

Guest-editorial

Special issue on intelligent knowledge processing and decision making techniques

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Started in 1997, the International Conference on Knowledge-Based and Intelligent Information & Engineering Systems (KES) series of conference provides excellent opportunities for the presentation of new, interesting research findings and results in the general areas of knowledge-based and intelligent systems, leading to knowledge transfer and the generation of new ideas and techniques in engineering and information technology. KES2008 is the 12th KES conference organized by the University of Zagreb and its Faculty of Electrical Engineering and Computing in association with KES International (<http://www.kesinternational.org/>).

The KES2008 conference took place in Zagreb, the capital of the Republic of Croatia, from 3–5 September, 2008. The KES 2008 conference featured keynote lectures by distinguished researchers in their fields, invited sessions organized and chaired by respected experts in specialized areas, as well as general sessions managed by track chairs. After a careful review process, a total of 316 high-quality papers have been accepted for poster and oral presentation. Three volumes of the conference proceedings have been compiled and published as Lecture Notes in Artificial Intelligence by Springer.

This special issue contains four carefully selected papers from the KES2008 conference. The papers address theoretical advances as well as practical applications of intelligent knowledge processing and decision

making techniques and systems. The authors have extended their KES2008 papers to include the latest findings and results. All extended papers have also been subjected to another round of review before acceptance. A summary of each paper is as follows.

One of the common ways for transferring knowledge is through presentation. In the first paper, the authors propose a framework for supporting presentation scenario composition by externalizing the intention of a presenter. It is argued that intention is concerned with the presentation strategy of the presenter and externalization of intention is concerned with expressing a presentation story and specifying semantic relation between idea fragments in topics. A network structure in which items are related to each other rhetorically is composed. By allowing the presenter to specify relation between items in a presentation scenario, it is possible to capture and handle the presenter's intention on the procedure of a presentation.

It is important issue for public health and water authorities to have a water supply that is free from pathogens micro-organisms. The second paper describes the design and implementation of a novel machine vision system to detect and identify micro-organisms in drinking water. Image processing techniques are devised to allow detailed inspection of parasite morphology to nanometre dimensions. In a case study, the proposed machine vision system provides a 100% detection rate of cryptosporidium micro-organism. The proposed system also outperforms the current manual method in terms of cost, time, accuracy,

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and reliability for detecting micro-organisms in treated water.

One of the commonly used tools to detect early signs of breast cancer is mammography. However, it is difficult to detect subtle signs of breast cancer, e.g., the presence of micro calcification within dense tissue, owing to low contrast in mammographic images. In the third paper, the authors demonstrate a moving contrast sweep approach to increase the effectiveness of simple contrast enhancement techniques in breast cancer detection. Instead of producing the result in the form of a single contrast enhanced image, the proposed method produces multiple images which have been enhanced at different intensity levels. The images are then combined to form frames for a moving video, resulting in seamless transition from one intensity level to another. The proposed method allows a radiologist to inspect the entire range of intensity levels to find suspicious signs of breast cancer in mammographic images in an easy and effective manner.

The logic of Chance Discovery (CD) and mathematical models for CD are hard to formalize. In the fourth paper, different techniques of non-classical logics to model various aspects of CD are discussed. Special epistemic (logical) operators are introduced, and a framework based on the Kripke-Hintikka semantics is formulated to allow the consideration of multiple expressive operators. An example of Logic of Discovery and Knowledge (LDK) is considered, and it is demonstrated that LDK, in mathematical terms, is decidable, and the satisfiability problem for it is solvable. These results are useful for verifying the correctness of reasoning about CD properties, and the methods suggested useful for investigating the properties of other logics in Artificial Intelligence and Computer Science.

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