International Journal of Knowledge-based and Intelligent Engineering Systems 8 (2004) 57–58
IOS Press


# Guest editorial

Intelligent techniques have been applied with great success to a wide range of real-world problems, many of these from the engineering domain. Today it is difficult to imagine large areas of engineering problems that have not been touched or influenced by techniques and approaches originating from artificial intelligence research. Intelligent systems play a central role in the solution of some engineering problems that would be difficult to solve using conventional techniques. Important examples are the areas of control engineering and automation, robotics, industrial fault diagnosis, machine and computer vision, signal processing, speech recognition, power electronics and drives, automotive applications, etc. Many of recent developments in these areas are heavily reliant on intelligent systems. This special edition presents some new advances in the area of intelligent techniques with application to engineering problems.

The issue comprises six papers, selected out of more than 350 presented at the Seventh International Conference on Knowledge-Based Intelligent Information & Engineering Systems (KES2003), September 3–5, 2003, in Oxford, UK. The annual KES Conference has become a traditional and prestigious world forum for the presentation of recent developments on intelligent techniques and applications. It has attracted an increasing number of delegates every year from all parts of the world. KES2003, organized at the University of Oxford, UK, attracted more than 400 delegates, and a similar number is expected to participate at KES2004, in Wellington, New Zealand. Most of these delegates have keen shared interests in many aspects of engineering applications of various intelligent techniques and approaches.

The selected papers cover some areas of the intelligent techniques spectrum that can be applied to engineering problems with the greatest benefit, such as: neural networks, fuzzy sets, multi-agent techniques, etc.

The first paper is concerned with neural network based models for vision. In this paper, K. Fukushima proposed a multi-layered hierarchical neural network model that can recognize and restore partly occluded patterns in a similar way to that which occurs in human perception. The second paper, by S. Kaskeridis and J. G. Taylor, introduces a new framework of so-called "Attentional Agents", for building smart robotic agents. The approach is inspired by attention control mechanisms from human brain and integrates sub-symbolic with symbolic processing, conflict resolution and action generation with multiple concurrent goals. A. Bargiela, W. Pedrycz and M. Tanaka proposed, in the third paper, a new algorithm for pattern classification based on an "inclusion/exclusion framework" of fuzzy hyperboxes. The fourth paper focuses on nonparametric data analysis. T. Gautama, D. P. Mandic and M. Van de Hulle present a new nonparametric statistical test which discriminates the complex-valued nature of time series. The paper describes an evaluation of this approach using some benchmarks in addition to real-world radar data. In the fifth paper, a new optimal control law for biosynthesis processes is proposed by G. Fetecau, V. Palade and V. Nicolau. A neural network based estimator for some process variables is implemented and used in order to implement an optimal control strategy. The last paper, by R. Khosla, describes a multi-layered distributed agent ontology for developing hybrid intelligent systems in various application areas. The ontology provides modelling support to the users, mainly at three levels: task level, optimization level, and technology level. Some practical applications of this ontology are presented in the paper.

The papers included in this special edition provide just a small idea of what was presented at KES 2003 with respect to the research topics covered by the papers as well as their applications. The editors are convinced that there were many other papers of excellent quality that deserved to be included in this issue, but this was not possible because of limited space. A number of other journals will also be publishing extended versions of other papers presented at KES2003. We would like to thank the authors for submitting the extended papers to this special issue. Considerable thanks are also due to the reviewers for providing their expertise and making valuable comments on the submitted papers. Their feedback helped the authors to improve their drafts and

ISSN 1327-2314/04/$17.00 

provide better papers for publication. We are very grateful for that.

The Guest Editors

Vasile Palade
*Oxford University, UK*
Bob Howlett
*University of Brighton, UK*