# PROGRESS IN BIOMEDICAL OPTICS AND IMAGING Vol. 26 No. 52

# Medical Imaging 2025

# **Computer-Aided Diagnosis**

Susan M. Astley Axel Wismüller Editors

17–20 February 2025 San Diego, California, United States

Sponsored by SPIE

Cosponsored by Siemens Healthineers (Germany)

Published by SPIE

Volume 13407

Proceedings of SPIE, 1605-7422, V. 13407

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 2025: Computer-Aided Diagnosis*, edited by Susan M. Astley, Axel Wismüller, Proc. of SPIE 13407, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510685925 ISBN: 9781510685932 (electronic)

Published by **SPIE** P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) SPIE.org Copyright © 2025 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

xiii Conference Committee

## CLASSIFICATION

13407 03	Characterizing inherent image ordinality to improve multiclass classification [13407-2]
13407 04	A surface-based deep learning approach for cortical shape analysis [13407-3]
13407 05	Knowledge-driven deep learning: automated ultrasound diagnosis of follicular thyroid carcinoma [13407-4]
	ABDOMEN I
13407 06	Generative models for high-resolution synthetic image of gastric cancer for improved
	gastric cancer detection [13407-6]
13407 07	gastric cancer detection [13407-6] Comparative study on kidney tumor segmentation for partial nephrectomy planning using hybrid CNN-transformer networks [13407-7]
13407 07 13407 08	Comparative study on kidney tumor segmentation for partial nephrectomy planning using

# HEAD, NECK, AND EYE

13407 09	Improving orbital bone segmentation with diffusion models and consensus-based refinement in facial CT images [13407-9]
13407 0A	Graph-based representation of retinal lesions for an interpretable diagnosis of diabetic retinopathy [13407-10]
13407 OB	Contrast-enhanced image-guided learning for nasopharyngeal carcinoma diagnosis using non-contrast MRI (All-Conference Best Student Paper Award - Finalist) [13407-11]
13407 OC	A diffusion model-based self-explainable generative classifier for retinal image analysis [13407-12]
13407 OD	Multilabel learning and model visualization for reliable head and neck cancer radiotherapy outcome prediction [13407-13]
13407 OE	Visual acuity assessment from optical coherence tomography images using the foundation model RETFound [13407-14]

#### CAD AND PERCEPTION: JOINT SESSION WITH CONFERENCES 13407 AND 13409

- 13407 OF Explainable unsupervised TNM category differentiation in PET images with deep texture analysis [13407-15]
- 13407 0G Conflict avoidance in mammography: filtering datasets for breast cancer risk prediction [13407-16]
- 13407 0H Classification of range of OCT-angiography capillary density using multichannel deep learning models in diabetic retinopathy, aging macular degeneration, and radiation retinopathy [13407-17]

#### CARDIOVASCULAR

- 13407 01 Improved plaque detection and segmentation for atherosclerotic plaque burden assessment on non-contrast and contrast-enhanced abdominal CT scans: multi-institutional study [13407-18]
- 13407 0J Coronary artery centerline extraction using a robust lightweight CNN approach [13407-19]
- 13407 0K Optimizing deep learning for brain vessel segmentation in CT angiography: a study on domain adaptation and generalizability [13407-20]
- 13407 OL Outlier detection to identify presence of clinical confounders to AI performance: application to coronary angiography and LVEF prediction [13407-21]

### CHEST

13407 OM	Development of an AI-based smart imagery framing and truthing (SIFT) system to annotate pulmonary abnormalities with corresponding boundaries based on CT images [13407-22]
13407 ON	Leveraging clinical indications and demographics to improve multilabel abnormality classification in 3D chest CT scans [13407-23]
13407 OP	ETT-LDx: transformer-based landmark detection system for endotracheal tube placement verification in chest radiographs [13407-25]
13407 OQ	Leveraging curriculum learning to address out-of-distribution data and inter-observer variability for lung nodule diagnostic interpretation [13407-26]

