Lecture Notes in Computer Science 11504

Commenced Publication in 1973
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Functional Imaging and Modeling of the Heart

10th International Conference, FIMH 2019
Bordeaux, France, June 6–8, 2019
Proceedings

Springer

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ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-030-21948-2 ISBN 978-3-030-21949-9 (eBook)
https://doi.org/10.1007/978-3-030-21949-9

LNCS Sublibrary: SL6 – Image Processing, Computer Vision, Pattern Recognition, and Graphics

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

FIMH 2019 was the 10th International Conference on Functional Imaging and Modeling of the Heart. It was held in Bordeaux, France, during June 6–8, 2019. This year edition of FIMH followed the past nine editions held in Helsinki (2001), Lyon (2003), Barcelona (2005), Salt Lake City (2007), Nice (2009), New York (2011), London (2013), Maastricht (2015), and Toronto (2017). FIMH 2019 provided a unique forum for the discussion of the latest developments in the areas of functional cardiac imaging as well as computational modeling of the heart. The topics of the conference included (but were not limited to) advanced cardiac imaging and image processing techniques, construction of computational meshes from images, myocardial tissue characterization and perfusion, computational fluid dynamics, forward and inverse problems in electrophysiology, cardiac growth, computational physiology and biomechanics of the heart, parameterization of mathematical models from data, as well as the pre-clinical and clinical applicability of these methods.

FIMH 2019 drew many submissions from around the world. From the initial registered papers, 46 selected papers were invited to be published by Springer in this *Lecture Notes in Computer Science* proceedings volume. All submitted papers were peer-reviewed by two or three Program Committee members or additional reviewers, who were international experts in the field. The review process was double-blinded. When preparing the final version of their manuscripts, authors addressed specific concerns and issues raised by reviewers, and improved the scientific content and the quality of the manuscripts.

The conference was greatly enhanced by invited keynote lectures given by four world experts in various fields related to the use of imaging to guide clinical treatment, ultrasound for mechanical and electromechanical characterization of the heart, patient-specific hemodynamic simulations for interventional planning, as well as uncertainty quantification to improve robustness when constructing patient-specific models. We are extremely grateful to Dr. Hubert Cochet (Hopital Haut-Lévêque, Pessac, France), Dr. Elisa Konofagou (Columbia University, New York City, USA), Dr. Irène Vignon-Clémentel (Inria, Paris, France), and Dr. Richard Gray (US Food and Drug Administration, Washington DC, USA) for their exceptional lectures.

We would like to thank the service congrès from the University of Bordeaux, the service de communication et médiation from Inria Bordeaux Sud-Ouest, specifically Flavie Attiguie, the administration of the Institut de Mathématique de Bordeaux, and namely Anne-France Contentin and Élodie Gaillacq from Liryc Institute for their kind and helpful support all along the preparation of this conference.

We hope that all these papers, along with the keynotes' contributions and fruitful discussions during the conference, will act to accelerate progress in the important areas of functional imaging and modeling of the heart.

June 2019

Yves Coudière
Valéry Ozenne
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Nejib Zemzemi

Organization

We would like to thank all organizers, additional reviewers, contributing authors, and sponsors for their time, effort, and financial support in making FIMH 2019 a successful event.

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inHEART, a spin-off from IHU Liryc and Inria, has the vision to bridge the gap between radiology and cardiac electrophysiology by providing cloud-based solutions for image-guided diagnosis, therapy planning, and navigation for patients with arrhythmias.

Liryc Institute

The Electrophysiology and Heart Modeling Institute (French: L'Institut de RYthmologie et Modélisation Cardiaque, LIRYC) is one of six French university hospital institutions created in 2011 as part of the Investments for the Future Program to boost medical research and innovation. LIRYC is a basic research, clinical, and teaching center focusing on the understanding, care, and treatment of cardiac electrical diseases that lead to heart failure and sudden death. It includes national and international doctors and researchers in cardiology, imaging, and signal processing and modeling, who have overlapping interests and skills in cardiac bio-electricity.

Université de Bordeaux

The University of Bordeaux is a public scientific, cultural, and professional institution. Run by a president who is elected by its executive board, it is composed of governing bodies, administrative components, and departments. The University of Bordeaux is ranked among the top French universities for the quality of its education and research. A multidisciplinary, research-focused, international institution, it leads an ambitious

development program with its partners to further promote Bordeaux as a Campus of Excellence.

CNRS, UMR 5251 Institut de Mathématiques de Bordeaux and GDR Mamovi

The French National Center for Scientific Research (French: Centre national de la recherche scientifique, CNRS) is the largest governmental research organization in France and the largest fundamental science agency in Europe. In 2016, it employed 31,637 staff, including 11,137 tenured researchers, 13,415 engineers and technical staff, and 7,085 contractual workers.

Inria

The National Institute for Research in Computer Science and Automation (Inria; French: Institut national de recherche en informatique et en automatique) is a French national research institution focusing on computer science and applied mathematics. It was created under the name Institut de recherche en informatique et en automatique (IRIA) in 1967 at Rocquencourt near Paris, part of Plan Calcul. Its first site was the historical premises of SHAPE (central command of NATO military forces). In 1979 IRIA became Inria. [1] Since 2011, it has been styled Inria. Inria is a Public Scientific and Technical Research Establishment (EPST) under the double supervision of the French Ministry of National Education, Advanced Instruction and Research, and the Ministry of Economy, Finance, and Industry.

France Life Imaging

The France Life Imaging – FLI – network was launched in 2012 to ensure high technological innovation in biomedical imaging and to offer open access for the academic, clinician, and industrial community to state-of-the-art in vivo imaging technologies and integrated services. FLI's mission is to increase French visibility in Europe and worldwide. This infrastructure is coordinated by the CEA (French Alternative Energies and Atomic Energy Commission).

Bordeaux INP

Bordeaux INP groups together eight of the region's engineering graduate schools. Its development strategy is based on enhancing the synergy between its three missions of training, research, and technology transfer via a range of high-level scientific and technical training courses, backed by 11 research laboratories of excellence and in permanent contact with the socio-economic world.

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