Lecture Notes in Computational Vision and Biomechanics

Volume 19

Research related to the analysis of living structures (Biomechanics) has been carried out extensively in several distinct areas of science, such as, for example, mathematics, mechanical, physics, informatics, medicine and sports. However, for its successful achievement, numerous research topics should be considered, such as image processing and analysis, geometric and numerical modelling, biomechanics, experimental analysis, mechanobiology and Enhanced visualization, and their application on real cases must be developed and more investigation is needed. Additionally, enhanced hardware solutions and less invasive devices are demanded. On the other hand, Image Analysis (Computational Vision) aims to extract a high level of information from static images or dynamical image sequences. An example of applications involving Image Analysis can be found in the study of the motion of structures from image sequences, shape reconstruction from images and medical diagnosis. As a multidisciplinary area, Computational Vision considers techniques and methods from other disciplines, like from Artificial Intelligence, Signal Processing, mathematics, physics and informatics. Despite the work that has been done in this area, more robust and efficient methods of Computational Imaging are still demanded in many application domains, such as in medicine, and their validation in real scenarios needs to be examined urgently. Recently, these two branches of science have been increasingly seen as being strongly connected and related, but no book series or journal has contemplated this increasingly strong association. Hence, the main goal of this book series in Computational Vision and Biomechanics (LNCV&B) consists in the provision of a comprehensive forum for discussion on the current state-of-the-art in these fields by emphasizing their connection. The book series covers (but is not limited to):

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In order to match the scope of the Book Series, each book has to include contents relating, or combining both Image Analysis and mechanics. Indexed by SCOPUS and Springerlink

More information about this series at http://www.springer.com/series/8910

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Developments in Medical Image Processing and Computational Vision

Springer

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Preface

This book presents novel and advanced topics in Medical Image Processing and Computational Vision in order to solidify knowledge in the related fields and define their key stakeholders.

The twenty-two chapters included in this book were written by invited experts of international recognition and address important issues in Medical Image Processing and Computational Vision, including: 3D Vision, 3D Visualization, Colour Quantisation, Continuum Mechanics, Data Fusion, Data Mining, Face Recognition, GPU Parallelisation, Image Acquisition and Reconstruction, Image and Video Analysis, Image Clustering, Image Registration, Image Restoring, Image Segmentation, Machine Learning, Modelling and Simulation, Object Detection, Object Recognition, Object Tracking, Optical Flow, Pattern Recognition, Pose Estimation, and Texture Analysis.

Different applications are addressed and described throughout the book, comprising: Biomechanical Studies, Bio-structure Modelling and Simulation, Bone Characterization, Cell Tracking, Computer-Aided Diagnosis, Dental Imaging, Face Recognition, Hand Gestures Detection and Recognition, Human Motion Analysis, Human-Computer Interaction, Image and Video Understanding, Image Processing, Image Segmentation, Object and Scene Reconstruction, Object Recognition and Tracking, Remote Robot Control, and Surgery Planning.

Therefore, this book is of crucial effectiveness for Researchers, Students, End-Users and Manufacturers from several multidisciplinary fields, as the ones related with Artificial Intelligence, Bioengineering, Biology, Biomechanics, Computational Mechanics, Computational Vision, Computer Graphics, Computer Sciences, Computer Vision, Human Motion, Imagiology, Machine Learning, Machine Vision, Mathematics, Medical Image, Medicine, Pattern Recognition, and Physics.

The Editors would like to take this opportunity to thank to all invited authors for sharing their works, experiences and knowledge, making possible its dissemination through this book.

João Manuel R.S. Tavares
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His main research areas include computational vision, medical imaging, computational mechanics, scientific visualization, human-computer interaction and new product development. (More information can be found at: www.fe.up.pt/∼tavares).

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Co-chair of the following conferences: all issues of CompIMAGE; 14th International Product Development Management; VIPIMAGE; Fourteenth Annual Scientific Conference on WEB Technology, New Media, Communications and Telematics Theory, Methods, Tools and Applications; all issues of VIPIMAGE; all issues of BioDENTAL; all issues of IDEMi; 6th International Conference on Technology and Medical Sciences, CIBEM 2011; International Conference on Computational and Experimental Biomedical Sciences; among other mini-symposia within conferences.

Founder and Editor of the International Journal for Computational Vision and Biomechanics. Guest editor of several scientific journals.

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