Editorial

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Biographical notes: Dimitrios A. Karras received his Diploma and MSc in Electrical Engineering from the National Technical University of Athens (NTUA), Greece, in 1985 and a PhD 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 a Professor in Digital Systems and Signal Processing as well as with the Hellenic Open University as a 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 programme committee member, programme and general chair in many international workshops and conferences in signal, image and automation systems. He is Editor-in-Chief of *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 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 last issue for 2010 of *International Journal of Signal and Imaging Systems Engineering* (IJSISE) is now a reality containing six interesting regular issue papers. We are happy to observe that there is balance in the research contributions herein presented between signal and imaging systems as well as that there are contributions on the hardware design of systems. However, we express again our interest in receiving more research contributions on the current trends in the hardware design of signal and imaging systems. The research contributions of this issue span the fields of image reconstruction and segmentation, digital filter design, Content based Image Retrieval (CBIR), FPGA implementation of Neural and other Systems based on

exponential calculations, as well as Wavelet applications in fingerprints enhancement.

The first regular paper by M. Mansouri and A. Mohammad-Djafari, from France, addresses the important problem of creating a Super-Resolution (SR) image from a set of Low Resolution (LR) images. The authors propose a novel interesting method based on the Bayesian estimation with a Gauss-Markov-Potts prior model (GMPPM), where the main objective is to get a new HR image from a set of severely blurred, noisy, rotated and shifted LR images. The proposed approach is based on an unsupervised algorithm. As a by-product of their prior model, they obtain jointly an SR image and an optimal

segmentation of it. A comparison of the performances of the proposed method with some classical and recent SR methods is provided in the experimental study of this research report and proves the efficiency and applicability of this new important methodology.

In the sequel, Mohammed Abo-Zahhad, Sabah M. Ahmed, Ahmad F. Al-Ajlouni and Nabil Sabor, from Egypt, adopt a modern heuristic optimisation algorithm, named the Taguchi-based Immune Algorithm (TBIA), to solve the problem of designing two-dimensional recursive digital filters with specified magnitude and group-delay characteristics. The TBIA is based on both features of the biological immune system and the Taguchi method, which increases the ability of the IA to find the global optimal solution in a non-linear space. On the basis of minimising the magnitude and group-delay errors, a multi-criterion combination is employed as the design criterion to obtain optimal recursive filter that satisfies the required specifications. The computational experiments show the ability of the proposed TBIA approach to design stable complex filters with better magnitude and group-delay characteristics and to obtain more robust results compared with the previous design methods.

In the third regular paper by A. Kumar, G.K. Singh and R.S. Anand, from India, a simple and efficient iterative technique for designing of cosine modulated filter banks with approximate reconstruction is presented. In the proposed technique, cut-off frequency is optimised to satisfy a new perfect reconstruction condition. Different window functions have been used to design the prototype filter for cosine modulated filter banks. The simulation results illustrate the improvement achieved through this method over other existing methods in terms of amplitude distortion, Number of Iterations (NOI), aliasing distortion and computational time (CPU time). The authors show that when their methodology is exploited for subband coding of the ECG and speech signals, it yields very good performance in the accuracy of measured parameters.

Next, Megha Agarwal and R.P. Maheshwari, from India, present how Histogram of Oriented Gradients (HOG) feature descriptor can be efficiently applied for CBIR. For handling similarity measurement of large amounts of data, the approach of vocabulary tree construction and application is involved. Experimental results illustrate the comparative analysis and reliability of a retrieval system based on the HOG feature descriptor and of another one based on the Gabor transform feature descriptor. It is verified that the HOG-based retrieval system improves significantly average precision and average recall performance compared with the Gabor-transform-based retrieval system.

The fifth research contribution by Supriya Aggarwal and Kavita Khare, from India, presents high-performance exponential computation based on the CORDIC algorithm, with emphasis on minimum hardware requirements. The re-designed unified CORDIC algorithm provides high throughput and is beneficial for the VLSI implementation of the activation functions in neural networks and realisation of exponent calculations in Gaussian Potential Functions. The authors show that the characteristics of ease of design and scale-free operation of the proposed technique can lead to the extension of the range of convergence compared with the original CORDIC algorithm. Approximately 57.1% hardware savings are accomplished in comparison with Flat CORDIC architectures for 32-bit word-length. The word-length of the processor is extensible and the experimental results confirm its efficacy.

Finally, P. Viswanathan and P. Venkata Krishna, from India, study a novel method based on Morlet wavelet applied to fingerprint image enhancement and compression. This algorithm consists of two stages. In the first stage, wavelet analysis is used, which estimates contextual information like frequency and orientation of fingerprint images. The second stage uses Gabor filtering for smoothening and noise removal. Good ridge continuity is obtained with compression and Gabor filtering removes the spurious minutiae. The experimental results achieved by this new algorithm provided accurate recognition and less storage compared with the existing approaches.

We feel that this issue, presenting a variety of contributions in the efficient implementation of major modules involved in the design of signal and imaging systems, will be of value for all practitioners and researchers. We thank all authors as well as all reviewers and our publisher for their support.

Our efforts are endlessly focused on improving quality and principally indexing of this journal. We are very happy at this point to remark that IJSISE is now indexed by Google Scholar, Inspec, Scirus, Scopus, Academic One File, Business and Company Resource Center, General Business File ASAP International, as well as InfoTrac Custom Journals indices proving that this journal is steadily increasing its impact to the research community and business of signal and imaging systems.

However, we believe that this is only the beginning and with your recommendations and support IJSISE will reach higher standards. To this end, your proposals for special issues on important topics of signal and imaging systems jointly with your high-quality original research reports and your advertisement within your institutions and librarians are important to achieve our goals for better quality and increased impact of this journal.