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Computational Methods and Clinical Applications for Spine Imaging

5th International Workshop and Challenge, CSI 2018
Held in Conjunction with MICCAI 2018
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Revised Selected Papers

 Springer

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Preface

The spine represents both a vital central axis for the musculoskeletal system and a flexible protective shell surrounding the most important neural pathway in the body, the spinal cord. Spine-related diseases or conditions are common and lead to a huge burden of morbidity and cost to society. Spine imaging is an essential tool for assessing spinal pathologies. Giving the increasing volume of imaging examinations and the complexity of their assessment, there is a pressing need for advanced computerized methods that support the physician in diagnosis, therapy planning, and interventional guidance.

The objective of this combined workshop and challenge on spinal imaging was to bring together researchers who share a common interest in spine-focused research and to attract additional researchers to this field. By allowing submissions both of papers on novel methodology and clinical research, and also papers which demonstrate the performance of methods on the provided challenges, the aim is to cover theoretical and very practical aspects of computerized spinal imaging.

We invited spine imaging researchers to share and exchange their experiences and expertise in spinal imaging and method development. Prof. Leo Joskowicz, head of the Computer-Assisted Surgery and Medical Image Processing Laboratory in the School of Computer Science and Engineering of the Hebrew University of Jerusalem gave the keynote speech. His talk was about the recent advances in computer-based diagnosis of sacroiliitis on CT scans. The talk, with full-house audiences, attracted not only all CSI participants but also many other MICCAI attendees on the workshop day.

The increasing number of publications in recent years on spinal imaging, in particular at MICCAI, indicate the high relevance of this topic to the community. After four very successful workshops at MICCAI 2013, 2014, 2015 and 2016, we also had an increased number of participants in this year's workshop. We accepted eight regular papers on spine image analysis, including vertebra detection, spine segmentation, image-based diagnosis, and image-guided spinal surgery. Each submission was rigorously reviewed by two or three Program Committee members on the basis of its technical quality, relevance, significance, and clarity. The best paper award was given to the paper "Automated Grading of Modic Changes Using CNNs — Improving the Performance with Mixup" by Dimitrios Damopoulos et al., based on the raw scores of all review feedbacks.

In addition to regular research presentations, the computational challenge was organized to attract researchers working on general-purpose algorithms to try their methods on spinal data. The MICCAI 2018 Challenge on Automatic IVD Localization and Segmentation from 3D Multi-modality MR (M3) Images was jointly organized with the CSI 2018 workshop. The goal of the challenge was to investigate (semi-) automatic IVD localization and segmentation algorithms and provide a standard evaluation framework with a set of multi-modality MR images acquired with the Dixon protocol. The challenge attract eight participating teams with nine submissions. The Changliu team achieved the best performance on all metrics. The short papers

of the IVD challenge participants are included in the workshop proceedings. These short papers focused on presenting the methodologies used for the challenge segmentation task.

We would like to thank the MICCAI workshop organizers for supporting the organization of the CSI workshop, all of the Program Committee members for their great efforts and cooperation in reviewing and selecting the papers. We would also like to thank all of the participants for attending the regular presentation sessions and challenge competition session. Finally, our gratitude goes to Alfred Hofmann, Anna Kramer, and Ingrid Haas of Springer for their continuous support in the publication of the workshop proceedings.

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