



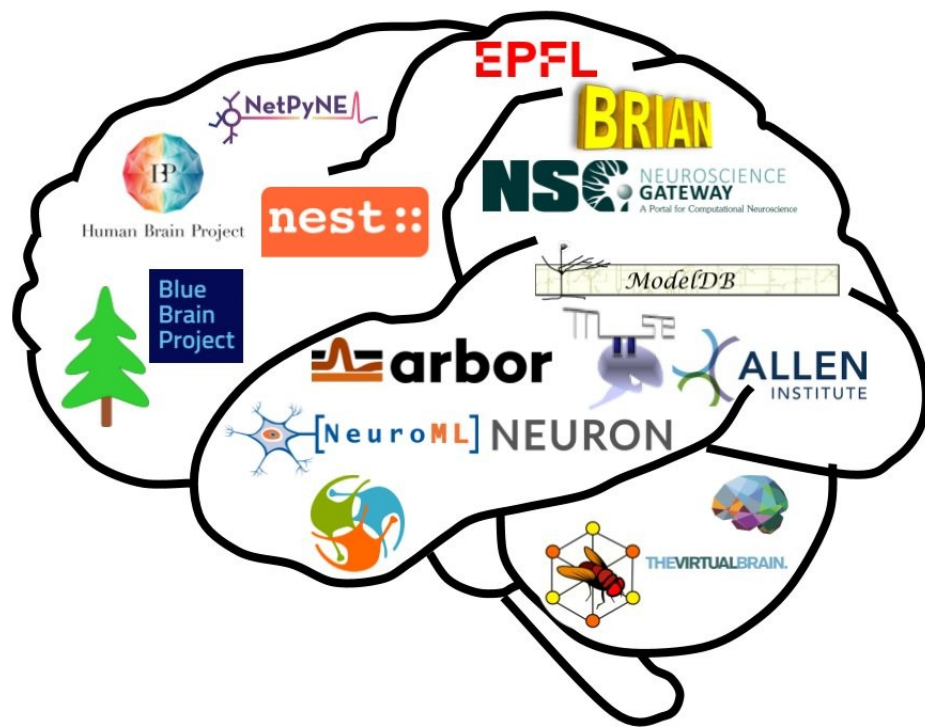
EBRAINS

NEST Desktop

A web-based simulation tool for spiking neuronal networks.

Sebastian Spreizer

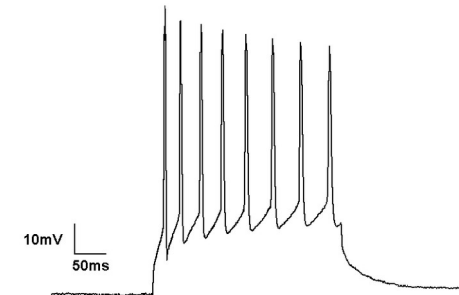
Simulation tools in computational neuroscience



An educational application for neuroscience

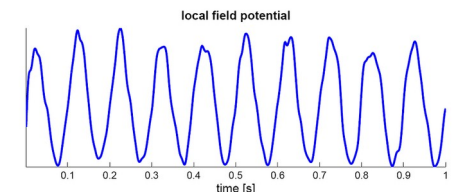
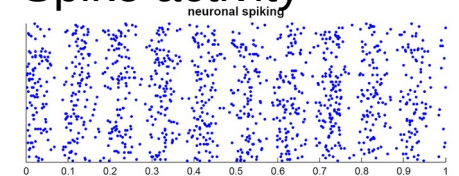


