Editorial

Chee Peng Lim

School of Electrical and Electronic Engineering,
University of Science Malaysia, Engineering Campus,
14300 Nibong Tebal, Penang, Malaysia
E-mail: cplim@eng.usm.my

Canicious Abeynayake

Defence Science and Technology Organisation,
P.O. Box 1500, Edinburgh, SA 5011, Australia
E-mail: canicious.abeynayake@dsto.defence.gov.au

Lakhmi C. Jain*

School of Electrical and Information Engineering,
University of South Australia,
Adelaide, Mawson Lakes Campus,
South Australia SA 5095, Australia
E-mail: Lakhmi.jain@unisa.edu.au
*Corresponding author

Biographical notes: Chee Peng Lim received his BEng (Electrical) from University of Technology Malaysia in 1992, and both the MSc in Engineering (Control Systems) and PhD from University of Sheffield, UK, in 1993 and 1997 respectively. He is currently a Professor at School of Electrical and Electronic Engineering, University of Science Malaysia. He has published more than 150 papers in books, international journals, and conference proceedings. He has also received six best paper/poster awards in international and national conferences. His research interests include computational intelligence, pattern recognition, fault detection and diagnosis, and condition monitoring.

Canicious Abeynayake is a Research Scientist in the Defence Science and Technology Organisation, Edinburgh, Australia. He has published key papers in the area of human and system security. His interests include the applications of conventional and intelligent techniques in security and civilian applications.

Lakhmi C. Jain is a Professor of Knowledge-Based Engineering and the Director/Founder of the Knowledge-Based Intelligent Engineering Systems (KES) Centre, located in the University of South Australia. He is a Fellow of the Institution of Engineers Australia. His interests focus on the artificial intelligence paradigms and their applications in complex systems, art-science fusion, e-education, e-healthcare, unmanned air vehicles and intelligent agents.

Intelligent techniques derived from knowledge engineering and related methodologies are useful for developing autonomous systems that are able to improve the quality of our life. These techniques normally possess humanlike attributes such as learning, generalisation, and self-organisation, and attempt to achieve humanlike performances in tackling a variety of real-world problems. In this special issue, extended papers from the KES2008 conference as well as from other submissions that highlight a number of innovative intelligent techniques and their applications to solving problems encountered in our daily life are presented. A summary of each paper is as follows.

Humans use common sense to understand an event and to make the necessary judgements. It would be useful to impact such ability to robots. In the first paper, the authors attempt to design and develop an intelligent robot that can converse naturally with humans. A technique based on an association mechanism is devised to associate a person and a thing existing in a place and the event done on the place from words expressing the place. The proposed technique contributes to the development of a robot which can make fluent conversation with humans.

The conformance-checking process normally involves a large amount of inter-disciplinary components. In the second paper, the authors present an ontology-based approach to capitalise and organise conformance-related knowledge that can be used in a knowledge-based system for checking the conformance of construction projects with respect to a set of requirements. To validate the proposed approach, a prototype system known as Conformance Checking in Construction with Reasoning (C3R) is developed, with its applicability evaluated by both construction experts and non-professional end users.

Effective data integration methods are necessary to increase the quality of business intelligence applications that need to access, analyse, and display data coming from heterogeneous data sources. In the third paper, the authors develop a novel semantics-aware matching strategy (SAMS) to manage a generic palette of matching operators. The matching algorithm is evaluated with benchmark tests provided by the ontology alignment evaluation initiative (OAEI), and the results compare favourably with those from other algorithms.

Recent development of information and communication technology has resulted in better management of taxi services. In the fourth paper, the authors propose a method of dynamic routing of multiple taxis. The aim is to compute the optimal travel routes of cruising taxis in order to serve the maximum number of customers. Two models are constructed to evaluate the usefulness of the proposed approach. The simulation results show that the proposed method is able to pick up more customers than the existing means of cruising taxis.

Pictograms are useful in situations where verbal communication is difficult or takes time. In the fifth paper, the authors examine the effectiveness of utilising pictograms for verbs or phrases to express actions in manufacturing processes. Instructional pictograms with signs depicting processing actions in manufacturing steps are designed. The comprehensibility of the pictogram elements in expressing manufacturing actions is studied. The results indicate that well-designed pictograms for an action combined with the illustration of an object can be used effectively in manufacturing settings.

Infrared imaging techniques have been proven useful in many industrial problems. While middle wave infrared (MWIR) thermography is well-suited for recognising high temperature targets, it is a challenge to use MWIR thermography in recognising low temperature objects as encountered in most biomedical applications. In the sixth paper, an

experimental study to acquire and process MWIR images from a human hand is presented. A histogram equalisation algorithm to contrast enhance the object in MWIR images is examined. The results are useful for further research in using MWIR thermography for biomedical applications.

Image segmentation is an important step to extract useful information and to characterise image contents. In the seventh paper, the authors examine the use of the fuzzy c-means (FCM) clustering algorithm for colour image segmentation with pixel clustering. A systematic experimental study to determine the appropriate colour model that best fits the FCM algorithm for segmenting complex outdoor and satellite images is conducted. A qualitative approach based on human subjective evaluation is employed. The segmented images from eight different colour models are compared and analysed.

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