

Editorial: Neurocomputing and Applications

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This special issue of International Journal of Computational Intelligence Research (IJ CIR) presents 22 original articles (6 regular papers and 16 short communication papers), which are extended versions of selected papers from the 3rd International Symposium on Neural Networks (ISNN2006), May 28-June 01, 2006, Chengdu, China. This prestigious annual conference is organized by Prof. Jun Wang from Department of Automation and Computer-Aided Engineering, The Chinese University of Hong Kong and is technically co-sponsored by the IEEE Circuits and Systems Society, IEEE Computational Intelligence Society, International Neural Network Society, Asia Pacific Neural Network Assembly and European Neural Network Society. The contributions of this issue reflect the well known fact that ISNN traditionally covers a broad variety of fundamental and theoretical aspects of artificial neural networks as well as recent applications. Based on the recommendation of the special session organizers and the reviews of the conference papers, a number of authors were invited to submit an extended version of their conference paper for this special issue of the International Journal of Computational Intelligence Research. All the invited articles were thoroughly reviewed once more by at least two independent experts and, finally, the 22 articles presented in this volume were accepted for publication.

Papers were selected on the basis of fundamental ideas/concepts rather than the thoroughness of techniques deployed. The papers are organized as follows.

Among 6 regular papers, the first paper by *Daniel Brüderle et al.*, introduces a simple activation function in forms of a recursive piecewise polynomial function as an activation function for numeral handwriting recognition problem. The accuracy of recognition can be adjusted according to the parameters of the function. In addition a new risk function measuring the discrepancy between the correct and estimated classification of the network is also presented to improve the performance.

The second paper by *Meiqing Liu* proposed a novel delayed standard neural network model (DSNNM), which interconnects a linear dynamic system with static delayed (or non-delayed) nonlinear operators consisting of bounded activation functions. The author further pointed that most delayed (or non-delayed) RNNs can be transformed into the DSNNMs to be stability analyzed in a unified way.

In third paper, *Dingguo Chen et al.* studied the properties of hierarchical neural networks to provide the theoretical justification for the application of hierarchical neural networks to load dynamics modeling within the proposed unified framework.

In the following paper, *Kevin Hsiao et al.* proposed an approach that combines neural network, clustering and valuation technology, which deals with the problem of long-period valuation. The data set used comprises of the MSCI 50 from the Taiwan stock market, and NOLPAT growth and ROIC of company are the key factors for segregating data by SOM. The result of the research provides investors a good investing index when they can enter the Taiwan stock market.

In the fifth paper, *Jia-Ruey Chang et al.* described a new neural network that can reasonably predict the depth to bedrock through FWD deflection data. Based on the results from the training, testing and verification sets, the developed ANN represents a significant improvement in accuracy as compared to previous analysis model.

In the final regular paper, *Ming Z. Zhang et al.* proposed a novel architecture for performing color image enhancement using a machine learning algorithm called Ratio Rule. The approach promotes log-domain computation to eliminate all multiplications and divisions, utilizing the approximation techniques for efficient estimation of the \log_2 and inverse- \log_2 . A new quadrant symmetric architecture is also presented to provide very high throughput rate for homomorphic filters which is part of the pixel intensity enhancement across RGB components in the system. The new concept of uniform filter design reduced the requirements of hardware resource and processing bandwidth from W PEAs to 2 PEAs for $W \times W$ window. The recurrent neural network based color restoration technique is found to be very effective in restoring the natural colors with the learned relationship between RGB channels.

In this special issue 16 short communication papers are included and the main topics of these papers are listed as follows. (1) The existence and global attractivity of the periodic solution to static neural network models with S-type distributed delays on a finite interval were investigated. (2) The exponential stability of a class of stochastic recurrent neural networks with time delays was studied. (3) The problem of robust stability is investigated for nonlinear perturbed interval parametric neural networks with multiple

