

*Medical Imaging 2024*

---

# **Computer-Aided Diagnosis**

**Weijie Chen**  
**Susan M. Astley**  
*Editors*

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

*Sponsored by*  
SPIE

*Cosponsored by*  
Siemens Healthineers (Germany)

*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 12927**

Proceedings of SPIE, 1605-7422, V. 12927

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

Medical Imaging 2024: Computer-Aided Diagnosis, edited by Weijie Chen,  
Susan M. Astley, Proc. of SPIE Vol. 12927, 1292701 · © 2024  
SPIE · 1605-7422 · doi: 10.1117/12.3031546

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](http://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: Computer-Aided Diagnosis*, edited by Weijie Chen, Susan M. Astley, Proc. of SPIE 12927, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510671584  
ISBN: 9781510671591 (electronic)

Published by  
**SPIE**  
P.O. Box 10, Bellingham, Washington 98227-0010 USA  
Telephone +1 360 676 3290 (Pacific Time)  
[SPIE.org](http://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](http://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](http://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

xiii *Conference Committee*

---

## SEGMENTATION I

---

- 12927 04 **Self and mixed supervision to improve training labels for multi-class medical image segmentation** [12927-1]
- 12927 05 **Automatic segmentation of malignant and benign adnexal lesions on ultrasound scans** [12927-2]
- 12927 06 **Segmentation of endoscopy images of the anterior nasal cavity using deep learning** [12927-3]
- 12927 07 **Human-in-the-loop informed deep learning rectal tumor segmentation on pre-treatment MRI** [12927-4]

---

## LUNG

---

- 12927 08 **Vessel-based lung lobe partitioning in ultra-short time echo proton MRI for regional ventilation assessment** [12927-5]
- 12927 09 **Semi-supervised learning for mRALE score prediction in COVID-19 chest radiographs (Computer-Aided Diagnosis Best Paper Award)** [12927-6]
- 12927 0A **Geometric features of pulmonary arteries are associated with early progression and progression-free survival in small-cell lung cancer patients treated with chemotherapy and immunotherapy** [12927-7]
- 12927 0B **Quantitative accuracy of lung function measurement using parametric response mapping: a virtual imaging study** [12927-8]

---

## BREAST

---

- 12927 0C **Breast density assessment via deep learning: head-to-head model comparisons in full-field digital mammograms and synthetic mammograms** [12927-9]
- 12927 0D **AI-based density prediction for breast cancer prevention: Can we measure mammographic density in just one breast?** [12927-10]
- 12927 0E **Quantifying input data drift in medical machine learning models by detecting change-points in time-series data** [12927-11]

- 12927 OF **Enhancing downstream classification of breast abnormalities in contrast enhanced spectral mammography using a neighborhood representation loss** [12927-12]
- 12927 OG **Lesion localization in digital breast tomosynthesis with deformable transformers by using 2.5D information** [12927-13]
- 12927 OH **Seeing beyond cancer: multi-institutional validation of object localization and 3D semantic segmentation using deep learning for breast MRI** [12927-14]

---

#### CLASSIFICATION AND PREDICTION

---

- 12927 OI **Enhancing robustness in prostate cancer aggressiveness prediction: a study of test-time augmentation-based ensemble methods** [12927-15]
- 12927 OJ **Federated learning for cross-institution brain network analysis** [12927-16]
- 12927 OK **Automated classification of body MRI sequence type using convolutional neural networks** [12927-17]
- 12927 OL **Combining frontal and profile view facial images to predict difficult-to-intubate patients using AI** [12927-18]
- 12927 OM **Predicting endobronchial valve treatment response in emphysema patients using the lung fissure integrity score extracted from chest CT scans** [12927-19]
- 12927 ON **MRI sequence impact on deep learning extraction of prognostic features for glioblastoma survival prediction** [12927-20]

---

#### SEGMENTATION II

---

- 12927 OO **Boosting substantia nigra segmentation from T2 weighted MRI via test-time normalization and distance-reweighted loss** [12927-21]
- 12927 OP **Enhancing calcium score quantification in cardiac images through robust mediastinum segmentation** [12927-22]
- 12927 OQ **Weakly-supervised detection of bone lesions in CT** [12927-23]
- 12927 OR **Towards automation in non-invasive measurement of knee implant displacement** [12927-24]
- 12927 OS **Weakly supervised detection of pheochromocytomas and paragangliomas in CT** [12927-25]

