
Editorial

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Biographical notes: Dimitrios A. Karras received his Diploma and MSc Degree in Electrical Engineering from the National Technical University of Athens (NTUA), Greece in 1985 and a PhD Degree in Electrical and Computer Engineering, from the NTUA in 1995, with honours. Since 2004 he has been with the Chalkis Institute of Technology, Automation Department, Greece as Professor in Digital Systems and Signal Processing as well as with the Hellenic Open University as Visiting Professor in Communication Systems. He has published more than 50 journal papers in pattern recognition, image/signal processing, neural networks and bioinformatics and more than 140 research papers in international conferences. His research interests span pattern recognition and neural networks, image and signal processing and systems, biomedical systems, communications, networking and security. He has served as program committee member, program and general chair in many international workshops and conferences in signal, image and automation systems. He is Editor-in-Chief of the *International Journal of SISE*.

George C. Giakos is a Professor in the Department of Electrical and Computer Engineering, and Biomedical Engineering, at the University of Akron, OH, USA. In addition, he is the Director of Imaging Technologies and Surveillance Technologies, Molecular Nanophotonics, and Applied Nanosciences Laboratories. His research is articulated in the design of imaging systems, ladars and surveillance sensor platforms for the Department of Defense and Homeland Security, multispectral polarimetry, exploration of molecular pathways and signatures for early detection of disease. His research group was the first in the USA to pioneer the characterisation of the detection and imaging characteristics of Cadmium Zinc Telluride for flat-panel radiography applications. His research has been rewarded with fifteen (15) US Patents and more than 150 peer-review articles. He is the recipient of a Distinguished Faculty Fellow Award, from the Office of Naval Research. He received numerous prestigious research awards from AFRL, NRL, and NASA. He is an IEEE Fellow.

The first issue of 2010 of the *International Journal of Signal and Imaging Systems Engineering (IJSISE)* contains two invited papers and five regular papers, covering important issues in the design of optical devices, x-ray imaging systems for security, imaging systems in agriculture and mammography, fault and landmine detection systems as well as novel algorithms for multispectral imaging.

The first invited paper by George C. Giakos reports a significant finding that certain nanocomposite biological macromolecules or organic molecular structures, with very large optical activities, behave like metamaterials with enhanced transmitted signal characteristics.

The second invited paper by George Zentai reports major issues involved in the design of systems for homeland security based on x-ray imaging.

In the sequel, in the first regular paper by A.O. Ajlouni and A.F. Sheta a novel process for detecting landmine from infrared (IR) images is described. The detection process is based on Karhunen Loeve Transformation (KLT) to extract the landmine features from the IR image features. An enhancement stage with three sub-stages

- Contrast Enhancement
- Noise Removal
- Smoothing Filter has then, been employed to improve the IR image quality.

Subsequently, Marker based Watershed Segmentation is used to segment the image and specify the domain of possible objects. The final stage involves the landmine recognition process. An extensive experimental study shows that the proposed method leads to higher detection rates with lower false alarms.

The second regular paper by T.N. Nagabhushan and D.S. Vinod proposes certain modifications to Kohonen's Self Organising Feature Map (SOFM) to achieve faster convergence specifically with respect to multispectral images. During the first stage the raw image is pre-processed using a data reduction technique to obtain reduced data set and then, Condensed Nearest Neighbour rule is applied to yield standard sub-set of samples. The samples in the standard subset are used to find the Best Matching Unit (BMU) and the samples in the reduced data set are used to update BMU and its neighbouring neurons. The suggested modified SOFM is compared with the conventional algorithm in synthetic and benchmark image data sets.

Next, the paper by A.P. Nunes et al. presents a computational methodology for mammographic analysis related to breast cancer detection. In the first step, the K-Means clustering algorithm and the Template Matching technique are used to detect suspicious regions. Next, geometry and texture features of each region are extracted. Texture is described using the Simpson's Diversity Index, which is used in Ecology to measure the biodiversity of an ecosystem. Finally, the information of texture is used by SVM to classify the suspicious regions into two classes: masses and non-masses. The tests demonstrate increased accuracy for sensitivity and specificity.

The paper by S.R. Paraskar et al. investigates an algorithm based on a combination of Discrete Wavelet Transforms (DWT) and Feed Forward Artificial Neural Network (FFANN) to discriminate magnetising inrush from interturn fault in single phase transformers. It is found that the proposed method gives satisfactory results, and may be useful in the development of modern differential relay for transformer protection.

Finally, the paper by R. Sarcus Sabeenian and V. Palanisamy investigates systematically how Multi Resolution Combined Statistical and spatial Frequency could be involved to discriminate the weeds from the crops and to classify them as narrow, little and broad weeds. Such weed control has a major effect on agriculture.

We hope that this issue, covering so many different applications and techniques of imaging systems, will be appreciated by all readers and the research community. We would like to thank especially all invited and regular issue authors as well as all reviewers and our publisher for their support and we are sure that their good work will cause an increasing interest for this journal. Although we think that the quality has reached a certain level we would like to have more comments on this issue by the research community. We would like to have your comments and reports on the papers published as well as on all important issues for the trends related to signal and imaging systems in industry and the market. Our efforts are continuously focused on improving quality and especially indexing of this journal in the near future. Your high quality research papers but, also, comments, market and industrial reports are always necessary to meet our targets.