tion Theory Approach to the Programming of Periodic Attractors in Network Models of Olf

Authors: Bill Baird

Abstract: A new learning algorithm for the storage of static and periodic attractors in biologically inspired recurrent analog neural networks is introduced. For a network of n nodes, n static or n/2 periodic attractors may be stored. The algorithm allows programming of the network vector field indepen(cid:173) dent of the patterns to be stored. Stability of patterns, basin geometry, and rates of convergence may be controlled. For orthonormal patterns, the l~grning operation reduces to a kind of periodic outer product rule that allows local, additive, commutative, incremental learning. Standing or traveling wave cycles may be stored to mimic the kind of oscillating spatial patterns that appear in the neural activity of the olfactory bulb and prepyriform cortex during inspiration and suffice, in the bulb, to predict the pattern recognition behavior of rabbits in classical conditioning ex(cid:173) periments. These attractors arise, during simulat(cid:173) ed inspiration, through a multiple Hopf bifurca(cid:173) tion, which can act as a critical "decision pOint" for their selection by a very small input pattern.