---

## DEEP LEARNING I

---

- 12927 OT **Decentralized gossip mutual learning (GML) for automatic head and neck tumor segmentation** [12927-26]
- 12927 OU **Unsupervised multi-parametric MRI registration using neural optimal transport** [12927-27]
- 12927 OV **W-MAFormer: W-shaped multi-attention assisted transformer for polyp segmentation** [12927-28]
- 12927 OW **Annotation-free deep-learning framework for microcalcifications detection on mammograms** [12927-29]
- 12927 OX **David vs. Goliath: large foundation models are not outperforming small models in multi-view mammogram breast cancer prediction** [12927-30]

---

## JOINT SESSION WITH CONFERENCES 12927 AND 12929

---

- 12927 OY **Using artificial intelligence for chest radiograph interpretation: a retrospective multi-reader-multi-case (MRMC) study of the automatic detection of multiple abnormalities and generation of diagnostic report system** [12927-31]
- 12927 OZ **Using NURBS for virtual resections in liver surgery planning: a comparative usability study** [12927-32]
- 12927 10 **Automated plaque detection and Agatston score estimation on non-contrast CT scans: a multicenter study** [12927-33]

---

## NEUROLOGY

---

- 12927 11 **Assessing variability in non-contrast CT for the evaluation of stroke: the effect of CT image reconstruction conditions on AI-based CAD measurements of ASPECTS value and hypodense volume** [12927-34]
- 12927 12 **Spatial interactions via graph-based learning (SIGL) to distinguish glioblastoma recurrence from pseudo-progression on clinical MRI** [12927-35]
- 12927 13 **CNN and Riemannian geometry for Alzheimer's disease progression classification** [12927-36]
- 12927 15 **Predicting brain age and associated structural networks in mouse models with humanized APOE alleles using integrative and interpretable graph neural networks** [12927-38]

---

## HEAD, NECK, AND EYE

---

- 12927 16 **Evaluation of few-shot detection of head and neck anatomy in CT** [12927-39]
- 12927 17 **Convolutional transformer network for paranasal anomaly classification in the maxillary sinus** [12927-40]
- 12927 18 **Deep learning prediction of radiation-induced xerostomia with supervised contrastive pre-training and cluster-guided loss** [12927-41]
- 12927 19 **Reducing the impact of domain shift in deep learning for OCT segmentation using image manipulations** [12927-42]
- 12927 1A **Fovea segmentation in fundus autofluorescence images using ground truth annotations from three-dimensional optical coherence tomography images** [12927-43]

---

## RADIOMICS

---

- 12927 1B **Harmonizing quantitative imaging feature values in CT using image quality metrics as a basis** [12927-44]
- 12927 1C **End-to-end deep learning restoration of GLCM features from blurred and noisy images** [12927-45]
- 12927 1D **Radiomic deformation features to predict associations between affected brain regions and verbal fluency scores in acute stroke patients: preliminary finding** [12927-46]
- 12927 1F **Investigating causal genetic effects on overall survival of glioblastoma patients using normalizing flow and structural causal model** [12927-48]
- 12927 1G **Utilizing domain knowledge to improve intravenous contrast phase classification of CT scans** [12927-49]

---

## LUNG AI

---

- 12927 1H **A tool for the assessment of AI generalizability via decision space composition** [12927-50]
- 12927 1I **CAFES: chest x-ray analysis using federated self-supervised learning for pediatric Covid-19 detection** [12927-51]
- 12927 1J **Manipulation of sources of bias in AI device development** [12927-52]

- 12927 1K **Comparison of anatomical priors for learning-based neural network guidance for mediastinal lymph node segmentation** [12927-53]
- 12927 1L **An investigation on the individual performance of feature extraction and classification modules in machine learning for diagnosis of low-dose computed tomography screening-detected lesions** [12927-54]

