

Poster presentation

Image-based configuration and interaction for large neural network simulations

 Mark Hereld*¹, Hyong C Lee², Wim van Drongelen² and Rick L Stevens¹

 Address: ¹Mathematics and Computer Science Division, Argonne National Laboratory, Argonne, IL USA and ²Department of Pediatrics, University of Chicago Hospitals, The University of Chicago, Chicago, IL USA

 Email: Mark Hereld* - hereld@mcs.anl.gov

* Corresponding author

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Background

Large neural network simulations are becoming more complex to set up. They require modeling at multiple scales, include the effects of many interacting physical processes, encompass greater detail, and consume greater computational resources. The drive to solve problems that

rely on increasingly complex codes will soon land us in the realm of petascale computing. How will we manage such simulations, configure them, and accurately aim them at the problems we're trying to solve? Simulation is an increasingly expensive process, with each run providing data to inform configuration and targeting of subse-

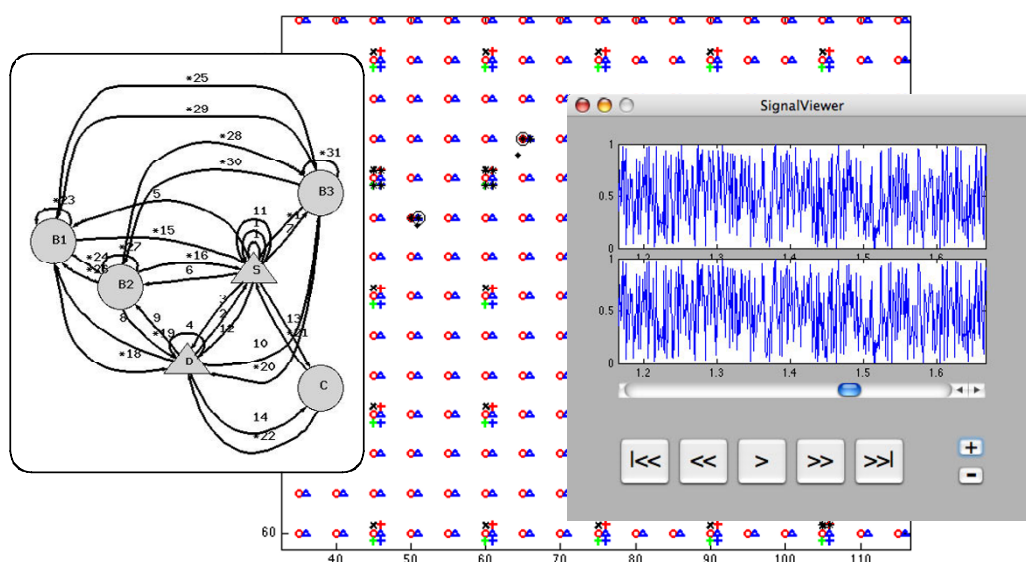


Figure 1
 Framework for interacting with large simulations.

quent runs. Hence, it is vital to configure and execute simulations efficiently in order to minimize time spent on the computer cycles as well as time spent interpreting simulation results and designing follow-up experiments. We are developing a framework for interacting with and configuring large simulations using image-based interfaces generated automatically from the simulation source code.

Figure 1 shows a working prototype of some of the key components of the interactive framework. The diagram at the left is an automatically generated view of the probabilistic wiring diagram showing excitatory (*) and inhibitory connections between pyramidal, basket, and chandelier cell types. The central image is an automatically generated physical layout of a portion of the neurons in a larger patch of the neocortex simulation. Circles, triangles, pluses, and exes correspond to superficial and deep pyramidal, basket, and chandelier cells. The mouse has been used to select two cells in the subpatch, which caused the signal viewer shown on the right to launch (not wired to a live simulation in this prototype).

Conclusion

The goal of the project is to create an interface to super-computing platforms that will enable scientists to directly engage the live simulation during its critical setup and initial phases and at later times for monitoring and redirecting. This capability will enable rapid intuition building and will improve scientists' effectiveness in deploying productive, well-targeted experiments across research domains.

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