

PROCEEDINGS OF SPIE

Medical Imaging 2024

Clinical and Biomedical Imaging

Barjor S. Gimi
Andrzej Krol
Editors

20–22 February 2024
San Diego, California, United States

Sponsored by
SPIE

Cooperating Organizations
American Association of Physicists in Medicine (United States)
Radiological Society of North America
World Molecular Imaging Society
Society for Imaging Informatics in Medicine (United States)
International Foundation for Computer Assisted Radiology and Surgery
Medical Image Perception Society (United States)

Published by
SPIE

Volume 12930

Proceedings of SPIE, 1605-7422, V. 12930

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

Medical Imaging 2024: Clinical and Biomedical Imaging, edited by Barjor S. Gimi,
Andrzej Krol, Proc. of SPIE Vol. 12930, 1293001 · © 2024 SPIE
1605-7422 · doi: 10.1117/12.3030912

Proc. of SPIE Vol. 12930 1293001-1

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 SPIDigitalLibrary.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 2024: Clinical and Biomedical Imaging*, edited by Barjor S. Gimi, Andrzej Krol, Proc. of SPIE 12930, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510671645
ISBN: 9781510671652 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2024 Society of Photo-Optical Instrumentation Engineers (SPIE).

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 fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center 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.

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.

SPIE. DIGITAL LIBRARY
SPIDigitalLibrary.org

Paper Numbering: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE 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

ix *Conference Committee*

TUESDAY MORNING KEYNOTES

12930 02 **Unlocking the value of 3D printed medical devices in hospitals and universities (Keynote Paper)** [12930-406]

SOFT TISSUE AND BONE IMAGING

12930 03 **Deep learning-based head and neck segmentation in CT angiography** [12930-1]

12930 04 **Quantitative trabecular bone morphometry using photon-counting CT** [12930-2]

VESSEL AND AIRWAY IMAGING

12930 06 **Deep learning-based automated lung tumor segmentation in mouse preclinical micro-CT scans with limited annotations** [12930-4]

12930 07 **Translating non-contrast CT calcium score images to virtual CCTA to aid segmentation of coronary arteries and myocardium** [12930-5]

12930 08 **3D rendering and analysis of dermal backflow as an early indicator of cancer-acquired lymphedema using RGB-D and near-infrared fluorescence lymphatic imaging** [12930-6]

CARDIAC STRUCTURE AND FUNCTION

12930 09 **A denoising diffusion fluid flow generative model for stenotic pipe flows** [12930-7]

12930 0A **First in vivo demonstration of 1000fps high speed coronary angiography (HSCA) in a swine animal model** [12930-8]

12930 0B **Deep learning-based epicardial adipose tissue measurement, maximizing prognostic information from attenuation correction imaging** [12930-9]

12930 0C **Prediction of major adverse cardiovascular events using comprehensive AI analysis of calcifications and fat depots in CT calcium score images** [12930-10]

12930 0D **AI predictions of major adverse cardiovascular event using epicardial and paracardial adipose tissue assessments in CT calcium score images** [12930-11]

12930 0E **Deep learning-based whole heart segmentation from CT images** [12930-12]

IMAGE PROCESSING, DETECTION, SEGMENTATION, REGISTRATION, AND ANALYSIS

- 12930 0F **Propensity-matching of patients from a large database of CT calcium score images reveals a distinct coronary calcification profile in diabetes mellitus** [12930-13]
- 12930 0G **Whole heart CNN-based segmentation for phenotypical analysis of APOE mouse models using photon counting cine cardiac micro-CT data** [12930-14]
- 12930 0H **Anatomical structure-constrained thrombus region segmentation and measurement using confocal laser scanning microscopic images** [12930-15]
- 12930 0I **Segmentation of catheter tubes and lines in chest x-rays using deep learning models** [12930-16]
- 12930 0J **Wavelet-based harmonization of local and global model shifts in federated learning for histopathological images** [12930-17]
- 12930 0K **Enhancing hierarchical transformers for whole brain segmentation with intracranial measurements integration** [12930-18]
- 12930 0L **Classification of endotracheal tube position in chest x-rays images** [12930-19]
- 12930 0M **Classifying chronic obstructive pulmonary disease using computed tomography imaging and 2D and 3D convolutional neural networks** [12930-20]
- 12930 0N **Volumetric brain region segmentation and morphometry in mouse models using high-resolution hybrid micro-CT imaging** [12930-21]

FUNCTIONAL NEUROIMAGING AND BRAIN MAPPING

- 12930 0O **Enhancing graph attention neural network performance for marijuana consumption classification through large-scale Augmented Granger Causality (IsAGC) analysis of functional MR images** [12930-22]
- 12930 0P **Controllability and robustness of functional and structural connectomic networks in dementia** [12930-23]
- 12930 0Q **Investigating interactions between subcortical structure, fMRI vigilance signals, and cognition in healthy and pathological aging** [12930-24]