---

#### DEEP LEARNING II

---

- 12927 1M **Domain adaptive federated learning for multi-institution molecular mutation prediction and bias identification** [12927-55]
- 12927 1N **Investigating melanoma classification in dermatoscopic images with convolutional neural networks using melanin and erythema indices** [12927-57]
- 12927 1O **Developing an image-domain transformation technique for adapting deep learning algorithms: preliminary work using simulated tomosynthesis of breast patches** [12927-58]
- 12927 1P **Learning carotid vessel wall segmentation in black blood MRI using sparsely sampled cross-sections from 3D data** [12927-59]
- 12927 1Q **Federated learning for prostate cancer detection in biparametric MRI: optimization of rounds, epochs, and aggregation strategy** [12927-76]

---

#### POSTER SESSION: ABDOMINAL AND CARDIOVASCULAR

---

- 12927 1R **Detection of deep lesion in resected stomach by near-infrared hyperspectral imaging** [12927-60]
- 12927 1S **Learning 3D aortic root assessment based on sparse annotations** [12927-61]
- 12927 1T **MRI-based prostate cancer detection using cross-shaped windows transformer** [12927-62]
- 12927 1U **ArHiFy: artificial histopathology-style features for improving MRI-based prostate cancer detection** [12927-64]
- 12927 1V **Large language model-assisted information extraction from clinical reports for survival prediction of bladder cancer patients** [12927-65]

---

#### POSTER SESSION: BREAST

---

- 12927 1W **Breast lesion detection scheme for low gadolinium dose DCE-MRI using radon cumulative distribution transform and domain transfer: preliminary results** [12927-66]

- 12927 1X **Maintaining high resolution information in AI-based breast cancer risk prediction** [12927-67]
- 12927 1Y **Estimating deep learning model uncertainty of breast lesion classification to guide reading strategy in breast cancer screening** [12927-68]
- 12927 1Z **A residual-attention multimodal fusion network (ResAMF-Net) for detection and classification of breast cancer** [12927-69]
- 12927 20 **Using an AI-based density prediction method to explore the risk of breast cancer in different ethnic groups** [12927-70]
- 12927 21 **Understanding impact of textural changes for mammogram analysis using counterfactuals** [12927-71]
- 12927 22 **Beyond mammographic density: a computational imaging approach to identify effects of early adulthood adiposity on breast parenchymal tissue patterns in premenopausal women** [12927-72]
- 12927 23 **Intrinsic subtype classification of breast cancers on mammograms using local selective patches** [12927-73]
- 12927 24 **Incorporating longitudinal changes of mammograms for breast cancer diagnosis** [12927-74]
- 12927 25 **Transfer learning from breast cancer detection models for image-based breast cancer risk prediction** [12927-75]

---

**POSTER SESSION: DEEP LEARNING**

- 12927 26 **Low does calcium scoring in cardiac computer tomography using deep learning** [12927-77]
- 12927 27 **Artificial intelligence in cystoscopic bladder cancer classification based on transfer learning with a pre-trained convolutional neural network without natural images** [12927-78]
- 12927 29 **Effect of semantic distribution shift on AI knowledge retention in a sequential training paradigm** [12927-82]
- 12927 2A **Quantifying the quality of GAN-synthesized images: a study on synthesizing post-contrast sequences from pre-contrast sequences in breast DCE-MRI** [12927-83]
- 12927 2B **Video and synthetic MRI pre-training of 3D vision architectures for neuroimage analysis** [12927-84]
- 12927 2C **Performance improvement for medical image classification model by using gradient-based analytical feature selection** [12927-85]
- 12927 2D **Automated classification of celiac disease in histopathological images: a multi-scale approach** [12927-86]
- 12927 2E **Spatial attention wavelon network (SpAWN) for survival-based risk stratification in kidney cancers via CT** [12927-87]



---

**POSTER SESSION: HEAD, NECK, AND EYE**

---

- 12927 2F **Focused unsupervised image registration for structure-specific population analysis** [12927-88]
- 12927 2H **Treatment-wise glioblastoma survival Inference with multi-parametric preoperative MRI** [12927-91]
- 12927 2I **Deep shape based intracranial aneurysm rupture prediction** [12927-92]
- 12927 2J **Self-supervised learning for seizure classification using ECoG spectrograms** [12927-93]

