A Novel Self-Organised Learning Model with Temporal Coding for Spiking Neural Networks

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Abstract

This chapter proposes a novel self-organized learning model with temporal coding for a network of spiking neurons, which encode information through the timing of action potentials. The development of this learning model is based on recent findings in biological neural systems. By utilizing the information available in the timing of single spikes, the model demonstrates its capability to learn complex non-linear tasks. The Hebbian-type learning equation for the proposed model utilizes the time difference between the input and output spikes. The proposed spiking neural network (SNN) learning model is tested on two sets of benchmark data. Clusters are formed in the output space based on the position of the output neurons and their firing time. The accuracy obtained is comparable to that of traditional network. The results show that networks trained using action potential timings are capable of learning complex tasks.