

Neural Network Models for Associative Memory Based on Multidimensional Neurons

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Continuous neural network models for associative memory usually consist of a set of interacting units, the neurons, that can themselves be regarded as elementary dissipative dynamical systems. The units interact in such a way that the neural network as a whole admits a global Liapunov (energy) function. In other words, the global dynamics is such that the composite system (network) always moves downhill ("morro abaixo") in the energy landscape. Models of this kind are usually based on neurons that are individually described as continuous one-dimensional dynamical systems. Our main purpose here is to investigate possible ways of extending the structural scheme of continuous neural network models for associative memory, to settings in which each neuron is a continuous (it multi-dimensional) dissipative system. With that aim in mind, we advance a coupling scheme for dissipative, multi-dimensional neurons, exhibiting dynamical features appropriate for modeling associative memory.