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OR 2.0 Context-Aware Operating Theaters, Computer Assisted Robotic Endoscopy, Clinical Image-Based Procedures, *and* Skin Image Analysis

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5th International Workshop, CARE 2018
7th International Workshop, CLIP 2018
Third International Workshop, ISIC 2018
Held in Conjunction with MICCAI 2018
Granada, Spain, September 16 and 20, 2018
Proceedings

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OR 2.0 2018 Preface

Surgical robotic tools and digitally enhanced operating theaters have been giving surgeons a helping hand for years. While they provide great control, precision, and flexibility to the surgeons, they do not yet address the cognitive assistance needs in the operating theater. We are on the verge of a new wave of innovations of artificial-intelligence-powered, context-aware operating theaters. OR 2.0, Context-Aware Surgical Theaters, aimed to highlight the potential use of a broad range of topics such as machine vision and perception, robotics, surgical simulation and modeling, multi-modal data fusion and visualization, image analysis, advanced imaging, advanced display technologies, human-computer interfaces, sensors, wearable and implantable electronics and robots, visual attention models, cognitive models, decision support networks to enhance surgical procedural assistance, context-awareness, and team communication in the operating theater, human-robot collaborative systems, and surgical training and assessment in defining the technologies of the next-generation operating theaters.

OR 2.0 was held in conjunction with the Medical Image Computing and Computer Assisted Intervention (MICCAI) conference in Granada, Spain. OR 2.0 has its roots in the M2CAI workshop series that started in 2009 in London (UK) and was organized every year until 2016 in Athens; it was, however, a new movement of the domain toward multidisciplinary approaches and teamed with a focus on translation and clinical applications that define operating room technologies of the future.

The workshop featured clinicians, engineers, and industry partners. It hosted keynote speakers, oral presentations, and a poster session of accepted papers on topics such as cognitive models, process modeling, anonymization in operating theaters, smart operating rooms, surgical data science, surgical process and discrete event simulation, surgical training, perioperative process optimization, human-computer interfaces, surgical workflow analysis, surgical phase recognition, automatic length, volume estimation to aid surgical robots, motion-planning, tracking, use of RFID tags with surgical instruments, as well as technical topics such as self-supervised learning, deep learning, bidirectional rapidly exploring random trees, open research problems of nonlinear trajectories, temporal coherence, segmentation, registration. OR 2.0 also featured an open discussion forum of next-generation context-aware operating theater technologies and their clinical impact.

September 2018

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CARE 2018 Preface

The 5th International Workshop on Computer-Assisted and Robotic Endoscopy (CARE 2018) was held on September 16, 2018 in Granada, Spain. This half-day workshop was held in conjunction with MICCAI 2018, the 21st International Conference On Medical Image Computing and Computer-Assisted Intervention.

As in the previous four CARE workshops, our objective is to bring together researchers, clinicians, and industry to advance the field of computer-assisted and robotic endoscopy through the presentation of original research manuscripts and invited keynotes from leading experts in academia, industry, and medicine. This year we were pleased to welcome Dr. Sandrine de Ribaupierre, a distinguished pediatric neurosurgeon and professor from Western University, Canada, who gave the keynote presentation “Neuroendoscopy: What Are the Needs and Use for AR and VR?”. After peer review, five papers were selected for oral presentation at CARE and the revised manuscripts are presented in these proceedings. We thank the authors for their high-quality papers and presentations at the workshop. It is their outstanding research and hard work that make this workshop a success.

We would like to express our sincere gratitude to the reviewers who contributed their time and effort in evaluating the papers. We would also like to thank KUKA Deutschland GmbH and Intuitive Surgical for their support in sponsoring the best papers and best presentation awards. Finally, we would like to thank the organizers of MICCAI for supporting and facilitating this workshop.

September 2018

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CLIP 2018 Preface

On September 16, 2018, the 7th International Workshop on Clinical Image-Based Procedures: From Planning to Intervention (CLIP 2018) was held in Granada, Spain in conjunction with the 21st International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI). Following the tradition set in the past six years, this year's edition of the workshop was an exciting forum for the discussion and dissemination of clinically tested, state-of-the-art methods for image-based planning, monitoring, and evaluation of medical procedures.

