
Editorial

Kang Li*

School of Electronics, Electrical Engineering and Computer Science,
Queen's University Belfast,
Ashby Building, Belfast BT9 5AH, UK
E-mail: k.li@qub.ac.uk
*Corresponding author

Q.H. Wu

Department of Electrical Engineering and Electronics,
University of Liverpool,
Brownlow Hill, Liverpool, L69 3GJ, UK
E-mail: q.h.wu@liv.ac.uk

Biographical notes: Kang Li is a Senior Lecturer in Intelligent Systems and Control at Queen's University Belfast. His research interests include advanced algorithms for the training and construction of neural networks, fuzzy systems and support vector machines, as well as advanced genetic algorithms, with applications to non-linear system modelling and control, microarray data analysis, systems biology and environmental modelling and monitoring. He has produced over 120 research papers and co-edited seven conference proceedings in his field. He is a Chartered Engineer, a member of the IEEE and the InstMC and the current Secretary of the IEEE UK and Republic of Ireland Section.

Q. Henry Wu is a Chair Professor in Electrical Engineering and leads the Intelligence Engineering and Automation Research Group at The University of Liverpool. He is a Chartered Engineer, Fellow of IET and Senior Member of IEEE. He has served as Committee Member of IET professional groups and as an Editorial Board Member of four academic journals. His research interests include non-linear adaptive control, neural networks, evolutionary computation, reinforcement learning, support vector machines, mathematical morphology, biologically inspired algorithms and multi-agent systems. He has authored or co-authored over 320 papers and has undertaken a number of research and industrial projects.

This is the second of the two special issues on computational intelligence, presenting ten papers, selected from the proceedings of the *2008 International Conference on Modelling, Identification and Control (ICMIC 2008)* held in Shanghai, China from 28 June to 2 July 2008, and are in their extended version. *ICMIC 2008* provided an international forum for professionals, academics and researchers to present the latest developments from interdisciplinary theoretical studies, computational algorithm development and applications in modelling, identification and control. The conference particularly welcomed those emerging methodologies and techniques that bridge theoretical studies and applications in all branches of engineering and the sciences. The two special issues reflect some of the latest research advances in computational intelligence and its applications in engineering systems, and particularly in the non-linear system modelling and control. This special issue mainly focuses on the latest development of fuzzy systems and non-conventional bio-inspired optimisation techniques and their engineering applications.

In this special issue, there are five papers discussing fuzzy systems, fuzzy neural networks, and their applications.

Pizzileo et al. investigate the modelling of non-linear systems using fuzzy neural networks. To reduce the network complexity, they propose a two-stage fast algorithm for the selection of network terms and simulation examples show the efficacy of the method.

Zhang et al. propose a new three-dimensional (3D) self-adaptive region fuzzy guidance law based on radial basis function (RBF) neural networks. Firstly, they build 3D motion equations for pursuit-evasion of the missile and the target. Then, use the proposed method to decrease the distance. The simulation results show that the proposed method can achieve better performance than a conventional method.

Shao et al. study the control of electro-hydraulic pressure servo systems, aiming to improve the rigidity performance of the hydrostatic thrust bearing. A non-linear hybrid controller is introduced, which is composed of a classical PID controller and a fuzzy controller. A

fuzzy switching mode is used to reject undesirable disturbances due to the switchover between the two control methods. The identification model of the practical system and the feasibility of the control scheme are validated by hardware-in-the-loop simulation experiments.

To solve the recognition problem for auto rack girders, Wang et al. introduce an online automatic inspection method which combines machine vision, wavelet transformation, fuzzy neural networks and Dempster-Shafer (D-S) evidence theory. Experimental tests show that their proposed method can effectively recognise the variety of the auto rack girders.

Zhu et al. investigate the problem of building a decision system model which can incorporate subjective judgements and statistical uncertainties, aiming to help investors to make research and development (R&D) decisions. They find that the fuzzy logic can be effectively used for this purpose and a real-time correction process is proposed to timely renew abandoned projects.

There are other four papers on the application of bio-inspired optimisation techniques.

Kim et al. consider the optimal grillage design, a multi-objective optimisation problem, and they use a real-coded genetic algorithm (GA) with multiple genetic operators to tackle this problem. The experimental results confirm that the proposed method can produce an important portion of the Pareto-front at a very low computational time frame.

Kim et al. also investigate the optimum design of bow structure of power yacht, a non-linear constrained optimisation problem. They use real-coded micro-GA to tackle the problem. In particular, during the optimisation procedure, finite element analysis is used to determine the constraint parameters at each iteration step of the optimisation loop. The optimisation results are compared with a previous design and show that 19% of the total steel volume is reduced to build the bow structure.

The operation of complex cascade reservoirs is often a challenging problem due to the curse of dimensionality problem and that solutions can easily get trapped in local optimum. Chang et al. propose a particle swarm optimisation method based on an immune evolutionary algorithm. The feasibility study confirms the efficacy of the proposed algorithm.

Han et al. study the speech recognition problem for speech-impaired people. It is understood that the movements of the speaker's face, nose, mouth and throat can convey visual cues and represent several different kinds of information contained in the speech signals. They propose a new speech recognition method using these visual features and neural networks. An improved GA is then used to optimise the network connection weights. Experimental tests show that the method is effective and can achieve high-speed speech recognition.

Finally, Zhang investigates the context-aware computing with uncertainty for proactive service. Because of multi-source evidence, context-aware information with uncertainty is dynamic and changing randomly. In order to

ensure the quality of service (QoS), they modify the fusion method of evidence information, taking into account the reliability of context, and time-efficiency and relativity. The efficiency of their method is tested and validated.

These ten papers serve as an introduction to the applicability of various bio-inspired computing techniques to a wide range of engineering problems, and should act as a catalyst and inspiration for future research. Finally, we would like to express our gratitude to many reviewers involved for editing this special issue.