



# Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization

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## Special issue: third MICCAI workshop on bio-imaging and visualization for patient-customized simulations

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EDITORIAL

## Special issue: third MICCAI workshop on bio-imaging and visualization for patient-customized simulations

Imaging and Visualisation are among the most dynamic and innovative areas of research of the past few decades. Justification of this interest arises from the demands of important practical applications such as the visualisation of computational data, the processing of medical images for assisting medical diagnosis, intervention and follow up, and the 3D geometry building and post-processing for patient customised computer simulations.

Currently, due to the development of more powerful hardware resources, mathematical and physical methods, researchers have been proposing advanced computational techniques to derive sophisticated methodologies that can better overcome the most demanding and complex existing problems. Consequent to these efforts, effective methodologies have been proposed, validated and some of them have already been included into software packages for computer simulations.

The main goal of the workshop *Bio-Imaging and Visualization for Patient-Customized Simulations*, that was organised under the auspicious of the *20th International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI 2017)*, held from 10 September to 14 September, 2017, in Quebec City, Quebec, Canada, 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 techniques and methodologies; and together, they explored the translational potentials of these emerging technologies and associated technological fields. As such, an excellent forum was established between software developers, specialist researchers and applied end-users from diverse fields related to Signal Processing, Imaging, Visualisation, Biomechanics and Simulation. The forum refined ideas for future work and to define constructive cooperation for new and improved solutions of imaging

and visualisation techniques, models and methodologies towards much more realistic and efficient computer simulations.

This special issue of the journal *Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization (CMBBE: Imaging & Visualization)* comprises the extended versions of 4 articles presented at the *MICCAI 2017 workshop Bio-Imaging and Visualization for Patient-Customized Simulations (MWBIVPCS 2017)*. These extended works were reviewed according to the *CMBBE: Imaging & Visualization* policy. They present and discuss new trends in those fields using several novel methods and techniques and addressing different applications: *Aipour et al.* use 3D ultrasound data from the human medial gastrocnemius muscle to study the muscle fascicle orientation and deformation during passive motion; a novel automated solution to segment liver tumour in abdomen images from computerised tomography scans based on fully convolutional networks and non-negative matrix factorisation based deformable model is proposed by *Zheng et al.*; *Kwon et al.* address the modelling of ballistic cranial injury towards forensic investigations, and *Fernandez et al.*, which won the *MWBIVPCS 2017 Best Paper Award*, study the prediction of personalised muscle mechanics based on diffusion tensor imaging.

The Guest-Editors wish to thank all the *MWBIVPCS 2017* Authors and members of the Program Committee for sharing their expertise, *The MICCAI Society* for having hosted and supported the workshop within *MICCAI 2017* and also to the *CMBBE: Imaging & Visualization Editors and Reviewers* for helping improving the manuscripts accepted.

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