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Uncertainty for Safe Utilization of Machine Learning in Medical Imaging and Clinical Image-Based Procedures

First International Workshop, UNSURE 2019
and 8th International Workshop, CLIP 2019
Held in Conjunction with MICCAI 2019
Shenzhen, China, October 17, 2019
Proceedings

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Preface

UNSURE 2019 is the first workshop on Uncertainty for Safe Utilization of machine Learning in Medical imaging organized as a satellite event of the 22nd International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2019) in Shenzhen, China.

With the rise of machine learning techniques in medical imaging applications, the need to understand and acknowledge the limitations of a given technique has recently attracted the attention of the MICCAI community. The workshop aims to develop awareness and encourage research in the field of uncertainty modeling to enable safe implementation of machine learning tools in the clinical world.

The proceedings of UNSURE 2019 contain 8 high-quality papers of 8 to 10 pages selected among a pool of 15 submissions following a double-blind review process. Each submission was reviewed by 3 members of the Program Committee that gathered 21 experts in the applications of deep learning and Bayesian modeling to medical imaging.

The accepted papers cover the fields of uncertainty quantification and modeling as well as robustness to domain shift in deep learning settings with applications ranging from lesion detection and classification to registration, including intra-operative multispectral imaging.

In addition to the papers presented in the proceedings, the workshop welcomed two keynote presentations, from experts Dr. Koen Van Leemput (Harvard Medical School, USA) and Dr. Yinzheng Li (Microsoft Research Cambridge, UK).

We hope this workshop has highlighted both theoretical and practical challenges in communicating uncertainties and further encourages research to (a) improve safety in the application of machine learning tools and (b) assist in the translation of such tools to clinical practice.

We would like to thank all the authors for submitting their manuscripts to UNSURE, as well as the Program Committee members for the quality of their feedback and dedication to the review process.

August 2019

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Preface

On October 17, 2019, the 8th International Workshop on Clinical Image-based Procedures: From Planning to Intervention (CLIP 2019) was held in Shenzhen, China in conjunction with the 22nd International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2019). Following the tradition set in the last seven 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.

Nowadays, it has become more and more important for many clinical applications to base decisions not only on image data alone, thus a focus of CLIP 2019 was the creation of holistic patient models. Here, image data such as radiologic images, microscopy images, and photographs are combined with non-image information such as 'omics' data (e.g. genomics, proteomics), lifestyle data, demographics, EEG, and others to build a more complete picture of the individual patient and to subsequently provide better diagnosis and therapies.

CLIP 2019 provided a forum for work centered on specific clinical applications, including techniques and procedures based on comprehensive clinical image and other data. Submissions related to applications already in use and evaluated by clinical users were particularly encouraged. Furthermore, novel techniques and applications that are looking at combining image analysis with clinical data mining and analytics, user studies, and other heterogeneous data were a focus as well.

In CLIP's 8th edition, world-class researchers and clinicians came together to present ways to strengthen links between computer scientists and engineers, and surgeons, interventional radiologists, and radiation oncologists.

In 2019, CLIP received 15 original manuscripts from all over the world. Each of the manuscripts underwent a meticulous double-blind peer-review by at least three members of the Program Committee, all of them prestigious experts in the field of medical image analysis and clinical translations of technology. 11 manuscripts were accepted for oral presentation at the workshop.

In addition to the presentation of high-quality papers, a highlight of CLIP has always been the keynotes featuring prominent experts in the field. This year, Dr. Chen Hao, founder and CEO of Insight Medical Technology shared his experience in founding a company in the medical image analysis domain and translating latest research to the market.

We would like to thank our Program Committee for its invaluable contributions and continuous support of CLIP over the years. Finding spare time in busy schedules and during holiday season is not an easy task and we are very grateful to all our members as CLIP 2019 would not have been possible without them. We would also like to thank all

authors for their high-quality contributions this year as well as their efforts to make CLIP 2019 a success. Finally, we would like to thank all MICCAI 2019 organizers and team for supporting the organization of CLIP 2019.

October 2019

Marius Erdt
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