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Simulation and Synthesis in Medical Imaging

6th International Workshop, SASHIMI 2021
Held in Conjunction with MICCAI 2021
Strasbourg, France, September 27, 2021
Proceedings

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Preface

The Medical Image Computing and Computer Assisted Intervention (MICCAI) community needs data with known ground truth to develop, evaluate, and validate computerized image analytic tools, as well as to facilitate clinical training. Since synthetic data are ideally suited for this purpose, a full range of models underpinning image simulation and synthesis, also referred to as image translation, cross-modality synthesis, image completion, etc., have been developed over the years: (a) machine and deep learning methods based on generative models; (b) simplified mathematical models to test segmentation, tracking, restoration, and registration algorithms; (c) detailed mechanistic models (top-down), which incorporate priors on the geometry and physics of image acquisition and formation processes; and (d) complex spatio-temporal computational models of anatomical variability, organ physiology, and morphological changes in tissues or disease progression.

The goal of the Simulation and Synthesis in Medical Imaging (SASHIMI) workshop is to bring together all those interested in such problems in order to engage in invigorating research, discuss current approaches, and stimulate new ideas and scientific directions in this field. The objectives are to (a) bring together experts on image synthesis to raise the state of the art; (b) hear from invited speakers outside of the MICCAI community, for example in the areas of transfer learning, generative adversarial networks, or variational autoencoders, to cross-fertilize these fields; and (c) identify challenges and opportunities for further research. We also want to identify the suitable approaches to evaluate the plausibility of synthetic data and to collect benchmark data that could help with the development of future algorithms.

The 6th SASHIMI workshop was successfully held in conjunction with the virtual 24th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2021) as a satellite event on September 27, 2021. Submissions were solicited via a call for papers circulated by the MICCAI organizers, via social media, as well as by directly emailing colleagues and experts in the area. Each of the 18 submissions received underwent a double-blind review by at least two members of the Program Committee, consisting of researchers actively contributing in the area. Compared to the 2020 edition, we introduced three paper categories to better reflect the scope of the individual contributions: papers introducing new methods, application-oriented papers, and demos. At the conclusion of the review process, 14 papers were accepted. Overall, the contributions span the following broad categories in alignment with the initial call for papers: methods based on generative models or adversarial learning for MRI/CT/microscopy image synthesis and applications of image synthesis and simulation for data augmentation, image enhancement, or segmentation.

We would like to thank everyone who contributed to this 6th workshop: the members of the Organizing Committee for their assistance, the authors for their contributions, and the members of the Program Committee for their precious review work, promotion of the workshop, and general support. We are particularly grateful to the invited speaker,

Gordon Wetzstein, who kindly shared his expertise and knowledge with the community. We also thank the MICCAI society for the general support.

September 2021

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