Analog signals, e.g. membrane potentials



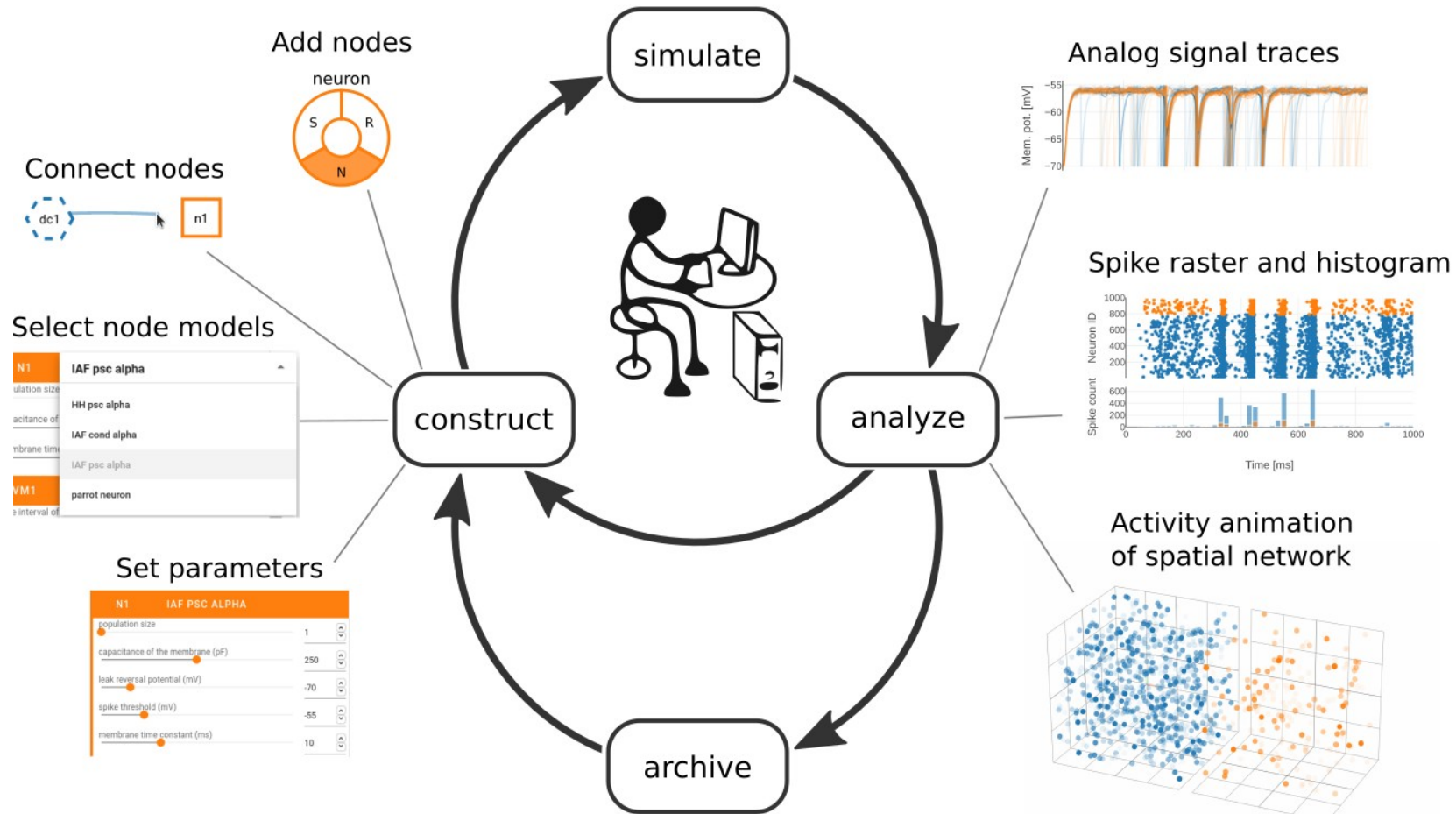
<https://en.wikipedia.org/wiki/Electrophysiology>

Spike activity



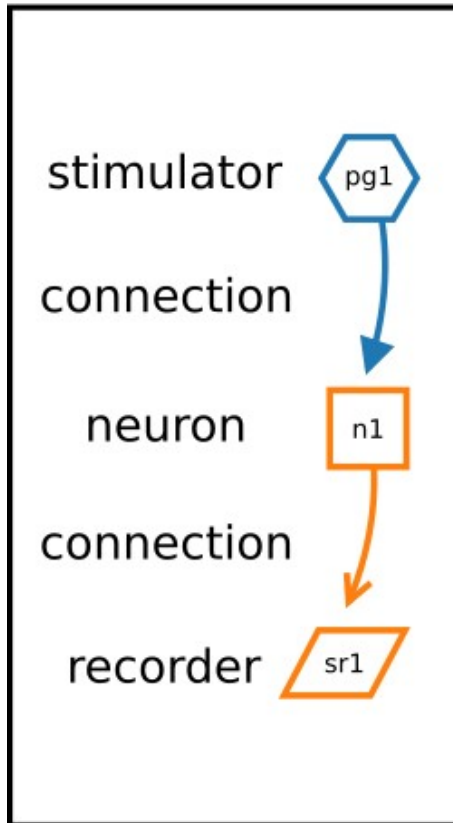
https://en.wikipedia.org/wiki/Neural_oscillation

