Annals of the BMVA Vol. 2013, No. 1, pp 1–2 (2013)

Guest Editorial: Medical Image Understanding and Analysis

Xianghua Xie

Department of Computer Science,
Swansea University, Swansea SA2 8PP, United Kingdom
<x.xie@swansea.ac.uk>
<http://csvision.swan.ac.uk>

The 16th Conference on Medical Image Understanding and Analysis (MIUA) was hosted in Swansea University in July 2012. MIUA is the principal UK forum for communicating research progress within the community interested in image analysis applied to medicine and related biological science. It is a single-track conference with oral and poster presentations. Authors were asked to submit 6-page technical papers for review by the programme committee. Review papers of up to 8 pages were also welcomed, and we kept the tradition of soliciting short challenge abstract. In total, we received 52 submissions, each of which was reviewed by at least three referees. Based on these reviews, 22 papers were accepted as oral presentation and 16 as posters. Authors of the best submitted papers, judged by the programme committee, were invited to submit extended versions of their work. A single-blind review was carried out and the revised versions were included in this special issue that covers a variety of techniques and applications.

The first three contributions report on novel feature extraction and classification in application to anatomical landmark detection, risk assessment, and tissue segmentation. The paper *Nakagami-based AdaBoost Learning Framework for Detection of Anatomical Landmarks in 2D Fetal Neurosonograms* presents an automated method for Choroid Plexus detection in ultrasound. Together with other image features, the parameters of the Nakagami distribution that are acquired using maximum likelihood estimation are used to classify image patches with adaptive boosting. The authors of the next paper, *Local Feature Based Breast Tissue Appearance Modelling for Mammographic Risk Assessment*, adopted the visual words approach to examine the correlation between breast tissue texture and the risk of developing breast cancer. Comparative analysis is carried out on a variety of local textural features. In *Spin-context Segmentation of Breast Tissue Microarray Images*, an automated method is proposed to segment *in-situ* and invasive tumor regions in images of breast tissue microarrays. Novel, rotation-invariant contextual feature descriptors are fed into multilayer perceptron classifiers to detect tumorous regions.

The next three papers focus on deformable models in biomedical image segmentation and tracking. The paper *Statistical Region based Active Contour using a Fractional Entropy*

Annals of the BMVA Vol. 2013, No. 1, pp 1–2 (2013)

Descriptor: Application to Nuclei Cell Segmentation in Confocal Microscopy Images presents an unsupervised statistical region based active contour model in level set representation with fractional entropy measure to segment single channel actin tagged fluorescence confocal microscopy images. The authors of *Learning Dynamical Shape Prior for Level Set based Cell Tracking* introduce a cell tracking method that combines autoregressive shape modelling, boundary based level set segmentation and Markov state modelling to cell nuclei segmentation and state detection. The paper *An Overview on Interactive Medical Image Segmentation* provides a detailed review of recent advances in interactive segmentation methods in medical applications. It summaries both technical developments and different interaction paradigms and provides some insights into the future development of this user assisted approach to image segmentation.

The following paper, *Tikhonov Regularisation in Diffusion Signal Estimation*, is concerned with the optimisation of regularisation for reconstruction of diffusion magnetic resonance imaging in order to minimise the adverse effect by measurement noise. The final paper, *Numerical Methods for Coupled Reconstruction and Registration in Digital Breast Tomosynthesis*, addresses the reconstruction problem in limited angle transmission tomography by combining reconstruction and registration through jointly estimating image intensities and parameters of deformation.

I would like to thank the authors for their contributions and the reviewers for their constructive comments. I also would like to thank Prof. Roy Davies, the Editor-in-Chief of the BMVA Annals, for helping me in organising this special issue.