

Design of an IDE for SpiNNaker

BACKGROUND

Spiking neural networks are detailed models of the biological neural circuitry found in the brains of humans and animals. Unlike the highly simplified neuron models used in artificial neural networks, spiking neurons exhibit complex dynamics and exchange information via discrete impulses called spikes. In the Neurorobotics subproject [1] of the Human Brain Project [2], researchers develop the tools required connect highly realistic spiking neuron-based models of the brain to robots. However, standard PCs are too slow to execute these models in real-time.

Controlling robots based on the outputs of simulated brains therefore requires specialized neuromorphic hardware like SpiNNaker [3] which is tailored to the simulation of spiking neural networks. The SpiNNaker architecture is based on standard ARM cores but features an efficient hardware-based modular routing system which transmits spikes between different chips and enables the simulation of spiking neural networks in biological real-time.



YOUR TASK

Currently, running, monitoring and debugging neural networks on SpiNNaker is a complex process based on many different tools. A task-specific prototype for interactive development and debugging is already available. Your task will be to start extending this prototype to an Integrated Development Environment (IDE) based on a thorough requirements analysis.

REQUIRED SKILLS

- Good knowledge of C/C++
- Interest in hardware architectures and network protocols

FURTHER READING

- [1] <http://www.neurorobotics.net>
- [2] <http://www.humanbrainproject.eu>
- [3] <http://apt.cs.manchester.ac.uk/projects/SpiNNaker/>

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