Virtual experiment



Generative simulation code




 graph





code
generation


 code

```
import nest

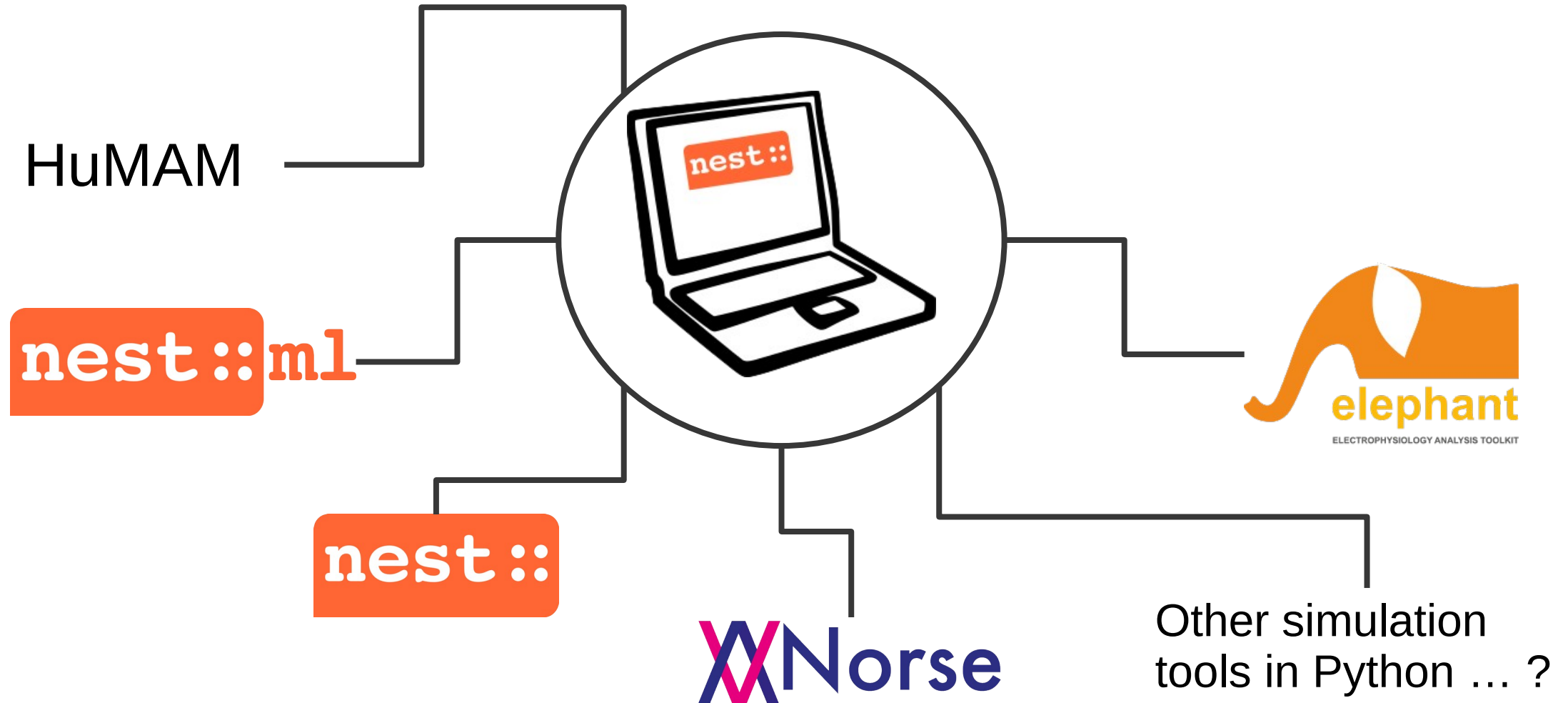
# Create nodes
 pg1 = nest.Create('poisson_generator')
 n1 = nest.Create('iaf_psc_alpha')
 sr1 = nest.Create('spike_recorder')

# Connect nodes
 nest.Connect(pg1, n1)
 nest.Connect(n1, sr1)

# Start simulation
nest.Simulate(1000)

# Get activity
 sr1.get('events')
```

