



Editorial

Recent developments in natural computation

The main objective of this special issue is to present readers with the significantly extended and improved versions of several high-quality articles presented at the Third International Conference on Natural Computation (ICNC'07). ICNC'07 was held jointly with The Fourth International Conference on Fuzzy Systems and Knowledge Discovery (FSKD'07) from August 24 to 27, 2007 in Haikou, Hainan, China. ICNC'07 featured the most up-to-date research results in computational paradigms inspired from nature, including biological, ecological, linguistic, and physical systems. It is an exciting and emerging interdisciplinary area in which a wide range of techniques and methods are being studied for dealing with large, complex, and dynamic problems. It received 1752 submissions from 35 countries/regions. After rigorous reviews, 770 papers were published in the ICNC'07 proceedings. The acceptance rate for publication was 44%.

Through a careful selection from the papers in the ICNC'07 proceedings published by IEEE Press, authors of 18 papers were invited to submit extended versions to this special issue. All authors except one submitted their version to Elsevier Editorial System for Neurocomputing. Each paper had gone through reviewing by at least three reviewers. Based on reviewers' comments, authors made further revisions. We present 12 papers in this special issue.

The first paper entitled "Behavioral task processing for cognitive robots using artificial emotions" authored by Evren Daglarli, Hakan Temeltas, and Murat Yesiloglu presents an artificial emotional-cognitive system-based autonomous robot control architecture. There are three levels, namely, behavioral system level, behavioral selection level, and emotion-motivation module, in its general control architecture.

"Binary classification using ensemble neural networks and interval neutrosophic sets" by Pawalai Kraipeerapun and Chun Che Fung proposes two approaches for binary classification. The first one applies a single pair of neural networks while the second one uses an ensemble of pairs of neural networks for the binary classification. Interval neutrosophic sets are used in both methods in order to represent imperfection in the prediction.

"Identification and control of nonlinear systems by a time-delay recurrent neural network" by Hongwei Ge, Wenli Du, Feng Qian, and Yanchun Liang introduces time-delay and recurrent mechanisms into a recurrent neural network. A dynamic recurrent back-propagation algorithm is developed for training the proposed neural network. Experiments show that the proposed network is very effective for identification and control for dynamic systems.

"A granular computing framework for self-organizing maps" by Joseph Herbert and JingTao Yao presents a granular computing framework for growing hierarchical self-organizing maps. This framework allows for precise definitions of the relationships between feature maps at different levels of a hierarchy. An algorithm for the construction, decomposition, and updating of the granule-based self-organizing map is also introduced.

"Division-based rainfall-runoff simulations with BP neural networks and Xinanjiang models" by Qin Ju, Zhongbo Yu, Zhenchun Hao, Gengxin Ou, and Dedong Liu is a more application-oriented article. Back-propagation neural networks are used for rainfall-runoff (flood and non-flood periods) simulations. The results are analyzed and compared with Xinanjiang model, a distributed, conceptual watershed model mainly dealing with rainfall-runoff processes.

The sixth paper, entitled "Denoising by using multineural networks for medical X-ray imaging applications" authored by Yeqiu Li, Jianming Lu, Ling Wang, and Yahagi Takashi proposes an adaptive multineural networks filter (MNNF) for digital radiological image restoration and enhancement. The MNNF is used to remove noise from X-ray images in their experiments. A wide range of images, computed tomography (CT), magnetic resonance image (MRI) and nuclear medicine (NM), are scheduled for further exploration.

"Design and implementation of an artificial neuromolecular chip and its applications to pattern classification problems" by Yo-Hsien Lin, Jong-Chen Chen, and Chao-Yi Huang presents their work on design and implementation of an artificial neuromolecular (ANM) chip. The ANM chip is an evolvable hardware architecture that combines intra- and interneuronal levels of processing. It is suggested through experiments that the ANM chip is capable at pattern classification.

"A self-organizing feature maps and data mining based decision support system for liability authentications of traffic crashes" authored by Pei Liu reports the developments of a decision support/reference system for liability authentications of two-vehicle crashes based on generated self-organizing feature maps and data mining models. It is shown that this system works well even with small data sets.

"Fault diagnosis of power electronic system based on fault gradation and neural network group" by Chengcai Ma, Xiaodong Gu, and Yuanyuan Wang proposes a fault diagnosis approach with fault gradation by using three sub-BP neural networks. Experimental results show that this approach increases the correctness rate of the fault diagnosis significantly and it is very suitable for on-line complex systems.

“Learning faces with the BIAS model: on the importance of the sizes and locations of fixation regions” by Predrag Neskovic, Ian Sherman, Liang Wu, and Leon Cooper presents a study on the Bayesian integrate and shift (BIAS) model for learning object categories, and investigate its sensitivity to changes in the sizes and locations of fixation regions. Experimental results on a fact category have been made.

“Responding efficiently to relevant stimuli using an emotion-based agent architecture” by Rodrigo Ventura and Carlos Pinto-Ferreira proposes an emotion-based agent system that provides adequate and efficient response to relevant stimuli for decision making. It is biologically inspired by the emotion mechanisms found in the brain, following recent neurophysiological research.

The last paper, entitled “Variant of Gaussian kernel and parameter setting method for nonlinear SVM” by Shui-sheng Zhou, Hong-wei Liu, and Feng Ye, discusses the classification problem with a new nonlinear support vector machine. In particular, the Gaussian kernel is modified by analyzing its performance with stretching ratio. Both angle and distance criteria are considered in order to find a better kernel parameter.

This special issue is a result of the dedication of the authors, the reviewers, and ICNC'07 participants. It was a pleasure for us to witness very critical and constructive discussions and reviews. We are grateful for their contribution. We thank the Editor-in-Chief,

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