

The KW-IEEE Section, the Signal Processing/Computational Intelligence
Societies joint Chapter, and

The Pattern Analysis and Machine Intelligence (PAMI) Group, E&CE
Dept., present

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BioMedical Image Analysis: From microscopical to human scales

Image Analysis is playing an important role in Biology and Medicine, helping the scientists to develop new ways to study living specimens or acting as a medical tool for computer aided diagnosis. This talk will address two applications: a biological problem, for automatic tracking of a moving root in confocal microscopy; and a computer aided diagnosis approach, for detecting lung nodules in X-ray images. These applications different in nature, scope, purpose, and image dimensions, illustrate the Image Analysis capabilities, limitations and challenges in Biology and Medicine.

Anisotropic diffusion, automatic thresholding, Hough transform, Kalman estimation are standard image processing and analysis techniques used in the automation of a confocal system for tracking a rapid growing *Arabidopsis* root, allowing the in vivo analysis of cell divisions in the root stem cell niche.

Posterior-anterior chest radiographs are used by the radiologists for diagnosis purposes, namely the detection of pulmonary nodules. However, it is known that only a fraction of actually positive cases (about 70%-80%) are really detected. Computer aided diagnosis can be an important 2nd opinion system for increasing the detection success rate. The system herein presented addresses several issues, namely the automatic location of the lung fields and ribs, and the detection of lung nodules.

SHORT BIOGRAPHY:

Aurelio Campilho received the Licenciado degree in Electrical Engineering, in 1973, the Ph.D. degree in 1985, and the Agregado degree, in 1993, all from FEUP - Faculty of Engineering of University of Porto, Portugal. He is at present Professor at FEUP, and co-ordinator of the research group BMI-VIC – Biomedical Imaging and Vision Computing, from INEB – Institute for Biomedical Engineering. He is the President of APRP – Portuguese Association for Pattern Recognition

He was the INEB President from 1994 to 2000. He was member of the Portuguese Group in the European Programme Telematic Applications - Health and Disabled and Elderly Sector (1996-1999). He was the Portuguese Delegate in the European Programme TIDE - Technology Initiative for Disabled and Elderly People (1993-1996). He had collaborated in several national and international projects. He authored one book, co-edited six books, guest edited three special issues of International journals and published over 120 papers in journals, and refereed conference proceedings. Dr. Campilho is Associate Editor of the IEEE Transactions on Biomedical Engineering. He chaired several conferences such as RECPAD-00, IBPRIA-03, SSPR-04 and the ICIAR conference series.

EVERYONE IS WELCOME.