Plugin based architecture



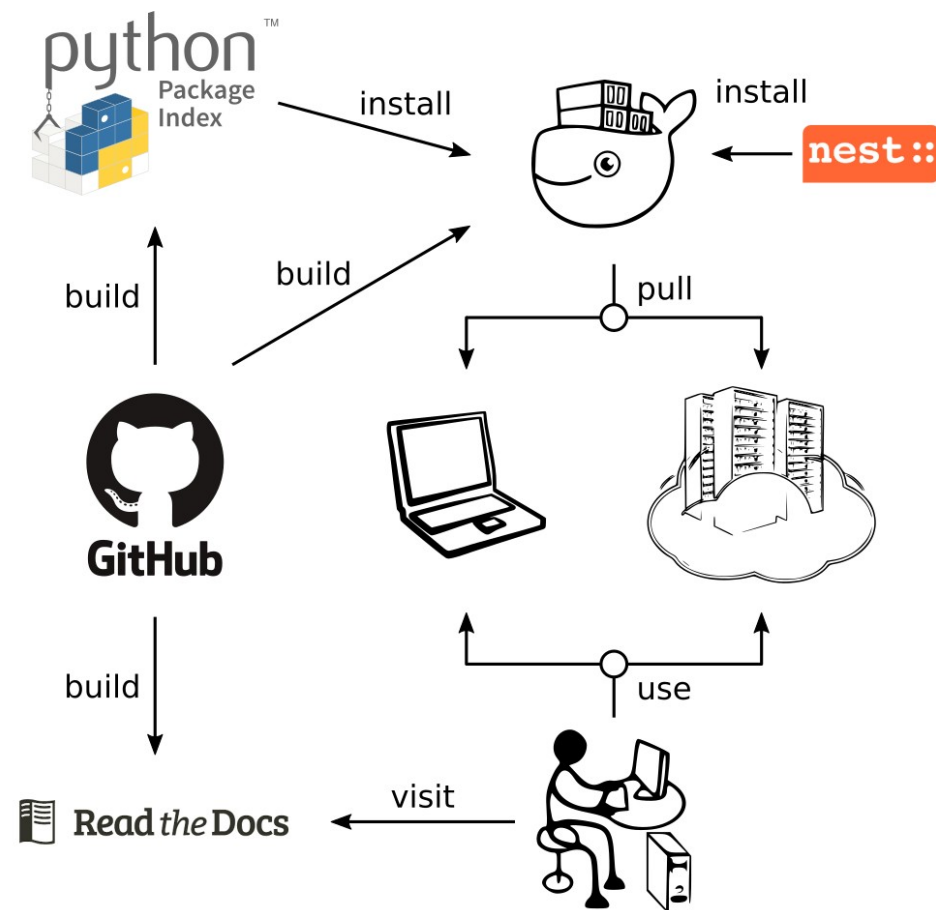
More details in tutorial session

docker pull docker-registry.ebrains.eu/nest/nest-desktop
→ <https://docker-registry.ebrains.eu/harbor/projects/6/repositories/nest-desktop>

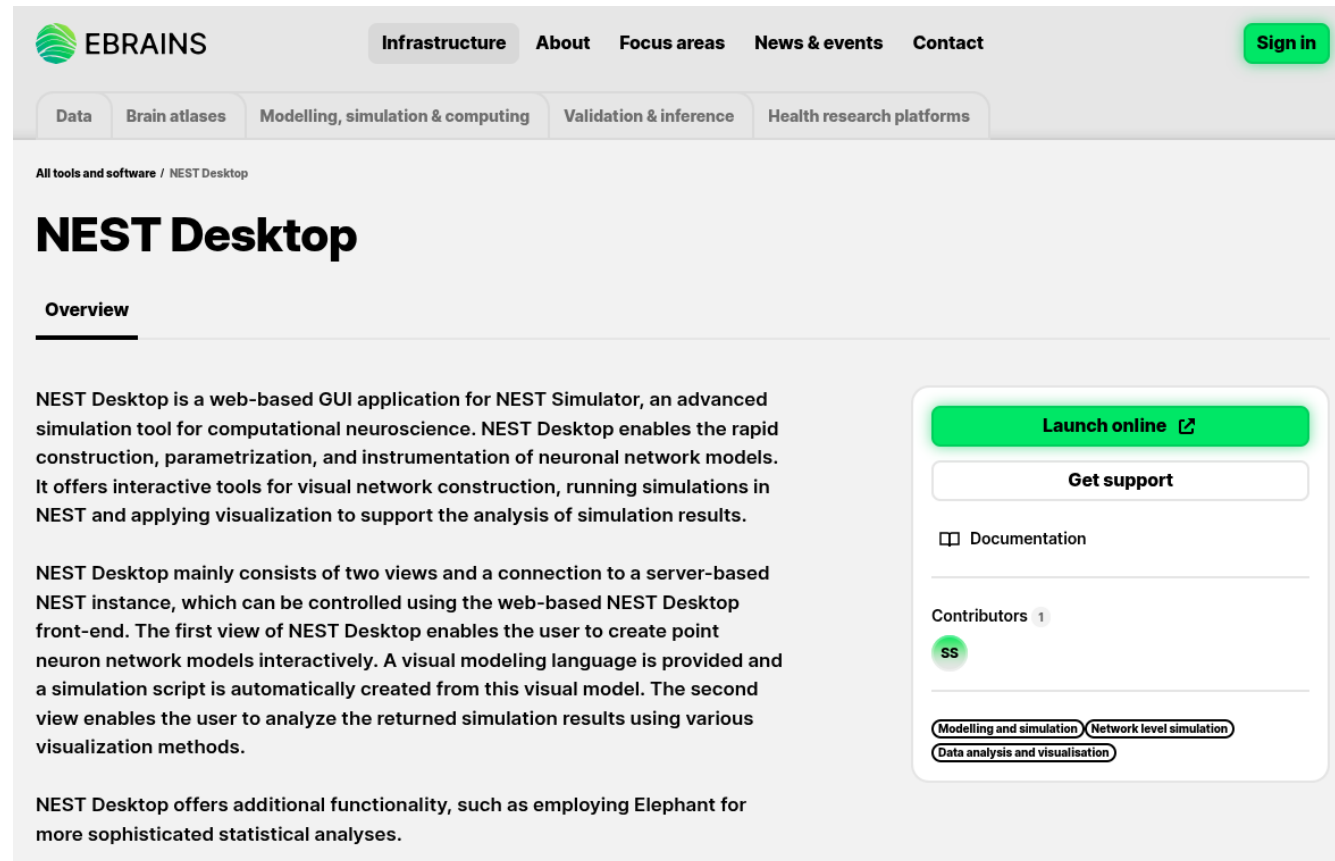
pip install nest-desktop
→ <https://pypi.org/project/nest-desktop>
or **mamba install nest-desktop**

