Medical Imaging 2020 Imaging Informatics for Healthcare, Research, and Applications

Po-Hao Chen Thomas M. Deserno Editors

16–17 February 2020 Houston, Texas, United States

Sponsored by SPIE

Cooperating Organizations AAPM—American Association of Physicists in Medicine (United States) MIPS—Medical Image Perception Society (United States) SIIM—Society for Imaging Informatics in Medicine (United States) IFCARS—International Foundation for Computer Assisted Radiology and Surgery (Germany) WMIS—World Molecular Imaging Society

Published by SPIE

Volume 11318

Proceedings of SPIE, 1605-7422, V. 11318

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in Medical Imaging 2020: Imaging Informatics for Healthcare, Research, and Applications, edited by Po-Hao Chen, Thomas M. Deserno, Proceedings of SPIE Vol. 11318 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

ISSN: 1605-7422 ISSN: 2410-9045 (electronic)

ISBN: 9781510634039 ISBN: 9781510634046 (electronic)

Published by SPIE P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445 SPIE.org Copyright © 2020, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$21.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 1605-7422/20/\$21.00.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.



Paper Numbering: Proceedings of SPIE follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

• The first five digits correspond to the SPIE volume number.

• The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

vii	Authors
ix	Conference Committee
xi	2020 Medical Imaging Award Recipients
SESSION 1	3D PRINTING AND ADVANCED VISUALIZATION
11318 02	Image-based marker tracking and registration for intraoperative 3D image-guided interventions using augmented reality [11318-1]
11318 03	Use of 3D printed intracranial aneurysm phantoms to test the effect of flow diverters geometry on hemodynamics [11318-2]
11318 05	Challenges and limitations of patient specific mitral valve 3D-printing [11318-4]
11318 06	Use of 3D-printed patient-specific neurovascular phantoms to investigate the correlation between disease severity and quantitative angiography results [11318-5]
SESSION 2	BIG DATA MANAGEMENT PLATFORMS
11318 07	Scalable Quality Assurance for Neuroimaging (SQAN): automated quality control for medical imaging [11318-6]
11318 08	PIM: a visualization-oriented web application for monitoring and debugging of large-scale image processing studies [11318-7]
11318 09	Preprocessing of clinical neuro-oncology MRI studies for big data applications [11318-8]
11318 0A	Exploiting biomedical literature to mine out a large multimodal dataset of rare cancer studies [11318-9]
11318 OB	SNIPR: Stroke Neuroimaging Phenotype Repository [11318-10]
11318 0C	WeLineation: crowdsourcing delineations for reliable ground truth estimation [11318-11]

SESSION 3 DEEP LEARNING DIAGNOSTICS

11318 0D	Breast cancer classification from digital breast tomosynthesis using 3D multi-subvolume
	approach [11318-12]

- 11318 OE Automated detection of microaneurysms in color fundus images using deep learning with different preprocessing approaches [11318-37]
- 11318 OF Imaging epigenetics study of schizophrenia with structure-enforced collaborative regression [11318-42]
- 11318 0G **Two-stage deep learning architecture for pneumonia detection and its diagnosis in chest** radiographs [11318-15]
- 11318 0H Deep super-resolution network on diffusion weighted imaging for improving prediction of histological grade in breast cancer [11318-16]

SESSION 4 ADVANCED IMAGING INFORMATICS

- 11318 0J Artificial intelligence-based interactive virtual reality-assisted gaming system for hand rehabilitation [11318-18]
- 11318 OK STAPLE performance assessed on crowdsourced sclera segmentations [11318-19]
- 11318 OL Tooth numbering in cone-beam CT using a relation network for automatic filing of dentition charts [11318-20]

SESSION 5 EXPLAINABLE ARTIFICIAL INTELLIGENCE

11318 0M	Impact of data augmentation techniques on a deep learning based medical imaging task [11318-21]
11318 ON	A method of dividing clinical data set for medical image AI training [11318-22]
11318 0O	Feasibility of predicting pancreatic neuroendocrine tumor grade using deep features from unsupervised learning [11318-23]
11318 OQ	A comparative study of 2D image segmentation algorithms for traumatic brain lesions using CT data from the ProTECTIII multicenter clinical trial [11318-48]
SESSION 6	FUTURE PACS AND SOFTWARE

11318 OR Usefulness of patient-specific past x-ray image reference support system in the facilities for severely disabled children and persons [11318-25]

11318 OS	Design and implementation of a new generation of PACS based on artificial intelligent visualization [11318-26]
11318 OT	Cloud platform for deep learning-based CAD via collaboration between Japanese medical societies and institutes of informatics [11318-27]
11318 OU	QuantMed: component-based deep learning platform for translational research [11318-28]
11318 OV	A toolbox for data processing in Radiomics analysis [11318-29]
11318 OW	A tracking-based semi-automatic software for focal liver lesion extraction in contrast- enhanced ultrasound (CEUS) cine-loops [11318-30]

SESSION 7 DEEP LEARNING SEGMENTATION

11318 OZ	Fully automated tumor localization and segmentation in breast DCE-MRI using deep learning and kinetic prior [11318-31]
11318 10	Anatomical landmark segmentation in uterine cervix images using deep learning [11318-32]
11318 11	Deep learning for nuclei segmentation and cell classification in cervical liquid based cytology [11318-33]
11318 12	Automated coronary artery segmentation in Coronary Computed Tomography Angiography (CCTA) using deep learning neural networks [11318-34]
11318 13	CT-based pancreatic multi-organ segmentation by a 3D deep attention U-net network [11318-35]
11318 14	Skin cancer segmentation and classification with improved deep convolutional neural network [11318-36]
	POSTER SESSION

- 11318 15 Machine learning for automatic construction of pediatric abdominal phantoms for radiation dose reconstruction [11318-38]
- 11318 16 A new case-based CAD scheme using a hierarchical SSIM feature extraction method to classify between malignant and benign cases [11318-39]
- 11318 17 Causal brain network in schizophrenia by a two-step Bayesian network analysis [11318-40]
- 11318 18 MR-radiomic biopsy for estimation of malignancy grade in parotid gland cancer [11318-41]
- 11318 19 Detection of defected nerve regions on retinal fundus images using OCT data for glaucoma screening [11318-43]

- 11318 1B **Radiomics for predicting response to neoadjuvant chemotherapy treatment in breast cancer** [11318-45]
- 11318 1C One-class classification for highly imbalanced medical image data [11318-46]