NEST Desktop: A web-based GUI for the NEST Simulator

Sebastian Spreizer[1,2,3], Jens Buchertseifer[1], Johanna Senk[2], Stefan Rotter[3], Markus Diesmann[2,4,5], Benjamin Weyers[1]

[1] Department IV - Computer Science, Human-Computer Interaction, University of Trier, Trier, Germany
[2] Institute of Neuroscience and Medicine (INM-6) and Institute for Advanced Simulation (IAS-6) and JARA-Institute Brain Structure-Function Relationships (INM-10), Jülich Research Centre, Jülich, Germany
[3] Bernstein Center Freiburg & Faculty of Biology, University of Freiburg, Freiburg, Germany
[4] Department of Psychiatry, Psychotherapy and Psychosomatics, School of Medicine, RWTH Aachen University, Aachen, Germany
[5] Department of Physics, Faculty 1, RWTH Aachen University, Aachen, Germany

Email: spreizer@uni-trier.de

NEST Desktop [1] comprises graphical elements for creating and configuring network models, running simulations, visualizing and analyzing the results. It allows students to explore important concepts in computational neuroscience without the need to learn a simulator control language before. In this contribution we demonstrate how NEST Desktop gives neuroscientists access to the features of NEST 3 and the European EBRAINS infrastructure [2].

Earlier versions of NEST Desktop required a NEST installation on the user's machine which limited not only the uptake by a non-expert audience but also the network models studied to what can be simulated on a laptop or desktop computer. To ease the use of the app and increase the range of possible simulations, we have separated the GUI from the simulation kernel: the web browser renders the GUI while the simulation kernel runs on a centrally maintained server. Furthermore, we discuss the potential of using an in-situ pipeline to enable the app to receive larger data sets from an ongoing NEST simulation. This enhances the interactivity of NEST for large simulations on HPC facilities.

In order to give students, teachers, and researchers installation-free access to the compute resources being built up by the European Union, we integrated NEST Desktop into the EBRAINS infrastructure also facilitating long-term sustainability. The same code remains available as a stand-alone version of NEST Desktop [3] for applications in teaching and training and installations at other sites.

Acknowledgements

This project has received funding from the European Union's Horizon 2020 Framework Programme for Research and Innovation under Specific Grant Agreement No. 785907 (Human Brain Project SGA2) and 945539 (Human Brain Project SGA3) and the Helmholtz Association Initiative and Networking Fund under project number SO-092 (Advanced Computing Architectures, ACA).

References

1. Documentation [https://nest-desktop.readthedocs.io]
2. EBRAINS [https://ebrains.eu/service/nest-desktop]
3. Source code [https://github.com/nest-desktop/nest-desktop]