Open source code
→ <https://github.com/nest-desktop/nest-desktop>

Online user documentation
→ <https://nest-desktop.readthedocs.io>



NEST Desktop on EBRAINS



The screenshot shows the EBRAINS website interface. At the top, there is a navigation bar with the EBRAINS logo, a menu with links to Infrastructure, About, Focus areas, News & events, and Contact, and a green 'Sign in' button. Below this is a secondary navigation bar with tabs for Data, Brain atlases, Modelling, simulation & computing, Validation & inference, and Health research platforms. The main content area is titled 'All tools and software / NEST Desktop' and features a large heading 'NEST Desktop' with an 'Overview' subheading. The text describes NEST Desktop as a web-based GUI application for the NEST Simulator, used for constructing, parametrizing, and instrumenting neuronal network models. It highlights interactive tools for visual network construction, running simulations, and analyzing results. A sidebar on the right contains a green 'Launch online' button with an external link icon, a 'Get support' button, a 'Documentation' link, a 'Contributors' section with a user icon 'ss', and a list of categories: 'Modelling and simulation', 'Network level simulation', and 'Data analysis and visualisation'.

EBRAINS

Infrastructure About Focus areas News & events Contact Sign in

Data Brain atlases Modelling, simulation & computing Validation & inference Health research platforms

All tools and software / NEST Desktop

NEST Desktop

Overview

NEST Desktop is a web-based GUI application for NEST Simulator, an advanced simulation tool for computational neuroscience. NEST Desktop enables the rapid construction, parametrization, and instrumentation of neuronal network models. It offers interactive tools for visual network construction, running simulations in NEST and applying visualization to support the analysis of simulation results.

NEST Desktop mainly consists of two views and a connection to a server-based NEST instance, which can be controlled using the web-based NEST Desktop front-end. The first view of NEST Desktop enables the user to create point neuron network models interactively. A visual modeling language is provided and a simulation script is automatically created from this visual model. The second view enables the user to analyze the returned simulation results using various visualization methods.

NEST Desktop offers additional functionality, such as employing Elephant for more sophisticated statistical analyses.

Launch online

Get support

Documentation

Contributors 1

ss

Modelling and simulation Network level simulation

Data analysis and visualisation

Try it out! → <https://ebrains.eu/tools/nest-desktop>

NEST Desktop in courses

- Already applied in student courses (up to 50 students)
- Topics from simple neuron models to network dynamics
- Online documentation for lecturer (with usecases)
- Guest accounts on EBRAINS infrastructure



Tutorials

- NEST Desktop
 - 14:00 - 16:00, Room R02.233 (office 2nd floor)
- EBRAINS Tools for Teaching
 - 16:30 – 18:30, Room R00.222 (Seminar room on ground floor)



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Thank you!

Spreizer et al, *NEST Desktop – An educational application for neuroscience*, 2021, <https://doi.org/10.1523/ENEURO.0274-21.2021>

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