MAGNETIC RESONANCE IMAGING (MRI): METHODS DEVELOPMENT, MRI QUANTITATION

- 12930 OR **MRI data consistency guided conditional diffusion probabilistic model for MR imaging acceleration** [12930-25]
- 12930 OS **Pipeline for automatic segmentation of multiparametric MRI data in a rat model of ischemic stroke** [12930-26]
- 12930 OT **Efficient post-processing of diffusion tensor cardiac magnetic imaging using texture-conserving deformable registration** [12930-27]

PRECLINICAL, CLINICAL IMAGING, AND CO-CLINICAL IMAGING

- 12930 OU **Evaluation of deep learning framework coupled with interactive user interface to predict clinical complications after aneurysmal subarachnoid hemorrhage** [12930-28]
- 12930 OV **Enhancing in vivo preclinical studies with VivoVist™ and photon-counting micro-CT imaging** [12930-29]
- 12930 OW **Gastro-intestinal lesion segmentation using deep learning: organ-based versus whole-body training** [12930-30]
- 12930 OX **Development of an inflatable murine lung phantom for phase-contrast and darkfield imaging** [12930-31]
- 12930 OY **Hypoplasia of the S1 vertebral body (pseudoretrolisthesis) and its association with early degenerative disc disease at the L5-S1 level** [12930-32]
- 12930 OZ **A hyperspectral surgical microscope with super-resolution reconstruction for intraoperative image guidance** [12930-33]
- 12930 10 **Lung lesion segmentation of CT scans after SARS-CoV-2 infection: combining nonhuman primate with human data for interspecies transfer learning** [12930-34]

NOVEL MOLECULAR AND FUNCTIONAL IMAGING TECHNOLOGIES

- 12930 11 **Comparing x-ray fluorescence emission tomography and computed tomography: contrast-to-noise ratios in a numerical mouse phantom** [12930-35]
- 12930 13 **Quantitative study of x-ray luminescence computed tomography** [12930-37]
- 12930 14 **Graph attention transformers and large-scale granger causality to classify marijuana consumption from functional MR images** [12930-38]
- 12930 15 **Raman microspectroscopy imaging revealed the spatial distribution of ω -3 and ω -6 fatty acids in white adipose tissues** [12930-39]

BIOMECHANICAL IMAGING AND MODELING

- 12930 16 **Perovskite Cs₃Cu₂I₅ thin film for high-resolution x-ray imaging** [12930-41]
- 12930 18 **Photon counting micro-CT imaging of Bi₂WO₆ nanoparticles** [12930-43]
- 12930 19 **Evaluation of aneurysm flow diverter (stent) treatment using multi-angled 1000 fps high-speed angiography (HSA) and optical flow (OF)** [12930-44]

MONDAY POSTER SESSION

- 12930 1C **Predicting glioma IDH mutation using multiparametric MRI and fractal analysis** [12930-68]

WEDNESDAY POSTER SESSION

- 12930 1D **Plasmonic polarization-contrast imaging of aqueous solutions using two-dimensional metallic surface relief gratings** [12930-47]
- 12930 1E **Generation of IVIM parametric images using a kernelized total difference-based method** [12930-48]
- 12930 1G **Interactive analysis system for narrow-band imaging bronchoscopy (Clinical and Biomedical Imaging Poster Award)** [12930-50]
- 12930 1H **Information maximized U-Nets for vestibular schwannoma segmentation using MRI with missing modality** [12930-51]
- 12930 1I **Low-dimensional representation of fMRI disentangles temporal contributions of EEG-determined vigilance from other global effects** [12930-52]
- 12930 1J **Weakly supervised detection of cell activation** [12930-53]
- 12930 1K **Translating the future: image-to-image translation for the prediction of future brain metabolism** [12930-55]
- 12930 1L **Demonstration of 1000 fps high-speed angiography (HSA) in pre-clinical in vivo rabbit aneurysm models during flow-diverter treatment** [12930-56]
- 12930 1M **Association between small vessel function and progressive white matter injury in CADASIL using advanced 7T MRI** [12930-57]
- 12930 1N **SegmentAnything helps microscopy images based on automatic and quantitative organoid detection and analysis** [12930-58]
- 12930 1O **Data-efficient segmentation of coronary arteries for pericoronary adipose tissue analysis on coronary CT angiography using self-supervised learning** [12930-59]

