Editorial

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During the last two decades there has been a widespread interest in the investigation of the nonlinear dynamics and signal processing capabilities of fundamental neural network paradigms such as the cellular neural networks, the Hopfield neural networks and the Cohen-Grossberg neural networks. The information is processed by these neural networks during the transient motion toward the static or dynamic attractor that is approached by the solutions for large times. In some important applications, as in the implementation of content addressable memories or the solution of image processing tasks in real time, a convergent dynamics where each solution tends toward an equilibrium point, is needed. However, there are other application fields where the processing takes place through a more complicated dynamics and the solutions converge toward periodic, almost periodic or even more complex (chaotic) attractors. This is true for example when using a reaction-diffusion dynamics for pattern recognition and in the processing of optical characters by means of auto waves.

The original Hopfield and cellular neural network models were described by a relatively simple autonomous system of ordinary differential equations with smooth neuron activations. Subsequently, these models have been equipped with concentrated and distributed delays, time-dependent coefficients and inputs, diffusive terms, impulsive effects, non-smooth (possibly) discontinuous nonlinearities, and stochastic terms. All of these generalizations have been motivated by the need to refine and improve the reliability of the model and to gain further capabilities in the processing of signals. Other classes of neural networks have also been proposed, as the networks for solving constrained optimization problems and variational inequalities, and the class of weakly connected cellular networks in which an array of coupled oscillators can implement in an efficient way a class of associative memories.

It is our belief that in the years to come these networks play more active role in various application domains of Science and Technology. Our thoughts and efforts along these

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lines have culminated in the organization of current research as a special issue of thoroughly reviewed articles that are of interest to the scientific community working in the area of dynamical neural networks.

In response to our call for papers, 38 papers were received for possible publication. Each paper was rigorously reviewed anonymously for quality and originality by two to three reviewers. Thirteen papers that met the high standards of the journal were finally approved for publication in the special issue after undergoing two full rounds of reviews.

It is our pleasure to thank the reviewers for their critical reviews which have contributed immensely to the decision making process.