

Title: Evolution of Spiking Neural Networks for Oscillation and Interval Timing

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Abstract:

Artificial Spiking Neural Networks (SNN) communicate temporal information between nodes through the use of simulated action potentials in the form of spike events. Evolutionary algorithms are commonly used to train or evolve the weights of conventional feed-forward neural networks that encode the spiking rate as continuous activation values. But evolutionary algorithms have not been as well studied in evolving spiking neural networks. Through a set of three experiments, we investigate the characteristics of evolving small spiking neural networks using an Evolution Strategy to perform basic temporal tasks such as oscillation and variable time-delay response. Unexpected exploitation of deep hyper-polarized inhibition and the emergence of sub-oscillators in longer delay-time circuits were observed and reported upon.