Medical Imaging 2024

Image Processing

Olivier Colliot Jhimli Mitra Editors

19–22 February 2024 San Diego, California, United States

Sponsored by SPIE

Cosponsored by
Philips Research (Netherlands)
Merck & Co., Inc. (United States)
Guerbet Group (France)
GE Research (United States)

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 12926

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 2024: Image Processing*, edited by Olivier Colliot, Jhimli Mitra, Proc. of SPIE 12926, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 1605-7422

ISSN: 2410-9045 (electronic)

ISBN: 9781510671560

ISBN: 9781510671577 (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.



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

xi Conference Committee

FOUNDATION MODELS 12926 02 FNPC-SAM: uncertainty-guided false negative/positive control for SAM on noisy medical **images** [12926-1] 12926 03 From generalization to precision: exploring SAM for tool segmentation in surgical environments [12926-2] 12926 04 Towards TotalSegmentator for MRI data leveraging GIN data augmentation [12926-3] 12926 05 Universal 3D CT lesion segmentation using SAM with RECIST annotation [12926-4] IMAGE REPRESENTATION, RESTORATION AND ENHANCEMENT 12926 06 Pushing the limits of zero-shot self-supervised super-resolution of anisotropic MR images [12926-5] 12926 07 Learning-based free-water correction using single-shell diffusion MRI [12926-6] 12926 08 Optimizing CycleGAN design for CBCT-to-CT translation: insights into 2D vs 3D modeling, patch size, and the need for tailored evaluation metrics [12926-7] 12926 09 CT image kernel synthesis using deep regularization [12926-8] **CARDIOVASCULAR IMAGING** 12926 0A Is registering raw tagged-MR enough for strain estimation in the era of deep learning? (Image Processing Best Student Paper Award) [12926-9] 12926 OB On TotalSegmentator's performance on low-dose CT images [12926-10] 12926 0C Accelerated reconstruction of highly undersampled 3D cardiac MRI image navigators [12926-11] 12926 0D Deep-learning-based prediction of fractional flow reserve after invasive coronary artery treatment [12926-12]

12926 OE	Four-dimensional assessment of left ventricular torsion in mitral valve prolapse using CMR [12926-13]
12926 OF	Deep-learning-based landmark localization in 3D CT images of the heart: method and dataset comparison [12926-14]
	DEEP LEARNING: TRANSFORMERS
12926 0G	Medical image classification using self-supervised learning-based masked autoencoder [12926-15]
12926 OH	CATS v2: hybrid encoders for robust medical segmentation [12926-17]
12926 OI	Transformer-based local feature matching for multimodal image registration [12926-18]
12926 OJ	Radiomics-guided 3D CNN-vision transformer (Rad-CNNViT) ensemble to diagnose pulmonary sarcoidosis from CT [12926-19]
12926 OK	Continual pretraining for enhanced multi-organ segmentation from CT images [12926-20]
	BRAIN IMAGING
12926 0Q	Optimizing contrastive learning for cortical folding pattern detection [12926-22]
12926 OR	Spatiospectral image processing workflow considerations for advanced MR spectroscopy of the brain [12926-23]
12926 OS	Generating PET-derived maps of myelin content from clinical MRI using curricular discriminator training in generative adversarial networks [12926-25]
12926 OT	Identification of functional white matter networks in BOLD fMRI [12926-26]
	SEGMENTATION
12926 OU	
	Automated estimation of microcirculation capillary density using relative perfusion maps [12926-27]
12926 OV	
12926 OV 12926 OW	[12926-27]

