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Editorial

Special Issue on MICCAI 2018

We were very pleased to host the 21st International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) in Granada, Spain, at the Granada Conference Center from September 17–19th, 2018. MICCAI 2018 and its satellite workshops attracted around 1700 world-leading scientists, engineers, and clinicians, from the fields of medical image reconstruction, analysis and image guidance, for clinical imaging applications spanning cardiovascular, chest, abdominal and neuroimaging. It was the largest MICCAI conference to-date, with a record 1,068 full paper submissions that were sent out to 58 Area Chairs and 600 invited expert reviewers from the research community. Ultimately, 272 full-length conference papers were selected using a robust double-blinded peer-review process. Papers were grouped into thematic topical sessions by methodology or clinical application, with recent trends such as deep learning featuring very strongly in oral and poster presentations.

Overall, 15 authors responded to our invitation for publication in this Special Issue of Medical Image Analysis (MedIA), of which nine significantly expanded manuscripts were selected for timely inclusion in this issue, after undergoing the regular thorough MedIA peer review process. These nine papers provide a representative range of emerging fields in MICCAI.

Two papers drive forward the emerging field of deep learning for deformable registration:

- an adversarial learning approach for single- and multi-modality image registration
- an unsupervised learning approach of probabilistic diffeomorphic registration of images and surfaces

Four papers explore the potential of deep learning for resolving challenges relating to inconsistencies and uncertainty in image segmentation, detection and tracking problems:

- a semi-supervised non-adjacency constraint for removing segmentation inconsistencies
- uncertainty measures in deep neural networks for multiple sclerosis lesion detection and segmentation
- a deep learning approach for robustly segmenting the prostate target volume in ultrasound imaging
- recurrent hourglass networks for segmenting and tracking cell instances

The remaining three papers focus on machine and deep learning methods for advanced neuroimaging applications:

- a multi-tissue global estimation framework to mitigate the effects of gyral bias in cortical tractography
- a combined tract segmentation and orientation mapping for bundle-specific tractography
- a generative adversarial network (GAN) to predict a PET-derived myelin content map from multimodal MRI

We would like to express our heartfelt thanks to the members of the MICCAI 2018 Program Committee and the MICCAI 2018 reviewers, as well as the reviewers for this Special Issue, for their voluntary support and dedicated scientific input. Importantly, we would also like to thank the authors and co-authors, students and their supervisors, as well as their funders, for their high-quality scientific contributions to the MICCAI 2018 conference and this Special Issue, which showcases several of the conference highlights. We hope that this body of work

originating from the MICCAI community will be of scientific interest and further inspire Media readers to engage with the MICCAI community, helping to drive the field even further.

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