
Editorial: Innovative researches on image processing

Aura Conci*

Computer Science Department,
Computer Institute – IC,
Federal Fluminense University – UFF,
Niterói, Rio de Janeiro, 24 210 – 240, Brazil
E-mail: aconci@ic.uff.br
*Corresponding author

Sidnei Paciornik

Digital Image Processing Laboratory – LPDI,
Department of Materials Engineering – DEMa,
Catholic University of Rio de Janeiro – PUC-Rio,
Rio de Janeiro, RJ, 22451-900, Brazil
E-mail: sidnei@puc-rio.br

Biographical notes: Aura Conci is a Professor in the Computer Science Department at Federal Fluminense University, Niteroi, Rio de Janeiro, where she coordinates the Visual Lab and the project Image Analysis for Mastology Applications. Her research interests include numerical methods applied to engineering, finite element methods, fractal geometry, pattern recognition, biomedical imaging, computer vision and graphics. She received her Doctorate in Civil Engineering from Pontifical Catholic University of Rio de Janeiro (PUC-Rio). She is a member of the Brazilian Society of Mechanical Sciences and Engineering (ABCM) and the international programme committees of International Conference on Systems, Signals, and Image Processing (IWSSIP) and the International Conference on Geometry and Graphics (ICGG).

Sidnei Paciornik is an Associate Professor at the Department of Materials Engineering of PUC-Rio, where he is in charge of the Digital Microscopy and Image Analysis Group. His research interests include all forms of microscopy for materials characterisation in which automation and image analysis are involved. His work involves the development of new 2D and 3D image analysis methods for microstructural quantification of metals, composites, ores and dental materials. He received his Doctorate in Physics from PUC-Rio and a Post-doc from the Lawrence Berkeley National Laboratory. He is a member of the Microscopy Society of America, of the ASTM E4 Metallography Committee and of several Brazilian associations.

Digital images are functions of the brightness values in 2D representations of real-world scenes. Image processing describes computer operations carried out on digital images with some goal in mind. Such goals are related to application areas in a variety of disciplines, from art and entertainment to engineering and medicine.

As image acquisition becomes easy and cheaper, the opportunities for image-based applications become even more interesting. Yet image processing is essential to so many common applications, including photography, television, movies, computers, Internet, mobiles, pods and pads, that it might seem everything is already done and no challenges remain. However, there are open questions: What aspects of image processing are fit subjects for further innovative applications? How can we develop and test new ideas to advance digital processing in commercial products in the near-term? How can we improve intelligent image processing itself?

There are growing needs for image processing in many key areas. In the biometric and security sector, increasing demand for public safety has led many governments to prioritise automatic, economic, and efficient solutions for insurance. Because video cameras are becoming relatively inexpensive, applying video processing techniques to live monitoring is now a cheaper and less disruptive alternative. Moreover biomedical applications and the use of images in the diagnostic of disease have become each day an important alternative to more invasive approaches. These two domains set the main context for this special issue on advances of image processing. Of the six articles in this issue, three are related to biomedical applications and two consider the intelligent recognition of elements in images for public or government surveillance.

In the paper ‘Streaming of medical images using JPEG2000 Interactive Protocol’, J-F. Pambrun and R. Noumeir describe how image streaming using the JPEG2000 Interactive Protocol (JPIP) can enable streaming

of medical images directly from electronic health records enabled image archives to visualisation workstations. By reducing bandwidth requirements and enabling interactive visualisation schemes, it allows physicians to start their investigation within few seconds of the initial request and stay productive during the entire download process.

'Moving license plate segmentation by region and corner-based approach' is a paper where A.M. Petters, J.M.L. Romero, H.A.L. Ayala and J. Facon propose a novel approach for license plate detection of vehicles in movement within dynamic scenes. By mixing component-based and corner-based algorithms, this approach combines characteristics of the previous works to improve success rate and robustness. Success rates of 91.8%, 90.8% and 95.6% were accomplished for the three approaches despite diverse illumination and bad physical conditions of the plates.

T.B. Borchardt, R. Resmini, L.S. Motta, E.W.G. Clua, A. Conci, M.J.A. Viana, L.C. Santos, R.C.F. Lima and A. Sanchez present a tool to help the diagnosis by thermographic breast images in the paper 'Combining approaches for early diagnosis of breast diseases using thermal imaging'. The main objective of such work is a viability study of the use of infrared images for automatic detection of pathologies by mamma texture symmetric analysis. Numerical simulations and experimentations were developed to analyse the relation between internal and surface temperatures for breast images.

In the paper 'Improving a dynamic ensemble selection method based on oracle information', L.M. Vriesmann, A. de Souza Britto, Jr., L.E.S. de Oliveira, R. Sabourin and A.H-R. Ko evaluate strategies to approximate the performance of a dynamic ensemble selection method to the oracle performance of its pool of weak classifiers. They analysed different distance measures in the KNORA method. Using a strong experimental protocol based on more than 60,000 samples of handwriting digits extracted from NIST-SD19, the experiments have shown that the fusion of the KNORA results with the results of its built-in KNN is very promising.

The paper 'Study of geostatistical functions applied to automatic eye detection' of J.D.S. Almeida, A.C. Silva and A.C. Paiva proposes a method for automatic eye detection

in images of human faces using geo statistical measures as input features for a support vector machine classifier. The method was tested with the ORL human face database and reached a sensitivity of 92.2% for the Moran's index, specificity of 93.4% and accuracy of 88.5% for the semi variogram function.

A. Almhdie-Imjabber, J.M. Ferrer-Villena, R. Harba, R. Lédée, C. Léger, P. Lopes-Pereira and S. Mème, in the paper 'Segmentation of mice cerebral structures: application in Trisomy 21', presents a semi-automatic method for the segmentation of mice cerebral structures in MR images. Results have shown that the brain volumes estimated by their method are identical to expert manually estimated volumes. The new method was used in the analysis of the cerebral malformations linked to Trisomy 21: no significant difference of the cerebral structures between Trisomy 21 mice and the control ones was found.

This special issue is composed of invited works selected from the 126 papers (from 38 countries) presented at the 17th International Conference on Systems, Signals, and Image Processing (IWSSIP). The conference, held in Rio de Janeiro, was organised by the Federal Fluminense University (UFF) in cooperation with IEEE Region 9 Latin America, coorganised by Brazilian Computer Society (SBC), the Brazilian Society of Mechanical Sciences and Engineering (ABCM), the Brazilian Association of Production Engineering (ABEPRO). The 17th IWSSIP was sponsored by the Coordination of Improvement of Higher Education Personnel, Ministry of Education (CAPES-MEC), the Foundation for Research Support of the State of Rio de Janeiro (FAPERJ) and UFF. Interested readers can find all 126 papers of the conference at <http://www.ic.uff.br/iwSSIP2010>.

The invited *IJICA* Editorial Committee selected initially 22 papers for submission. Those papers were expanded from their original presentations, submitted to a new peer-review process, and evaluated by at least three new reviewers. We thank all the reviewers and authors involved in this process for their kind efforts. We would like to thank specially the *IJICA* Editor-in-Chief, Nadia Nedjah, for her support in such idea of organising this special issue. We hope readers will find this to be an interesting report on some of the latest advances in computing application.