---

**POSTER SESSION: LUNG**

---

- 12927 2K **Enhancing lung tumor segmentation: a comparative study of CNN-based network with multi-scale strategies and attention mechanisms and hybrid transformer-CNN network** [12927-94]
- 12927 2L **A deep learning algorithm for segmentation of lung cancer lesions in MR images of mouse models** [12927-95]
- 12927 2M **Enhancing sensitivity in lung nodule malignancy classification: incorporating cost values into deep learning-based CAD systems** [12927-96]
- 12927 2N **Deep learning methods for multi-class pneumoconioses grading of chest radiographs** [12927-97]
- 12927 2O **COVID-19 score severity prediction using 3D-based deep learning models on lung ultrasound video: Could the system stand the test of time and of disease's evolution?** [12927-98]
- 12927 2P **Quantitative evaluation of activation maps for weakly-supervised lung nodule segmentation** [12927-99]
- 12927 2Q **Anatomical landmark detection in chest x-ray images using transformer-based networks** [12927-101]
- 12927 2R **Radiomic phenotypes of the background lung parenchyma from [18]F-FDG PET/CT images can augment tumor radiomics and clinical factors in predicting response after surgical resection of tumors in patients with non-small cell lung cancer** [12927-102]
- 12927 2S **Training CAde algorithms with synthetic datasets: augmenting clinical data for improved lung nodule detection** [12927-103]
- 12927 2T **Lung age estimation from low-dose chest CT images using deep learning** [12927-104]
- 12927 2U **Explainable AI for lung nodule detection and classification in CT images** [12927-105]

---

**POSTER SESSION: MUSCULOSKELETAL**

---

- 12927 2V **Interpretable rotator cuff tear diagnosis using MRI slides with CAMscore and SHAP** [12927-106]
- 12927 2W **Algorithmic shortcutting in medical image analysis** [12927-107]
- 12927 2X **Automated labeling of spondylolisthesis cases through spinal MRI radiology report interpretation using ChatGPT** [12927-108]

---

**POSTER SESSION: RADIOMICS**

---

- 12927 2Y **Radiomics and quantitative multi-parametric MRI for predicting uterine fibroid growth (Computer-Aided Diagnosis Best Scientific Poster Award)** [12927-109]
- 12927 2Z **Assessing radiomic feature robustness using agreement over image perturbation** [12927-110]
- 12927 30 **Radiomics feature based benign vs. malignant characterization of solid renal masses on MRI** [12927-111]
- 12927 31 **Temporal assessment of magnetic resonance imaging radiomic features to predict renal function decline in patients with autosomal dominant polycystic kidney disease** [12927-112]
- 12927 32 **The use of radiomics on computed tomography scans for differentiation of somatic BAP1 mutation status for patients with pleural mesothelioma** [12927-113]
- 12927 33 **Exploring the prognostic power and biological significance of a robust radiomic biomarker of overall survival in advanced non-small cell lung cancer patients treated with first-line immunotherapy** [12927-114]

---

**POSTER SESSION: SEGMENTATION**

---

- 12927 34 **Refining boundaries of the segment anything model in medical images using an active contour model** [12927-115]
- 12927 35 **Polyp-SAM: transfer SAM for polyp segmentation** [12927-117]
- 12927 36 **Tympanic membrane segmentation of video frames to create composite images using SAM** [12927-118]
- 12927 37 **Self-supervised learning without annotations to improve lung chest x-ray segmentation** [12927-120]
- 12927 38 **Weakly supervised learning for subcutaneous edema segmentation of abdominal CT using pseudo-labels and multi-stage nnU-Nets** [12927-121]
- 12927 39 **Automating tumor segmentation and tumor enhancement quantification of I-SPY2 data** [12927-122]

- 12927 3A **Comparative analysis of multiphase CT volumetric kidney segmentation: fine-tuning to domain adaptation** [12927-123]
- 12927 3B **Geometric domain adaptation for CBCT segmentation** [12927-124]
- 12927 3C **Auto-segmentation of hemi-diaphragms in free-breathing pediatric dynamic MRI** [12927-125]

---

**DIGITAL POSTER SESSION**

- 12927 3D **Deep learning-based diagnosis of thyroid tumors using histopathology images from thyroid nodule capsule** [12927-79]
- 12927 3E **Deeply learned bronchial structures driven automatic bronchopulmonary segments segmentation** [12927-116]
- 12927 3F **A robust multi-environment tongue image segmentation method for computer-aided tongue diagnosis** [12927-119]
- 12927 3G **Predicting cerebral small vessel disease through retinal scans and demographic data with Bayesian feature selection** [12927-89]



