
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 with honours from the NTUA in 1995. 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 a 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 second issue for 2011 of the *International Journal of Signal and Imaging Systems Engineering (IJSISE)* is comprised of six exciting regular papers, covering essential facets in imaging and signal systems both in theory and applications. Fortunately, hardware implementations are suggested too. Moreover, we consider the fact that these papers come from research groups spanning three different continents as a significant characteristic of this issue showing that IJSISE gains impact on a larger audience.

More specifically, the research reported in this issue spans support vector machines for image recognition, new multimedia ciphers implementations based on chaos theory, efficient target recognition systems, exciting applications in bioinformatics and the design of optimal Audio-Visual Speech Recognition (AVSR) systems.

The first regular paper by Rostom Kachouri, Khalifa Djemal and Hichem Maaref from France, is developing an attractive new approach for Content Based Image Retrieval systems (CBIR), based on the Multiple Kernel Learning (MKL) methodology. While MKL approach depends essentially on the used kernels and the computation of the optimal weight coefficients, however, in the case of heterogeneous databases, a situation normally encountered in real world CBIR systems, the complexity to treat and classify images provides great difficulty to define and determine optimal kernel weights. The authors propose an original kernel weighting method, which is intended for Multiple Kernel based SVM classification. Depending on the relevance of kernel training rates, the proposed method allows us to ensure better

classification accuracy and significantly less computation time. The performed experiments, under heterogeneous image recognition, prove the efficiency of the suggested method. A comparison with existing MKL algorithms is provided as well.

In the sequel, the paper by Tun-Kai Yao, Ching-Han Chen and Chia-Ming Kuo from Taiwan, presents a stimulating new approach to the design of highly efficient Multimedia Ciphers involving filter chaos-based pseudo random number generators. While numerous contemporary cryptosystems are based on chaotic equations, achieving good statistical properties and security, however, the majority of these approaches require ideal chaos-based pseudo random number generators. The authors are herein developing a novel chaos-based pseudo random number generator (CPRNG) hardware device to generate the chaotic bit-sequence without relying to ideal properties. More specifically, in order to improve the generated bit-sequence of the chaotic equation, the authors suggest that the results of the CPRNG would pass through a properly designed filter. This approach generates a bit-sequence with greater variation than the original chaotic equation. The proposed methodology uses a 32-bit fixed point arithmetic circuit to implement a filter chaos-based pseudo random number generator and the multimedia cipher is derived through a suitable modular architecture.

The third paper by Junwei Tian, Qing E. Wu, Yongxuan Huang and Tuo Wang from China, deals with a stirring new methodology for improved target recognition system based on fast optimal fuzzy c-means image segmentation. More specifically, the authors suggest a novel Fast Optimal Fuzzy C-Means (FOFCM) clustering algorithm to improve target recognition in image processing. They show that FOFCM could find the best clustering number of images by exploiting the characteristics of the given images and reduce the segmentation time significantly at the same time. The experimental results indicate that FOFCM has noteworthy better performance and lower complexity than previously proposed approaches. Both, recognition rate and clustering efficiency are improved significantly.

The next paper by Eric Dahai Cheng, Subhash Challa, and Rajib Chakravorty from Australia, is a really exciting bioinformatics application of signal and imaging systems and IJSISE strongly welcomes such research investigations. The authors, based on the concept that a microscopic image is a random field, and segmenting cells reliably and correctly in the random field is actually a pretty difficult task with only the edge contour of the moving and changing cells being a critical feature, have developed several cell segmentation algorithms in parallel to compensate the miss detections due to random reasons. Then, they suggest a hierarchical model in decision fusion that combines the three pairs of detection results to increase the probability of final cell detection. A false detection removal algorithm, which is based on average cell intensity, has also been proposed to remove some false detections. The distance and watershed transforms have also been used to separate the

connected cells. Experimental results show that the set of these algorithms is pretty robust to variable microscopy image data, and variable cell densities, and with the proposed fusion and false removal algorithms, the cell detection rate is increased significantly.

The fifth paper by Malaya Kumar Hota and Vinay Kumar Srivastava from India, is a very interesting application of digital signal processing techniques in bioinformatics research too and more specifically in the investigation for the identification of protein coding regions. The authors suggest a novel weighted mean multi-window (with different sliding window lengths) short-time discrete Fourier transform singular value decomposition (ST-DFT-SVD) based method for identification of protein coding regions. The proposed method has two modes of operation: training mode and test mode. Its performance is analysed in comparison with the ST-DFT method at various sliding window lengths. Furthermore, its performance is evaluated in comparison with other existing methods such as ST-DFT, Infinite Impulse Response (IIR) anti-notch filter and multi-stage filter. Receiver Operating Characteristic (ROC) curve and Area under ROC Curve (AUC) are used to evaluate the performance at the nucleotide level. The results show that this new approach provides superior performance in terms of identification accuracy at several benchmark data sets.

Finally, the paper by R. Rajavel and P.S. Sathidevi from India too, deals with Audio-Visual Speech Recognition (AVSR) using acoustic and visual signals of speech and its robustness in noisy environments. The authors attempt to address an important issue in the design of decision fusion based AVSR systems, that is, the determination of appropriate integration weights for the speech modalities to integrate and ensure better performance under various signal-to-noise ratio conditions. To this end, they present a new Genetic Algorithm (GA) based optimisation scheme to obtain the appropriate integration weight from the acoustic and visual reliabilities. They demonstrate the performance of the proposed GA optimised integration weight estimation scheme for isolated word recognition (incorporating commonly used functions in mobile phones) via multi-speaker database experiments. The results show that the proposed scheme improves robust recognition accuracy over the conventional unimodal systems, and a couple of related bimodal systems, under various signal-to-noise ratio conditions.

We deem that this issue, demonstrating exciting new contributions in the design of important mechanisms of imaging and signal systems, spanning so different but important applications will be quite appealing for all engineers and researchers in the relevant fields. We would like to thank all authors as well as all anonymous reviewers and our journal manager and publisher for their constant and immense support.

Finally, we would like to thank all contributors and guest editors for the growing interest for special issues organisation which reflects the amplified interest and impact of our journal in the research and engineering community.

We always rely with assurance on your quality proposals and research investigations in order to advance the impact of this journal in the academic community and business of signal and imaging systems. However, this emergent interest increases the pool of high quality accepted papers to be managed for publication too and our task to publish them

without delays becomes more difficult onwards. In any case we will try our best to timely publish high quality research satisfying authors and reviewers but most of all the needs of our expanding audience, and of course we apologise in advance if a paper would face any unavoidable publication delay.