#### BREAST

13407 OR LLaVA-MultiMammo: adapting vision-language models for explainable and comprehensive multiview mammogram analysis in breast cancer assessment [13407-28]

13407 OS	Exclude at your own peril: evaluating the omission of data in training AI breast cancer risk models [13407-29]
13407 OT	Al-driven race prediction from mammographic images: anatomical insights for Al model's bias mitigation [13407-30]
13407 OV	Developing breast dense tissue segmentation algorithm in digital breast tomosynthesis [13407-32]

#### METHODS

- 13407 0W Prospective study on the reproducibility of radiomic features in the setting of variable CT contrast timing: initial results [13407-33]
- 13407 0X Worse is better? Performance and bias implications of feature selection in radiomics-based survival analysis [13407-34]
- 13407 OY Interactive image diagnosis using test-time backpropagation from the auxiliary task [13407-35]
- 13407 0Z Importance of stratified sampling for use in the development of training and test sets: medical imaging AI applications [13407-36]

#### SEGMENTATION

- 13407 10 Dual-perspective virtual unfolding U-Net (DPVU-Net) models for comprehensive superficial skeletal muscles segmentation in CT images [13407-37]
- 13407 11 Cluster dice: a simple and fast approach for instance-based semantic segmentation evaluation via many-to-many matching [13407-38]
- 13407 12 GRN+: a simplified generative reinforcement network for tissue layer analysis in 3D ultrasound images for chronic low-back pain [13407-39]
- 13407 13 Improving U-Net segmentation of cutaneous chronic graft-versus-host disease in clinical photographs with semi-supervised training [13407-40]
- 13407 14 Benchmarking multiorgan segmentation tools for multiparametric T1-weighted abdominal MRI [13407-41]

#### BRAIN

- 13407 15 Parameter efficient fine-tuning of transformer-based masked autoencoder enhances resource constrained neuroimage analysis [13407-42]
- 13407 16 Investigation of multimodal deep-learning architectures for the classification of Alzheimer's disease and amyloid status [13407-43]

- 13407 17 Personalized prediction of tumor recurrence with image-guided physics-informed computational model in high-grade gliomas (Best Student Paper Award - Third Place; All-Conference Best Student Paper Award - Finalist) [13407-44]
- 13407 18 Two-level classification for differential diagnosis and molecular subtype classification of pediatric medulloblastoma from other posterior fossa tumors [13407-45]
- 13407 19 Large-scale nonlinear Granger causality (IsNGC) analysis of functional MRI data for schizophrenia classification [13407-46]
- 13407 1A WPDM: enhancing subarachnoid hemorrhage CT detection with Worley-Perlin noise diffusion on imbalanced data [13407-47]

#### **ABDOMEN II**

- 13407 1B Enhanced identification of pheochromocytoma and paragangliomas' genetic clusters from CT [13407-48]
- 13407 1C Predicting response to therapy in pancreatic ductal adenocarcinoma using convolutional neural networks [13407-49]
- 13407 1D Dynamic U-Net: adaptively calibrate features for abdominal multiorgan segmentation [13407-50]
- 13407 1E Leveraging anatomical priors for automated pancreas segmentation on abdominal CT (Best Student Paper Award - Second Place) [13407-51]

#### POSTER SESSION: ABDOMEN

- 13407 1G Masked image modeling in medical hyperspectral imaging: reconstruction evaluation and downstream tasks [13407-52]
- 13407 11 The search for CT imaging subtypes of colorectal liver metastases and the impacts of slice thickness [13407-54]
- 13407 1J Multiclass characterization of colorectal polyps under class imbalance using a calibrated cascade model [13407-55]
- 13407 1K Observer study: impact of case complexities and physician characteristics on AI-assisted treatment response assessment in bladder cancer [13407-56]
- 13407 1L Predicting early hepatic recurrence in patients with pancreatic ductal adenocarcinoma using handcrafted and deep radiomics features [13407-57]
- 13407 1M Context-aware focal modulation for detection of inflammatory bowel diseases from MRE images [13407-58]