# Conference Committee

## *Symposium Chairs*

**Despina Kontos**, Penn Medicine (United States)  
**Joseph Y. Lo**, Carl E. Ravin Advanced Imaging Labs. (United States)

## *Conference Chairs*

**Weijie Chen**, U.S. Food and Drug Administration (United States)  
**Susan M. Astley**, The University of Manchester (United Kingdom)

## *Conference Program Committee*

**Sameer K. Antani**, U.S. National Library of Medicine (United States)  
**Samuel G. Armato III**, The University of Chicago (United States)  
**Ulas Bagci**, Northwestern University (United States)  
**Matthew S. Brown**, UCLA Center for Computer Vision & Imaging Biomarkers (United States)  
**Kenny H. Cha**, U.S. Food and Drug Administration (United States)  
**Heang-Ping Chan**, University of Michigan (United States)  
**Thomas M. Deserno**, Technische Universität Braunschweig (Germany)  
**Karen Drukker**, The University of Chicago (United States)  
**Jan Ehrhardt**, Universität zu Lübeck (Germany)  
**Catalin Fetita**, Télécom SudParis (France)  
**Aimilia Gastounioti**, Penn Medicine (United States)  
**Maryellen L. Giger**, The University of Chicago (United States)  
**Hayit Greenspan**, Tel Aviv University (Israel)  
**Lubomir M. Hadjiiski**, University of Michigan (United States)  
**Horst K. Hahn**, Fraunhofer MEVIS (Germany) and Jacobs University Bremen (Germany)  
**Takeshi Hara**, Gifu University School of Medicine (Japan)  
**Anja B. Hennemuth**, Fraunhofer-Institut für Digitale Medizin MEVIS (Germany)  
**Helen Hong**, Seoul Women's University (Korea, Republic of)  
**Khan M. Iffekharuddin**, Old Dominion University (United States)  
**JongHyo Kim**, Seoul National University Hospital (Korea, Republic of)  
**Despina Kontos**, Columbia University Irving Medical Center (United States)  
**Juhun Lee**, University of Pittsburgh (United States)  
**Zhengrong Jerome Liang**, Stony Brook University (United States)  
**Marius George Linguraru**, Children's National Medical Center (United States)  
**Hongbing Lu**, PLA Air Force Military Medical University (China)  
**Maciej A. Mazurowski**, Duke University (United States)

**Fabrice Meriaudeau**, Université de Bourgogne (France)  
**Kensaku Mori**, Nagoya University (Japan)  
**Chisako Muramatsu**, Shiga University (Japan)  
**Janne J. Näppi**, Massachusetts General Hospital (United States) and  
Harvard Medical School (United States)  
**Carol L. Novak**, Siemens Healthineers (United States)  
**Nicholas A. Petrick**, U.S. Food and Drug Administration (United States)  
**Antonio R. Porras**, Children's National Health System (United States)  
**Prateek Prasanna**, Stony Brook University (United States)  
**Letícia Rittner**, University of Campinas (Brazil)  
**Ravi K. Samala**, U.S. Food and Drug Administration (United States)  
**Clarisa I. Sánchez-Gutiérrez**, University of Amsterdam (Netherlands)  
**Amber L. Simpson**, Queen's University (Canada)  
**Ronald M. Summers**, National Institutes of Health Clinical Center  
(United States)  
**Kenji Suzuki**, Tokyo Institute of Technology (Japan)  
**Jonas Teuwen**, Netherlands Cancer Institute (Netherlands) and  
Radboud University Medical Center (Netherlands)  
**Pallavi Tiwari**, University of Wisconsin-Madison (United States)  
**Heather M. Whitney**, The University of Chicago (United States)  
**Matthias Wilms**, University of Calgary (Canada)  
**Axel Wismüller**, University of Rochester Medical Center (United States)  
**Shandong Wu**, University of Pittsburgh (United States)  
**Xiaofeng Yang**, Emory University School of Medicine (United States)  
**Hiroyuki Yoshida**, Massachusetts General Hospital (United States) and  
Harvard Medical School (United States)  
**Chuan Zhou**, Michigan Medicine (United States)