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M. Jorge Cardoso · Tal Arbel et al. (Eds.)

Imaging for Patient-Customized Simulations and Systems for Point-of-Care Ultrasound

International Workshops, BIVPCS 2017 and POCUS 2017
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International Workshop on Bio-Imaging and Visualization for Patient-Customized Simulations, BIVPCS 2017

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International Workshop on Bio-Imaging and Visualization for Patient-Customized Simulations, BIVPCS 2017

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 and mathematical and physical methods, researchers have been incorporating advanced computational techniques to derive sophisticated methodologies that can better solve the problems encountered. Consequently, effective methodologies have been proposed, validated, and in some cases integrated into commercial software for computer simulations.

The main goal of this MICCAI workshop on Bio-Imaging and Visualization for Patient-Customized Simulations is to provide a platform for communication 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. Another important objective of this MICCAI workshop is to establish a viable connection 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 2017 workshop on Bio-Imaging and Visualization for Patient-Customized Simulations (BIVPCS 2017), which was organized under the auspices of the 20th International Conference on Medical Image Computing and Computer Assisted Intervention 2017, held in Quebec City, Quebec, Canada, during September 10–14, 2017. BIVPCS 2017 brought together researchers representing several fields, such as biomechanics, engineering, medicine, mathematics, physics, and statistics. The works included in this book present and discuss new trends in those fields, using several methods and techniques, including the finite element method, muscle mechanics, computational fluid dynamics, convolutional neural networks, similarity metrics, histograms of oriented gradients, local binary pattern descriptors, non-negative matrix factorization, local cumulative spectral histograms, partial least squares regression, atlas, level-set thresholding, k-means clustering, deformable models, and sensors calibration, in order to address more efficiently different and timely applications involving signal and image acquisition, image processing and analysis, image segmentation, image classification, image reconstruction, image registration, 2D-3D reconstruction, computer simulation, image based modelling, image based diagnosis, surgery planning and simulation, and therapy planning.

The editors wish to thank all the BIVPCS 2017 authors and members of the Program Committee for sharing their expertise, and also the MICCAI Society for having hosted and supported the workshop within MICCAI 2017.

September 2017

João Manuel R.S. Tavares
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International Workshop on Point-of-Care Ultrasound, POCUS 2017

Point-of-Care Ultrasound (POCUS) encompasses automated ultrasound image and RF data analysis algorithms, rugged ultrasound probes, robust tracking hardware, and specialized user interfaces including augmented reality systems. The goal of a POCUS system is to guide novice users to properly manipulate a ultrasound probe and interpret the acquired data. The output of a POCUS system is typically a quantitative measure or an automated diagnosis, not a B-mode image. POCUS applications range from detecting intra-abdominal bleeding at the scene of an accident to in-home monitoring of liver health. The POCUS workshop featured invited and accepted presentations, live demonstrations, and a panel discussion.

September 2017

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Emad Boctor
Gabor Fichtinger
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Deborah Kane
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