

Guest-editorial

Special Issue on VIII Brazilian Symposium on Neural Networks

In this Special Issue of the Journal of International Fuzzy Systems, JIFS, nine papers selected among the best evaluated accepted papers for the VIII Brazilian Symposium on Neural Networks, SBRN'04 are presented. This symposium covers topics related to Artificial Neural Networks, Evolutionary Computation, Fuzzy Systems and other Computational, accepting papers presenting new theoretical studies and novel applications. SBRN has an international Program Committee, with well known international researchers. In the last editions, the SBRN proceedings have been published by IEEE Computer Society.

SBRN'2004 was held in the city of São Luís, Brazil, between September 29th and October 1st. It was sponsored by the Brazilian Computer Society (SBC) and co-sponsored by SIG/INNS/Brazil Special Interest Group of the International Neural Networks Society in Brazil. SBRN'04 received 329 submissions from several countries. Among these submissions, 154 full papers were accepted. From these papers, 22 high quality were pre-selected and their authors were asked to submit an extended and updated version for this special issue. The selection process took into account the originality, relevance and technical contribution. The new versions were submitted to a rigorous peer review process conducted by international reviewers. Nine papers recommended by the reviewers were accepted for this special issue.

The accepted papers include both theoretical and application research works from very diverse areas, such as Neurophysiology, Neural Modeling, Hybrid Intelligent Systems, VLSI Implementation, Classification, Clustering, Associative Memory and Kernel Machines. Next, we briefly comment the topics covered by the papers published in this issue.

The paper *Applying genetic algorithms and SVMs to the gene selection problem*, by Souza et al. describes a

novel hybrid approach for gene selection from micro-arrays, based on Genetic Algorithms and Support Vector Machines (SVMs). The main idea of the paper is to use SVMs to estimate fitness in a gene selection strategy for the classification of micro-array tissue samples. Another paper also related to the combination of evolutionary strategies with SVMs is *Evolutionary design of multiclass SVMs applied to protein structural class prediction*, by Lorena et al. The idea is this paper is to use Genetic Algorithms to determine binary decompositions of multi-class problems. SVMs are then used in the classification of each one of the 2-class decomposed problems. Both papers are applied to Bioinformatics problems.

Another hybrid intelligent system, combining neural networks and fuzzy systems is described in the paper *Hybrid neural systems for large scale credit risk assessment applications*, whose authors are Amorim and colleagues. In this paper, the authors compare the performance of two neuro-fuzzy models: *Feature-weighted detector and fuzzy neural network* in a large scale finance problem, credit risk analysis. They investigate the accuracy and the quality of the knowledge extracted by these models. They also use multi-layer perceptron networks in the comparison.

Two papers on biological neurons were also selected for this special issue. The paper *Bottom-up design of a Class 2 silicon nerve membrane*, by Kohno and Aihara, is oriented to VLSI implementation. The authors extend their previous work in which they proposed a biologically realistic MOSFET-based Class 2 silicon nerve membrane to focus on a method of designing such a silicon structure. The approach is based on mathematical analyses that have been applied to biological neuron models. The other paper covering biological neurons is *Calcium does not change memory in single calcium-activated potassium channel kinetics*,

by Catão T. F. Barbosa, Regina. A. Campos de Oliveira and Romildo A. Nogueira. This paper presents a more neuro-physiologically motivated approach. The focus of the paper is on the existence of short and long term memories on ion channels, which is usually modeled as a memoryless process. In the paper, the authors investigate the effect of calcium on the memory of the single calcium-activated potassium channel. Although a markovian model presented in the paper did not confirm the results produced by experimental data, experiments performed by the authors confirmed the presence of long term memory in the channels, as argued by them.

In their paper, *Simulation of contra-lateral activation using Venn-networks*, Lima Neto and de Wilde are interested in simulating contra-lateral inhibition in brains of higher animals. The authors proposed a tool, named Generalized Venn-network Simulator (GVNS), and investigate its ability to mimic important properties present in the brain. The GVNS is a simulator containing the Venn-network, a biologically inspired artificial neural network to create non-linear associations between input and output spaces by utilizing a two dimensional map of processing elements. The authors carried out simulations where they trained two virtual hands using a pair of motor regions, one for each hand, sensory areas. They investigated whether Venn models were able to evoke the contra-lateral phenomenon. The results show the right hand more skilful than the left hand, reproducing the original data. The uneven tasks among hands are understood as the cause of the network behavior. When the authors swapped the input files (hand-wise), the resulting performances of the hands were also inverted. In their simulations, they employed digital representations of finger positions of a piano player when performing a Mozart sonata.

The two next works are related to self-organising maps. The first of them, *Anomaly detection in mobile communication networks using the self-organizing map*, by Frota et al., proposes a procedure to compute decision thresholds in order to detect anomalies in mobile communication networks. This procedure is based on self-organizing maps and the computation of non-parametric confidence intervals. The authors present the results of several experiments where they compare the performance of the proposed method with standard SOM-based anomaly detection.

The use of MLP networks for data clustering is explored in the paper *Clustering with multilayer perceptrons and self-organized (Hebbian) learning*, by Montalvão et al. The authors investigate a new learning algorithm able to perform data clustering using sigmoidal activation functions through the search of valleys in the probability density function of the multivariate random variables modeling input data. The proposed algorithm was evaluated by a set of experiments using artificial and real datasets.

The ninth paper, entitled *Dynamic behaviors in the chaotic bidirectional associative memory*, whose authors are Araujo et al., proposes a set of chaotic bidirectional associative memory models, named C-BAM family. These models incorporate chaotic neuron in the original BAM models. In this paper, the authors evaluate the influence of each parameter of the chaotic neuron through a set of experiments. They set the values of parameters to show the existence of behaviors like bifurcation, deterministic chaos and crisis. The authors also show that, by using chaotic neurons, these new models expand the functionality of original BAM family.

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