12926 OY	Pre- to post-contrast breast MRI synthesis for enhanced tumour segmentation [12926-31]
12926 OZ	Intestine segmentation from CT volume based on bidirectional teaching [12926-32]
	DEEP DIVE
12926 10	Distilling vision transformers for no-reference perceptual CT image quality assessment [12926-33]
12926 11	Design, training, and applications of foundation model for chest computed tomography volumes [12926-34]
12926 12	Revisiting registration-based image synthesis: a focus on unsupervised MR image synthesis [12926-35]
	EXPLAINABLE AND TRUSTWORTHY AI
12926 13	A general approach to improve adversarial robustness of DNNs for medical image segmentation and detection [12926-36]
12926 14	Evaluating the performance of hyperparameters for unbiased and fair machine learning [12926-37]
12926 15	Boundary-aware uncertainty for automatic caliper placement [12926-38]
12926 16	Leveraging epistemic uncertainty to improve tumour segmentation in breast MRI: an exploratory analysis [12926-39]
12926 17	An interpretable deep learning approach for lesion detection and segmentation on whole-body [18F]FDG PET/CT [12926-40]
	QUALITY CONTROL AND HARMONIZATION
12926 19	Automatic detection of exam contents from a 3D image series [12926-41]
12926 1A	Leveraging noise and contrast simulation for the automatic quality control of routine clinical T1-weighted brain MRI [12926-42]
12926 1B	Assessment of subject head motion in diffusion MRI [12926-43]
12926 1C	Automatic quality control of segmentation results using early epochs as data augmentation: application to choroid plexuses [12926-44]
12926 1D	Inter-vendor harmonization of CT reconstruction kernels using unpaired image translation [12926-45]

POSTER SESSION

12926 1E	Sparse-view tomographic reconstruction using residual U-Net with attention gates [12926-46]
12926 1F	Leveraging healthy population variability in deep learning unsupervised anomaly detection in brain FDG PET [12926-47]
12926 1H	The intriguing effect of frequency disentangled learning on medical image segmentation [12926-49]
12926 11	A tournament of transformation models: B-Spline-based vs. mesh-based multi-objective deformable image registration [12926-50]
12926 1J	Patient pose assessment in radiography using time-of-flight cameras [12926-51]
12926 1K	Motion compensation in short-scan CBCT reconstructions for dental applications [12926-52]
12926 1L	Evaluating task-specific augmentations in self-supervised pre-training for 3D medical image analysis [12926-53]
12926 1M	Segment any medical model extended [12926-54]
12926 1N	Fully automatic mpMRI analysis using deep learning predicts peritumoral glioblastoma infiltration and subsequent recurrence [12926-55]
12926 10	Border irregularity loss for automated segmentation of primary brain lymphomas on post-contrast MRI [12926-56]
12926 1P	CT-MRI liver registration for selective internal radiation therapy [12926-57]
12926 1Q	Feasibility of lung CBCT first order delta radiomics after each SBRT treatment fraction [12926-58]
12926 18	ASL MRI denoising via multi-channel collaborative low-rank regularization [12926-60]
12926 1T	Characterizing fluid flows in breast tumor DCE-MRI studies using unbalanced regularized optimal mass transport methods [12926-61]
12926 1U	UNETRIS: transformer-based nuclear instance segmentation for three-dimensional fluorescence microscopy images [12926-62]
12926 1V	Preliminary exploration of data incremental learning method [12926-63]
12926 1X	Evaluation of mean shift, ComBat, and CycleGAN for harmonizing brain connectivity matrices across sites [12926-65]
12926 1Y	Ensemble processing and convexity measure for abnormally shaped nuclei segmentation [12926-66]

