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Bio-realistic models of cortical circuits as a freely shared platform for discovery

Thursday 23 June 2022 16:00 (45 minutes)

A central question in neuroscience is how the structure of brain circuits determines their activity and function. To explore this systematically, we developed a 230,000-neuron model of mouse primary visual cortex (area V1). The model integrates a broad array of experimental data: distribution and morpho-electric properties of different neuron types in V1; connection probabilities, synaptic weights, axonal delays, dendritic targeting rules inferred from a thorough survey of the literature; and a representation of visual inputs into V1 from the lateral geniculate nucleus. The model is shared freely with the community via brain-map.org, as are the datasets it is based on. We also openly share our software tools: the Brain Modeling ToolKit (BMTK) –a software suite for model building and simulation –and the SONATA file format. These tools leverage the excellent simulation capabilities of NEST, and work is ongoing to establish closer integration with it. We will discuss applications of our V1 model at different levels of resolution to various problems of broad interest, how this is enabled by NEST and our tools, and the opportunities this provides to the computational neuroscience community.

Acknowledgements

Preferred form of presentation

Talk & (optional) poster

Topic area

models and applications

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Yes

References

Speaker time zone

Keywords

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