Accelerated Neural Computing on an Embedded Multicore System

BACKGROUND

In recent years, neural networks have evolved to the one of the most powerful computational models in both research and industry. Deep artificial neural networks are the state of the art in image classification and enable sophisticated natural language processing in digital personal assistants on mobile devices. In neuroscience, brain simulations based on spiking neural networks [1] are revolutionizing the way research is done. The goal of neurorobotics [2] is to make this progress in neural computation available for robotic applications by connecting neural models of brains to robots. However, standard hardware is either too slow to execute state updates of the neural network in real-time or to power-consuming for usage in a mobile robot. The Epiphany multicore chip available on the Parallella Board [3] is based on a power-efficient parallel architecture which seems especially suited for neural simulation.

YOUR TASK

You will implement a neural network simulator which runs on Parallella/Epiphany. Depending on your preferences you may either work with deep artificial neural networks or biological spiking neuron models.

REQUIRED SKILLS

- Good knowledge of C/C++
- Experience in parallel programming
- Basic knowledge about microprocessor architectures

FURTHER READING


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