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Molecular Imaging, Reconstruction and Analysis of Moving Body Organs, and Stroke Imaging and Treatment

Fifth International Workshop, CMMI 2017
Second International Workshop, RAMBO 2017
and First International Workshop, SWITCH 2017
Held in Conjunction with MICCAI 2017
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Preface CMMI 2017

Molecular imaging is an evolving clinical and research discipline enabling the visualization, characterization, and quantification of biological processes taking place at the cellular and subcellular levels within intact living subjects. As a dedicated workshop, Computational Methods for Molecular Imaging (CMMI 2017) covered various areas from image synthesis to data analysis and from clinical diagnosis to therapy individualization, using molecular imaging modalities PET, SPECT, PET/CT, SPECT/CT, and PET/MR. Technical topics included image reconstruction, image enhancement, physiological modeling, computational simulation, multi-modal analysis, and artificial intelligence methods with clear clinical application and close industrial connection.

September 2017

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Preface RAMBO 2017

Physiological motion is an important factor in several medical imaging applications. The speed of motion may inhibit the acquisition of high-resolution images needed for effective visualisation and analysis, for example in cardiac or respiratory imaging or in fMRI and perfusion applications. Additionally, in cardiac and fetal imaging, the variation in frame of reference may confound automated analysis pipelines. The underlying motion may also need to be characterised either to enhance images or for clinical assessment. Techniques are therefore needed for faster or more accurate reconstruction or for analysis of time-dependent images. Despite the related concerns, few meetings have focused on the issues caused by motion in medical imaging, without restriction on the clinical application area or methodology used.

After a very successful international workshop on Reconstruction and Analysis of Moving Body Organs (RAMBO) at MICCAI 2016 in Athens, Greece, we are proud to have organised this meeting for the second time in conjunction with MICCAI 2017 in Quebec, Canada.

RAMBO was set up to provide a discussion forum for researchers for whom motion and its effects on image analysis or visualisation is a key aspect of their work. By inviting contributions across all application areas, the workshop aimed to bring together ideas from different areas of specialisation, without being confined to a particular methodology. In particular, the recent trend to move from model-based to learning-based methods of analysis has resulted in increased transferability between application domains. A further goal of this workshop series is to enhance the links between image analysis (including computer vision and machine learning techniques) and image acquisition and reconstruction, which generally tends to be addressed in separate meetings.

The presented contributions can be broadly categorised into “registration and tracking” and “image reconstruction and information retrieval”, while application areas include cardiac, pulmonary, abdominal, fetal, and renal imaging, showing the breadth of interest in the topic. Research from both academia and industry is presented and keynote lectures from Dr. Aleksandra Popovic (Philips Research North America) and Prof. Ali Gholipour (Harvard Medical School) give an overview of recent developments.

We believe that this workshop fosters the cross-fertilisation of ideas across application domains while tackling and taking advantage of the problems and opportunities arising from motion in medical imaging.

September 2017

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Preface SWITCH 2017

The first Stroke Workshop on Imaging and Treatment Challenges (SWITCH) was held at the Medical Image Computing and Computer Assisted Intervention Conference (MICCAI) in Quebec City, Canada, 2017.

The SWITCH workshop focused on the challenges in the management of stroke patients, particularly regarding diagnostic imaging and treatment. The purpose of this workshop was to introduce the clinical background of challenges/opportunities related to imaging for stroke to the imaging community and to stimulate discussion and the exchange of ideas. The SWITCH half-day workshop joined the MICCAI initiative for bundled joint proceedings of the satellite events together with the Ischemic Stroke Lesion Segmentation (ISLES) Challenge.

The SWITCH workshop organizing committee consisted of scientists and clinical experts from the Erasmus MC, Delft University of Technology, Massachusetts Institute of Technology, Harvard Medical School, the University of Bern, the University Hospital of Bern, and Amsterdam Medical Center.

The challenges in stroke imaging were addressed by three clinical keynote speakers, Dr. Roland Wiest (University Hospital of Bern) on MR imaging, and Dr. Kambiz Nael (Icahn School of Medicine at Mount Sinai) on CT imaging and Dr. Vitor Mendes Pereira (Toronto Western Hospital) on stroke interventions.

The papers submitted for this workshop were evaluated by two independent scientific reviewers each, whose affiliations were checked to avoid conflict of interest, and all four papers were included in the proceedings. The topics addressed in these papers focus on CT(A)-based quantitative imaging biomarkers for stroke.

The organizers of the two workshops would like to express their sincere thanks to the keynote speakers, the authors of the contributed papers, and the attendees of the workshops. A special word of thanks goes to the sponsors, Olea Medical and Philips Healthcare, who facilitated the contributions of the clinical keynote speakers at the workshop.

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