Evolution of Biologically-Inspired Ion Channel Neural Networks for Simple Brain Behaviours

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Presentation Abstract Summary A novel biologically-inspired Neuron model is introduced and utilized within a Genetic Algorithm (GA)-driven attractor network to realize simple animal behaviours such as ant foraging. By modeling the operation of ion channels, which modulate biological neuron spiking behaviours, with simple state-based computations, a biologically mimetic neuron model incorporating the complex spiking behaviours of real neurons is realized. By utilizing a GA with a population of 100 individual networks to evolve the synaptic connections given an array of 25 neurons per individual, simple brain functionality is demonstrated to emerge within 500 generations.

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Keywords

Keywords
model of neural networks; dendrite; spiking neuron; Hebbian learning; hierarchical network; generalization; clustering; unsupervised learning; supervised learning; encode; biological plausibility; processing unit; pattern recognition; online learning; error criterion.

genetic algorithm