Over the past few years, there has been considerable and growing interest in the development and evaluation of new translational image-based techniques in the modern hospital. For a decade or more, a proliferation of meetings dedicated to medical image computing has created a need for greater study and scrutiny of the clinical application and validation of such methods. New attention and new strategies are essential to ensure a smooth and effective translation of computational image-based techniques into the clinic. For these reasons and to complement other technology-focused MICCAI workshops on computer-assisted interventions, the major focus of CLIP 2018 continued to be on filling gaps between basic science and clinical applications.

Members of the medical imaging community were encouraged to submit work centered on specific clinical applications, including techniques and procedures based on clinical data or already in use and evaluated by clinical users. Once again, the event brought together world-class researchers and clinicians who presented ways to strengthen links between computer scientists and engineers, and surgeons, interventional radiologists, and radiation oncologists.

In response to the call for papers, 13 original manuscripts were submitted for presentation at CLIP 2018. Each of the manuscripts underwent a meticulous double-blind peer review by three members of the Program Committee, all of them prestigious experts in the field of medical image analysis and clinical translations of technology. A member of the Organizing Committee further oversaw the review of each manuscript. Eight manuscripts were accepted for oral presentation at the workshop. The accepted contributors represented a considerable diversity of countries from different continents. Judging by the contributions received, the quality of CLIP 2018 maintained the high standards of previous years.

As always, the workshop featured prominent expert keynote speakers. Vesna Prchkovska, Chief Operating Officer of the company QMENTA, provided her vision of the translation of research to industry. Dr. Elisenda Eixarch, fetal surgeon from Hospital Clinic and Hospital Sant Joan de Déu in Barcelona, presented her experience in bringing technology to real use in fetal and perinatal care.

We would like to acknowledge the invaluable contributions of our entire Program Committee, many members of whom have actively participated in the planning of the workshop over the years, and without whose assistance CLIP 2018 would not be possible. Our thanks also go to all the authors in this volume for the high quality

of their work and the commitment of time and effort. Finally, we are grateful to the MICCAI organizers for supporting the organization of CLIP 2018.

September 2018

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ISIC 2018 Preface

The Third International Skin Imaging Collaboration (ISIC) Workshop and Challenge on Skin Image Analysis was held at the Granada Conference Center, Granada, Spain, on September 20, 2018, in conjunction with the 21st International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI).

The skin is the largest organ of the human body, and is the first area of assessment performed by any clinical staff when a patient is seen, as it provides numerous insights into a patient's underlying health. For example, cardiac function, liver function, immune function, and physical injuries can be assessed by examining the skin. In addition, dermatologic complaints are also among the most prevalent in primary care. Images of the skin are the most easily captured form of medical image in health care, and the domain shares qualities with other standard computer vision datasets, serving as a natural bridge between standard computer vision tasks and medical applications.

This workshop served as a venue to facilitate advancements and knowledge dissemination in the field of skin image analysis, as well as to host a melanoma detection challenge, raising awareness and interest in these socially valuable tasks. Invited speakers included major influencers in computer vision and skin imaging, top-ranked participants of the hosted challenge, and authors of accepted manuscripts on skin image analysis.

Authors were asked to submit full-length manuscripts for double-blind peer review. A total of 28 submissions were received, and with a Program Committee composed of 31 experts in the field, reviewed by at least three reviewers. Based on the feedback and critiques, ten of the best papers (36%) were selected for oral presentation at the workshop, and included in the LNCS volume published by Springer.

For the associated challenge, participants were asked to perform three tasks on dermoscopic images: lesion segmentation, attribute detection and localization, and disease classification. Approximately 931 users registered for data download. In total, 115 submissions were made to the lesion segmentation task, 27 submissions to the lesion attribute detection task, and 159 submissions to the disease classification task, all with manuscripts supplied describing the approaches, hosted and made available on the challenge website. Six participants were selected for presentation.

We thank the authors for submitting their excellent work, our reviewers for their timely and detailed reviews, our invited speakers, challenge participants, and all our attendees. We sincerely hope that the efforts coming together to make this workshop possible will help advance the field and have a positive impact on health care around the world.

September 2018

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