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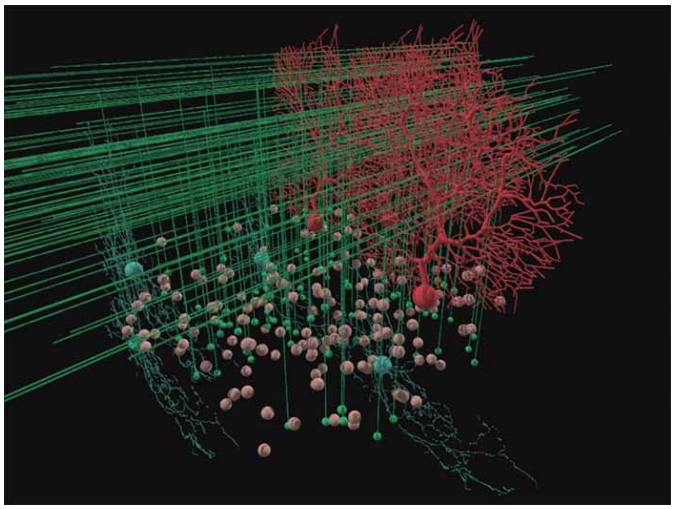
New SDSC Award Provides Easy Path to Supercomputing for Neuroscientists

Neuroscience Gateway-R Project Part of the National BRAIN Initiative



Visualization of 3-D Cerebellar Cortex model generated by researchers Angus Silver and Padraig Gleeson from University College London. The NeuroScience Gateway was used for simulations.

The National Science Foundation (NSF) and the United Kingdom's Biotechnology and Biological Sciences Research Council (BBSRC) have awarded funding for the Neuroscience Gateways project led by the San Diego Supercomputer Center at the University of California, San Diego. The project will contribute to the national BRAIN initiative announced by the Obama administration in 2013 to advance researchers' understanding of the human brain.

The project builds upon the Neuroscience Gateway (NSG), first funded by the NSF in 2012, to develop a science gateway for the computational neuroscience community thereby increasing access to high-performance computing (HPC) viewed an essential resource to advancing research. Science gateways provide easy access through web based portal to advanced cyberinfrastructure tools and resources that can significantly improve the productivity of researchers. They successfully hide the administrative and technical complexities associated with accessing HPC resources.

The collaborative project, funded under three separate awards, is between UC San Diego, with Amit Majumdar as the Principal Investigator (PI) and Subhashini Sivagnanam as co-PI; Yale University, with Ted Carnevale as PI; and University College London, with Angus Silver as PI.

“Back in 2010 it was already clear that neuroscience research would soon require computational modeling and data analysis that exceeded the resources that were available to most neuroscientists, and that’s why we wrote the proposal that funded NSG’s initial development,” said Carnevale, a computational neurobiologist at Yale. “NSG is the first and only resource that provides convenient access to HPC for large-scale neuroscience modeling projects, and the NSG-R project is the logical next step in expanding this access. The NSG portal has caught on quickly with neuroscientists, and we expect that NSG-R will help it meet the growing need for HPC in neuroscience.”

The project, based on a proposal called “Seamless Integration of Neuroscience Models and Tools with HPC - Easy Path to Supercomputing for Neuroscience” and funded under the NSF’s Advances in Biological Informatics program, will use REpresentational State Transfer (REST) services to provide programmatic access to HPC for the computational neuroscience community. This will allow users of neuroscience community projects such as Open Source Brain (OSB), NeuroInformatics Framework (NIF), OpenWorm, ModelDB, and others to readily access advanced computational resources from their respective websites.

Now called NSG-R to include REST, the project will be a free and open neuroscience gateway infrastructure that will enable greater research productivity and wider use of large-scale computational modeling by scientists and students. NSG-R also will enable large-scale neuronal modeling using XSEDE’s (eXtreme Science and Engineering Discovery Environment) HPC resources such as the *Comet* supercomputer at SDSC and *Stampede* at the Texas Advanced Computing Center.

“Open Source Brain is building a platform for sharing and collaboratively developing neuronal models,” said Silver, the PI from University College London. “Getting access to high performance computing resources via NSG-R will make it easier for our users to simulate models of increased complexity and biological realism, all through the existing OSB web interface.”

“There has been robust interest in NSG since its inception in early 2013 and based on community feedback, we realized the need for providing programmatic access to HPC resources especially from community projects such as OSB, NIF, and OpenWorm”, said Majumdar, SDSC’s division director for the Center’s Data Enabled Scientific Computing division.

“Currently, NSG users must still upload models, launch simulations, and download results – a process that involves many time-consuming, and potentially error-prone steps,” said Majumdar, who is also an associate professor with UC San Diego’s Department of Radiation Medicine and

Applied Sciences. “We plan to eliminate these steps by enabling on-demand, automated communication between the gateway and researchers’ familiar working environments.”

“NSG-R has the potential to accelerate progress in brain science, and have far-reaching beneficial effects on related fields such as robotics and engineering of adaptive and learning systems,” said Subhashini Sivagnanam, the software architect for the NSG. “We also view it as increasing opportunities for educational and career advancement in neuroscience and engineering by serving as an entry point for students and researchers from historically underrepresented schools and colleges.”

NSG-R workshops have been hosted at the Society for Neuroscience (SFN) and Computational Neuroscience annual meetings since 2013 and at minority serving institutions (MSI). Students from MSI and other institutions will be able to do internships with the NSG-R team at UC San Diego.

The NSF part of the grant is funded through the foundation’s Directorate for Biological Sciences. Project abstracts can be viewed at:

- Award Abstract #1458840
- Award Abstract #1458495
- BBSRC-BB/N005236/1

MEDIA CONTACT

Jan Zverina, 858-534-5111, jzverina@sdsc.edu