12926 20	High-resolution reference image assisted volumetric super-resolution of cardiac diffusion weighted imaging [12926-68]
12926 21	Recent advances in the open-source ClinicaDL software for reproducible neuroimaging with deep learning [12926-69]
12926 22	Predicting animal behavior from neuronal miniscope data: a deep learning approach [12926-70]
12926 23	Evaluating clinical and radiomic features for predicting lung cancer recurrence pre- and post-tumor resection $[12926-71]$
12926 24	Feasibility study of using masked auto-encoder for a streak artifact reduction in sparse view CT [12926-72]
12926 25	Deep-learning-based metal extraction with no reference in dental CBCT for metal artifact reduction [12926-73]
12926 26	Age-dependent generalizability of lumbar spine detection and segmentation models: a comparative study in pediatric populations (Image Processing Poster Award) [12926-74]
12926 28	Robustness evaluation of CAD systems for lung nodule segmentation using clinically relevant image perturbations [12926-76]
12926 29	Multistream fusion segmentation and classification of prostate lesions from magnetic resonance images [12926-77]
12926 2A	Open-source, deep-learning skin surface segmentation model for cost-effective neuronavigation accessible to low-resource settings [12926-78]
12926 2B	Tractography with T1-weighted MRI and associated anatomical constraints on clinical quality diffusion MRI [12926-79]
12926 2D	Denoising of home OCT images using Noise2Noise trained on artificial eye data [12926-81]
12926 2F	A novel cylinder-domain-based method for colon registration [12926-83]
12926 2G	A study of relationship between social determinant of health and imaging based age estimation using head CT [12926-85]
12926 2H	Disentangled multimodal brain MR image translation via transformer-based modality infuser [12926-86]
12926 21	Predicting age from white matter diffusivity with residual learning [12926-87]
12926 2J	A clinical guideline driven automated linear feature extraction for vestibular schwannoma [12926-88]
12926 2K	Learning physics-inspired regularization for medical image registration with hypernetworks

12926 2L	Synthetic CT generation from MRI using 3D diffusion model [12926-91]
12926 2M	Automatic hemorrhage segmentation in brain CT scans using curriculum-based semi-supervised learning. [12926-92]
12926 2N	Vertebral segmentation without training using differentiable appearance modeling of a deformable spine template $[12926\text{-}93]$
12926 20	Registration of longitudinal spine CTs for monitoring lesion growth [12926-94]
12926 2P	A deep learning network for breast mass detection using paired view mammogram [12926-95]
12926 2S	Deformable current-prior registration of DCE breast MR images on multi-site data [12926-98]
12926 2T	Deep transfer learning from limited source for abdominal CT and MR image segmentation [12926-99]
12926 2U	Analysis of disentangled representation learning for high-resolution dynamic MRI synthesis [12926-100]
12926 2V	Diffeomorphic image registration with bijective consistency [12926-101]
12926 2X	Multi-method and multi-atlas segmentation fusion for delineation of thigh muscle groups in 3D water-fat separated MRI [12926-103]
12926 2Y	Edge-preserving, CNN-based, denoising in low dose SPECT myocardial perfusion imaging [12926-104]
12926 2Z	Detection of local emphysema progression using conditional CNN [12926-105]
12926 30	Self-supervised learning based on StyleGAN for medical image classification on small labeled dataset [12926-106]
12926 31	Single image super resolution on dynamic x-ray radiography based on a vision transformer [12926-107]
12926 32	Detection of reticular pseudodrusen on optical coherence tomography images [12926-108]
12926 33	Transformer-based classifier with feature aggregation for cancer subtype classification on histopathological images [12926-109]
12926 34	A sequential geometry-reconstruction-based deep learning approach to improve accuracy and consistence of lumbar spine MRI image segmentation [12926-111]
12926 35	Head re-orientation along desired plane using deep-learning-based landmark detection for CT images [12926-112]
12926 36	Deep convolutional neural networks for PET super-resolution [12926-113]

12926 37	Mid-sagittal cross-section identification for vertebra landmarking in MR spine images [12926-114]
12926 38	Deep implicit statistical shape models for 3D lumbar vertebrae image delineation [12926-115]
12926 39	Deep-learning-based segmentation of hydrocephalus brain ventricle from ultrasound [12926-253]
12926 3A	Leveraging sinusoidal representation networks to predict fMRI signals from EEG [12926-254]
12926 3B	Spatiotemporal disentanglement of arteriovenous malformations in digital subtraction angiography [12926-24]
	DIGITAL POSTER SESSION
12926 3C	Unsupervised learning with alternating matching features for 3D image registration [12926-16]
12926 3D	A comparison of U-Net series for teeth segmentation in CBCT images [12926-84]