- 12930 1Q **Full-dose PET synthesis from low-dose PET using 2D high efficiency denoising diffusion probabilistic model** [12930-65]
- 12930 1R **Supervised and semisupervised methods of nematode images classification for drug discovery** [12930-66]
- 12930 1S **Using diffusion model to generate high-resolution MRI** [12930-67]
- 12930 1T **Anatomic attention regions via optimal anatomy modeling and recognition for DL-based image segmentation** [12930-70]
- 12930 1U **Diaphragm motion as a function of the scoliotic spinal curve in thoracic insufficiency syndrome (TIS)** [12930-71]
- 12930 1V **Automated pericardium-segmentation using an attention-based convolutional neural network** [12930-72]
- 12930 1W **MLP-UNEXT for brain metastasis detection and segmentation in multiparametric MRI** [12930-73]
- 12930 1X **Active learning applied to selection of diverse training data using radiomic features for optimal lung lesion segmentation in nonhuman primates** [12930-74]
- 12930 1Y **Enhancing the UNet3+ architecture for deep learning segmentation of kidneys and cysts in autosomal dominant polycystic kidney disease (ADPKD)** [12930-75]
- 12930 20 **Prediction of heart failure using an analysis of epicardial adipose tissue from CT calcium score images** [12930-78]
- 12930 21 **Cardiac MRI segmentation using block-partitioned transformer with global-local information integration** [12930-79]
- 12930 22 **Image-domain material decomposition for dual-energy CT using a conditional diffusion model** [12930-80]
- 12930 23 **Dose-weighted proton linear energy transfer map generation using a deep learning framework** [12930-81]
- 12930 24 **GAN-based motion artifact correction of 3D MR volumes using an image-to-image translation algorithm** [12930-82]
- 12930 25 **Characterizing low-cost registration for photographic images to computed tomography** [12930-83]
- 12930 26 **Standardized MR nano-radiomics for early detection and amyloid burden classification in Alzheimer's disease** [12930-84]
- 12930 27 **Unsupervised generation of pseudo normal PET from MRI with diffusion model for epileptic focus localization** [12930-85]
- 12930 28 **Exploratory magnetic resonance elastography synthesis from magnetic resonance and diffusion tensor imaging** [12930-86]

- 12930 29 **AniRes2D: anisotropic residual-enhanced diffusion for 2D MR super-resolution** [12930-87]
- 12930 2A **Nerve detection and visualization using hyperspectral imaging for surgical guidance** [12930-88]
- 12930 2B **Contrast-enhanced dual-energy CT synthesis from single energy CT using diffusion model** [12930-89]
- 12930 2C **Heatmaps autoencoders robustly capture Alzheimer's disease's brain alterations** [12930-90]
- 12930 2D **Dynamic-threshold template matching with autodidactic enhancement algorithm for ischemic myocardial scar classification** [12930-91]
- 12930 2E **Learning site-invariant features of connectomes to harmonize complex network measures** [12930-92]
- 12930 2F **Human microscopic vagus nerve anatomy using deep learning on 3D-MUSE images** [12930-93]
- 12930 2G **Segmentation of cerebral digital subtraction angiography (DSA) images in idiopathic intracranial hypertension and venous sinus stenosis: evaluating the efficacy of the segment anything model (SAM) and MedSAM** [12930-95]
- 12930 2H **CDPNet: a radiomic feature learning method with epigenetic application to estimating MGMT promoter methylation status in glioblastoma** [12930-96]
- 12930 2I **Harmonization-enriched domain adaptation with light fine-tuning for multiple sclerosis lesion segmentation** [12930-97]
- 12930 2J **Optimizing biomedical volume rendering: fractal dimension-based approach for enhanced performance** [12930-98]
- 12930 2K **Self-supervised super-resolution of 2-D pre-clinical MRI acquisitions** [12930-99]
- 12930 2L **Cluster synchronization in fractional-order dynamic dementia networks** [12930-40]

DIGITAL POSTER SESSION

- 12930 2M **Automatic CT pulmonary artery-vein segmentation using 3D RSU and semantic embedding** [12930-62]
- 12930 2N **Enhanced visualisation of major blood vessels using multispectral NIR imaging for surgical safety** [12930-63]
- 12930 2O **Improved gastrointestinal endoscopic imaging using spectral color estimation** [12930-69]
- 12930 2P **Synthesizing fractional anisotropy maps from T1-weighted magnetic resonance images using a simplified generative adversarial network** [12930-94]

Conference Committee

Symposium Chairs

Despina Kontos, Columbia University Irving Medical Center
(United States)
Joseph Lo, Duke University School of Medicine (United States)

Conference Chairs

Barjor S. Gimi, University of Massachusetts Chan Medical School
(United States)
Andrzej Krol, SUNY Upstate Medical University (United States)

Conference Program Committee

Amir A. Amini, University of Louisville (United States)
Cristian T. Badea, Duke University School of Medicine (United States)
Nancy L. Ford, The University of British Columbia (Canada)
William E. Higgins, The Pennsylvania State University (United States)
Ciprian N. Ionita, SUNY University at Buffalo (United States)
Vikram Kodibagkar, Arizona State University (United States)
Changqing Li, University of California, Merced (United States)
Armando Manduca, Mayo Clinic College of Medicine (United States)
Sunitha Thakur
John B. Weaver, Dartmouth Hitchcock Medical Center
(United States)
David L. Wilson, Case Western Reserve University (United States)
Axel Wismüller, University of Rochester Medical Center (United States)
Baohong Yuan, The University of Texas at Arlington (United States)