13407 1N	A study on the performance of U-Net modifications in retroperitoneal tumor segmentation [13407-59]
13407 10	Demographic characteristics prediction using deep learning analysis of kidney imaging [13407-60]
13407 1P	Performance evaluation of a stacked classifier for predicting treatment response in unresectable colorectal liver metastases [13407-61]
13407 1Q	Leveraging persistent homology for liver tumour classification [13407-62]
13407 1R	PanNet: a feature-based attention aggregation model for segmenting pancreatic ductal adenocarcinoma on contrast-enhanced CT images of the abdomen [13407-63]
13407 15	Adaptive region-oriented masked vision retentive network for predicting macrovascular invasion in hepatocellular carcinoma [13407-65]
13407 IT	Automated hepatocellular carcinoma detection and segmentation in abbreviated MRI using vision transformers (Honorable Mention Poster Award) [13407-66]
13407 1U	Prediction of kidney function decline in patients with autosomal dominant polycystic kidney disease using radiomic features extracted from the non-cystic kidney parenchyma [13407-67]
13407 1V	Exploring transfer learning for deep learning polyp detection in colonoscopy images using YOLOv8 [13407-68]
13407 1W	Identifying key challenges in ovarian tumor classification: a comparative study using deep learning and radiomics [13407-69]
13407 1X	A fully automated pancreatic subregion segmentation tool for CT [13407-70]

#### POSTER SESSION: BRAIN

- 13407 1Y Rapid, automated prediction of post-stroke cognitive impairment for ischemic stroke [13407-71]
- 13407 12 Investigation of domain specific pretraining of a Swin transformer to improve Alzheimer's disease classification on three different brain imaging modalities [13407-73]
- 13407 20 Glioblastoma tumor segmentation using an ensemble of vision transformers [13407-74]
- 13407 21 Multioutput lesion-symptom mapping with explainable artificial intelligence in cerebral small vessel disease [13407-75]
- 13407 22 Assessing the efficacy of classical and deep neuroimaging biomarkers in early Alzheimer's disease diagnosis [13407-76]

- 13407 23 A comprehensive processing framework crafted for pediatric brain MRI [13407-77]
- 13407 24 A comparison of atlas- and DL-based brain segmentation in hybrid PET/MR for regional SUV quantification [13407-78]

## POSTER SESSION: BREAST

13407 25	Modal interaction attention-based multimodal fusion network for early prediction of response to neoadjuvant chemotherapy in breast cancer [13407-79]
13407 26	Optimizing mammography computer-aided detection: from bilateral learning to single-view inference [13407-80]
13407 27	Breast masses classification using a radiomic analysis in contrast-enhanced spectral mammography [13407-81]
13407 28	Pitfalls with anomaly detection for breast cancer risk prediction (Cum Laude Poster Award) [13407-82]
13407 29	Can artificial intelligence support less experienced radiologists in interpreting indeterminate mammographic screenings? [13407-83]
13407 2A	Breast cancer risk prediction using background parenchymal enhancement, radiomics, and symmetry features on MRI (Honorable Mention Poster Award) [13407-84]
13407 2B	Classification of pure DCIS cases in breast ultrasound images by multiscale contrastive learning [13407-85]
13407 2D	GhostTuDNet: accelerating tumor detection on CPUs with a compact and efficient model [13407-87]
	POSTER SESSION: CARDIOVASCULAR
13407 2E	Predicting high-risk plaque features using epicardial adipose tissue assessments from non-contrast CT calcium scoring scan [13407-90]
13407 2F	Al prediction of obstructive coronary artery disease using calcium-omics from non-contrast CT calcium scoring scans [13407-91]
13407 2G	Prediction of major adverse cardiovascular events (MACE) in Agatston low-risk patients using comprehensive AI analysis of low-cost screening CT calcium score exams [13407-92]
13407 2H	Uncertainty in automated stenosis quantification using multiview x-ray coronary angiography videos [13407-93]
13407 21	Automated cardiac chamber segmentation using non-contrast CT images [13407-94]

