During the thesis you will have access to state-of-the-art computer hardware including the latest NVIDIA graphics cards.

Prerequisites: Profound knowledge in programming and algorithm design.

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