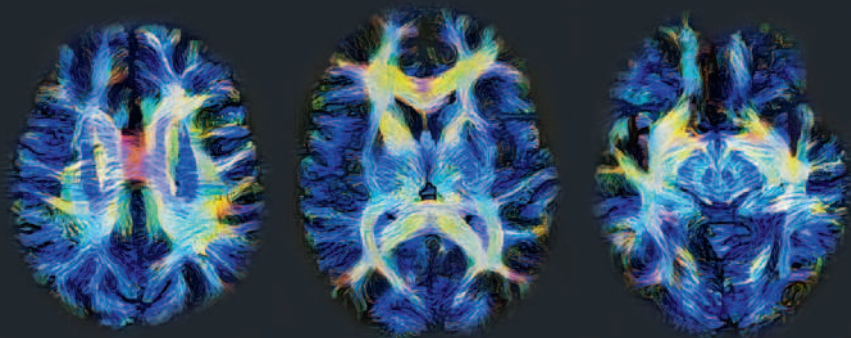


Mathematics and Visualization



Noemi Gyori · Jana Hutter ·
Vishwesh Nath · Marco Palombo ·
Marco Pizzolato · Fan Zhang *Editors*

Computational Diffusion MRI

International MICCAI Workshop, Lima,
Peru, October 2020



Mathematics and Visualization

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ISSN 1612-3786

Mathematics and Visualization

ISBN 978-3-030-73017-8

<https://doi.org/10.1007/978-3-030-73018-5>

ISSN 2197-666X (electronic)

ISBN 978-3-030-73018-5 (eBook)

Mathematics Subject Classification: 00B25, 00A66, 00A72, 42B35, 60J60, 60J65, 62P10, 65CXX, 65DXX, 65Z05, 68R10, 68T99, 92BXX

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Preface

It is our great pleasure to present the proceedings of the 2020 International Workshop on Computational Diffusion MRI (CDMRI'20). CDMRI'20 was held under the auspices of the International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), which took place virtually on October 8th 2020, having originally been planned to take place in Lima, Peru.

This volume presents the latest developments in the highly active and rapidly growing field of diffusion MRI. The reader will find numerous contributions covering a broad range of topics, from the mathematical foundations of the diffusion process and signal generation, to new computational and machine learning methods and estimation techniques. The contributions are focused toward the *in vivo* recovery of microstructural and connectivity features, as well as combined diffusion-relaxometry acquisitions techniques. This edition includes chapters from high-profile researchers with the specific focus on four topics that are gaining momentum or have received increasing interest within the diffusion MRI community: (i) diffusion MRI signal acquisition, (ii) orientation processing: tractography and visualization, (iii) microstructure modeling and representation, (iv) signal augmentation and super resolution, and (v) diffusion MRI applications.

This volume offers the opportunity to share new perspectives on the most recent research challenges for those currently working in the field, and a valuable starting point for anyone interested in learning computational techniques in diffusion MRI. The book includes rigorous mathematical derivations, a large number of rich, full-color visualizations, and clinically relevant results. As such, it will be of interest to researchers and practitioners in the fields of computer science, MRI physics, and applied mathematics.

Each contribution in this volume has been peer-reviewed by multiple members of the international Program Committee. We would like to express our gratitude to all CDMRI'20 authors and reviewers for ensuring the quality of the presented work. We are grateful to the MICCAI 2020 chairs for providing a platform to present and discuss the work collected in this volume. We also would like to thank the editors of the Springer book series Mathematics and Visualization as well as Leonie Kunz and Martin Peters (Springer, Heidelberg) for their support to publish this collection as part of their series.

Finally, we express our sincere congratulations to the winners of the prizes that were awarded during CDMRI'20, including:

- Prize for the best CDMRI paper: “Learning Anatomical Segmentations for Tractography from Diffusion MRI”, Christian Ewert et al. German Center for Neurodegenerative Diseases (DZNE), Bonn, Germany
- Prize for the best CDMRI oral presentation: “Longitudinal Parcellation of the Infant Cortex Using Multi-Modal Connectome Harmonics”, H. Partick Taylor et al. University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA
- Prize for the best CDMRI power-pitch presentation: “Image Reconstruction from Accelerated Slice-Interleaved Diffusion Encoding Data”, Tiantian Xu et al. University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA
- Joint First Prize for the best Super-MUDI method: Kurt Schilling et al. Vanderbilt University, Nashville, Tennessee, USA.
- Joint First Prize for the best Super-MUDI method: Haoyu Lan et al. University of Southern California, Los Angeles California, USA.

Lima, Peru
October 2020

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