Author

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Title

Software tool for modelling coding and processing of information in auditory cortex of mice

Abstract

The coding and processing of information in the auditory cortex (AC) is still poorly understood. Having a computational model of the AC could be beneficial for many reasons and could help to explain or clarify some questions about the coding processing of information in the AC. The first goal of this thesis was to develop a software tool (simulator SUSNOIMAC), specialized to modelling the AC. The second goal of the thesis was to design a computational model of the AC, with the following features: Izhikevich model of neuron, long-term plasticity in the form of the Spike-timing-dependent plasticity (STDP), six layers, and parameterized neuron types, density of neurons and probability of synapses. The designed model was tested in dozens of experiments, with different parameterization and network sizes (up to 100 thousand of neurons and almost 21 million of synapses). The experiments were analyzed and compared to the observations from the real AC. Several interesting observations of network activity and emergence of tonotopy were made, described and analyzed.