



Delft University of Technology

Preface

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Preface

Cardiac image analysis has remained an active research field in medical imaging. Numerous studies have focused on developing statistical atlases and computational models of the heart to enhance our understanding of cardiac structure and function. These models provide valuable insights into the complex dynamics and behaviour of the heart, allowing for improved diagnosis and treatment of various cardiac conditions. Additionally, the use of artificial intelligence and machine learning algorithms in cardiac image analysis has further revolutionized the field.

However, clinical translations of these methods are still constrained by the lack of complete and rigorous technical and clinical validations, as well as benchmarking with common data. The Statistical Atlases and Computational Modelling of the Heart (STACOM) workshop aims to achieve these goals by providing a platform for researchers to exchange ideas, present their advancements, and collaborate on the development of robust and validated computational models of the heart.

The 14th edition of STACOM (<https://stacom.github.io/stacom2023/>), was held in conjunction with the 26th MICCAI conference in Vancouver, Canada, on 12 October 2023. It followed the thirteen successful previous editions (<https://stacom.github.io/>): STACOM 2010 (Beijing, China), STACOM 2011 (Toronto, Canada), STACOM 2012 (Nice, France), STACOM 2013 (Nagoya, Japan), STACOM 2014 (Boston, USA), STACOM 2015 (Munich, Germany), STACOM 2016 (Athens, Greece), STACOM 2017 (Quebec City, Canada), STACOM 2018 (Granada, Spain), STACOM 2019 (Shenzhen, China), STACOM 2020 (Lima, Peru), STACOM 2021 (Strasbourg, France), and STACOM 2022 (Singapore). Throughout these thirteen years, the STACOM workshop has provided a forum to discuss the latest developments in various areas of computational cardiac imaging, cardiac modelling, application of artificial intelligence and machine learning to cardiac image analysis, electro-mechanical modelling of the heart, novel methods in preclinical/clinical imaging for tissue characterization and image reconstruction, as well as statistical cardiac atlases.

The STACOM 2023 workshop attracted 29 paper submissions, of which 24 were accepted for presentation during the workshop. Topics range from cardiac segmentation, modelling, strain quantification, registration, statistical shape analysis, and quality control. Deep learning methods were still the predominant approach to performing automated cardiac image analysis. Left atrial image analysis and modelling gained more attention in this workshop with atrial fibrillation being the common area of interest.

The workshop awarded the best oral to **Laura Alvarez Florez** from Amsterdam University Medical Center, the Netherlands, for her paper entitled *Deep Learning for Automatic Strain Quantification in Arrhythmogenic Right Ventricular Cardiomyopathy*.

The best poster presenter was awarded to **Jiachuan Peng** from University of Oxford, UK, for his paper entitled *Generating Virtual Populations of 3D Cardiac Anatomies with Snowflake-Net*.

This year STACOM 2023 also hosted a challenge on reconstruction of cardiac MRI: CMRxRecon (<https://cmrxrecon.github.io/>), which aimed to establish a platform for fast CMR image reconstruction and provide a benchmark dataset that enables the broader research community to promote advances in this area of research. The challenge included two independent tasks: 1) to accelerate reconstruction of cine MRI by raw data subsampling and to address the image degradation due to motion artefacts caused by voluntary breath-hold imperfections or cardiac arrhythmia, and 2) to improve the T1 and T2 mapping estimation accuracy from raw data under-sampling. The CMRxRecon challenge attracted 24 paper submissions, of which 21 are presented in this volume.

Finally, the STACOM workshop organisers would like to express our gratitude to external reviewers from King's College London (UK), University of Auckland (New Zealand), Inria (France), University of Oxford (UK), Fudan University (China), Imperial College London (UK), Technische Universiteit Delft (the Netherlands), and Universitat Pompeu Fabra (Spain). Special thanks to Tareen Dawood, Debbie Zhao, Edward Ferdian, Gabriel Bernardino, Josquin Harrison, Shuo Wang, Yidong Zhao, Chen Qin, Carlos Albors Lucas, and Vicky Wang, who spent their time to meticulously review papers for these proceedings. Ultimately, we would like to thank all authors who participated in this workshop.

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