time delays. (4) A control system based on Washout-Filter for an artificial neural network with variable time delays is considered. With various control parameters, the control system may appear stable, bifurcation and chaos. The existence of period solution in the control system is investigated; (5) Several computational intelligence techniques, i.e., Linear Genetic Programs (LGPs), Classification and Regression Trees (CART), TreeNet, and Random Forests, Multilayer Perceptron (using back propagation), Hidden Layer Learning Vector Quantization to the problem of bankruptcy prediction of medium-sized private companies. (6) The paper illustrated the effect of a connectionist model, designed to avoid catastrophic interference, applied on popular unsupervised topology preservation networks. The authors have shown that network which dynamically change their lattice structure, perform better than networks with predefined grid of nodes. (7) A classification approach based on evolutionary neural networks (CABEN) is presented, which establishes classifiers by a group of three-layer feed-forward neural networks. The neural networks are trained by using a hybrid algorithm which synthesizing modified Evolutionary Strategy and Levenberg-Marquardt optimization method. (8) A high performance control method for trajectory tracking of Reusable Launch Vehicles during descending phase was presented. Algorithms for adjusting vehicle heading angle, heading speed and altitude to maintain desired lateral, longitudinal and vertical trajectory tracking are derived using neural network and robust control technique. (9) A new robust clustering method - weighted deterministic annealing (WDA) algorithm was proposed, which attempts to solve the noise sensitivity problem by reformulating the source distribution of conventional DA approach. (10) A modular system of times series prediction was proposed. This system is based on three conventional methods, a self organizing map (SOM) for learning the past of the times series, an ascendant hierarchical clustering (AHC) for optimizing the number of classes formed by SOM and a set of multi layer perceptrons (MLPs) for predicting the evolution of data in the future. (11) A new blind separation method by using Spatial Time-Frequency Distribution (STFD) of signals is proposed. The blind separation criterion is based on combined the joint-diagonalization and anti-diagonalization of a set of STFD matrices. (12) An analog diagnosis method, using NNs based on testability analysis and multi-frequency TPG, has been described, which includes a fault set chosen, test patterns compacted and fault feature information infused. (13) A novel method based on support vector machine (SVM) is proposed for detecting computer virus. (14) The problem of structural classification of protein database is explored in machine learning framework by neural networks to incorporate the experts' judgments and existing classification schemes into the learning procedure. (15) A mental speller by constructing a virtual keyboard in a computer screen for those with neuromuscular disorders and motor disabilities was developed. The carriers of communication between brain and computer were induced by a so-called "imitating-natural-reading" paradigm. (16) The usefulness of the ANN model in forecasting success when implementing Enterprise Resource Planning (ERP) systems was investigated and the results were compared with the methods of Multivariable Discriminant Analysis (MDA) and Case-based Reasoning (CBR).

The editors wish to thank Professor Ajith Abraham (Editor-in-Chief of *IJCIR*) and Professor Jun Wang (General Chair of ISNN2006) for providing the opportunity to edit this special issue on *Neurocomputing and Applications*. The editors wish also to thank the referees who have critically evaluated the papers within the short stipulated time. Finally we hope the reader will share our joy and find this special issue very useful.

Editor Biographies



Yuehui Chen received his B.Sc. degree in mathematics/automatics from the Shandong University of China in 1985, and Master and Ph.D. degree in electrical engineering from the Kumamoto University of Japan in 1999 and 2001. During 2001–2003, he had worked as the Senior Researcher of the Memory-Tech Corporation at Tokyo. Since 2003 he has been a member at the Faculty of Electrical Engineering in Jinan University, where he currently heads the Computational Intelligence Laboratory. His research interests include Evolutionary Computation, Neural Networks, Fuzzy Logic Systems, Hybrid Computational Intelligence and their applications in time-series prediction, system identification, intelligent control, intrusion detection systems, web intelligence and bioinformatics. He is the author and co-author of more than 70 technical papers. He is an Associate Editor of *IJCIR* and also is the Program Co-Chair of the Sixth International Conference on Intelligent Systems Design and Applications (ISDA'06). Professor Yuehui Chen is a member of IEEE, the IEEE Systems, Man and Cybernetics Society and the Computational Intelligence Society, a member of Young Researchers Committee of the World Federation on Soft Computing, and a member of CCF Young Computer Science and Engineering Forum of CHINA. More information at: <http://cilab.ujn.edu.cn>



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