

# Preface

Imaging and Visualization are among the most dynamic and innovative areas of research of the past few decades. Justification of this activity arises from the requirements of important practical applications such as the visualization of computational data, the processing of medical images for assisting medical diagnosis and intervention, and the 3D geometry reconstruction and processing for computer simulations.

Currently, due to the development of more powerful hardware resources, mathematical and physical methods, investigators have been incorporating advanced computational techniques to derive sophisticated methodologies that can better enable the solution of the problems encountered. Consequent to these efforts any effective methodologies have been proposed, validated, and some of them have already been integrated into commercial software for computer simulations.

The main goal of the workshop *Bio-Imaging and Visualization for Patient-Customized Simulations*, that was organized under the auspicious of the *16th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2013)*, held from September 22nd to 26th, 2013 in Nagoya, Japan, was to provide a platform for communications among specialists from complementary fields such as signal and image processing, mechanics, computational vision, mathematics, physics, informatics, computer graphics, bio-medical practice, psychology, and industry. Participants in this workshop presented and discussed their proposed techniques and methods and explored the translational potentials of these emerging technological fields. As such, an excellent forum was established to refine ideas for future work and to define constructive cooperation for new and improved solutions of imaging and visualization techniques and modeling methods toward more realistic and efficient computer simulations, between software developers, specialist researchers, and applied end-users from diverse fields related to signal processing, imaging, visualization, biomechanics, and simulation.

This book contains the full papers presented at the *MICCAI 2013* workshop *Bio-Imaging and Visualization for Patient-Customized Simulations (MWBIVPCS 2013)*. *MWBIVPCS 2013* brought together researchers representing several fields, such as Biomechanics, Engineering, Medicine, Mathematics, Physics, and Statistic. The works included in this book present and discuss new trends in those fields, using several methods and techniques, including the finite element method,

similarity metrics, optimization processes, graphs, Hidden Markov models, sensor calibration, fuzzy logic, data mining, cellular automation, active shape models, template matching, and level sets, in order to address more efficiently different and timely applications involving signal and image acquisition, image processing and analysis, image segmentation, image registration and fusion, computer simulation, image-based modeling, simulation and surgical planning, image-guided robot-assisted surgical, and image-based diagnosis.

The editors wish to thank all the *MWBIVPCS 2013* authors and members of the Program Committee for sharing their expertise, and also to *The MICCAI Society* for having hosted and supported the workshop within *MICCAI 2013*.

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