#### **POSTER SESSION: CHEST**

13407 2J	Automated detection of central chest lymph nodes for guided bronchoscopy [13407-95]
13407 2K	Ensemble artificial neural network lung nodule classification utilizing nodular and peri-nodular radiomics [13407-96]
13407 2L	Predicting future lung cancer risk in low-dose CT screening patients with AI tools [13407-98]
13407 2M	Enhanced semi-supervised lung CT segmentation with shape-aware CycleGAN synthesis of pathological data [13407-99]
13407 2N	Assessing tuberculosis detection and treatment outcome prediction in x-ray images: a cross-domain foundation model performance analysis [13407-100]
13407 20	Enhancing lung nodule classification with variational autoencoder-based image augmentation [13407-102]
13407 2P	Longitudinal assessment of lung lesion burden in CT [13407-103]
13407 2Q	Ordinal classification framework for multiclass grading of pneumoconiosis [13407-104]
13407 2R	Explainable deep learning for rib fracture detection in chest x-rays [13407-105]
13407 2S	Unsupervised CBCT quality improvement for quantitative image analysis in radiotherapy using patient-specific score-based prior (Best Student Paper Award - First Place) [13407-106]
	POSTER SESSION: CLASSIFICATION

- 13407 2U SentinelAdvMedical: toward adversarial attacks detection on medical image classification via out-of-distribution strategies [13407-108]
- 13407 2V Multiview contrastive learning for myelodysplastic syndrome screening : adding deep image representation to blood parameters [13407-109]
- 13407 2W Obesity prediction from structural MRI using conformal deep learning with uncertainty quantification [13407-110]
- 13407 2X Persistence image from 3D medical image: superpixel and optimized Gaussian coefficient [13407-112]
- 13407 2Y Feature learning and transfer learning approaches for classification of human burn wounds using multispectral SWIR imaging [13407-113]

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

- 13407 2Z Parsing disease heterogeneity in structural and functional MRI-derived measures using normative modeling and generative adversarial networks (GANs) [13407-114]
- 13407 31 Using an adult retinal image analysis foundation model for retinopathy of prematurity staging: are there benefits? [13407-116]
- 13407 32 A video classification method for diagnosing ear diseases using otoscope imaging [13407-117]
- 13407 33 **2.5D** mapping of the esophagus as imaging quality and completeness assuring extension for endoscopic computer-aided detection systems [13407-118]
- 13407 34 Retina layers thickness guided vision transformer for glaucoma diagnosis [13407-119]
- 13407 35 Survival prediction in head and neck cancer utilizing vision graph neural network on PET/CT images [13407-120]

#### POSTER SESSION: METHODS

- 13407 36 GS-TransUNet: integrated 2D Gaussian splatting and transformer UNet for accurate skin lesion analysis [13407-122]
- 13407 38 Parameter-efficient fine-tuning and few-shot learning of multiscale vision transformers for liver tumour segmentation in CT [13407-125]
- 13407 39 Leveraging prior knowledge in machine intelligence for improving cancer diagnostic accuracy [13407-126]
- 13407 3A Federated vs. centralized learning for medical image classification and segmentation [13407-127]
- 13407 3C Is segmentation performance of deep-learning models affected by cancer type? A performance analysis on PET/CT [13407-130]
- 13407 3D A one-shot/few-shot interactive segmentation method for CT image segmentation [13407-131]

#### POSTER SESSION: MUSCULOSKELETAL

- 13407 3E Pediatric osteopenia prediction and interpretation in wrist x-rays [13407-132]
- 13407 3F Multitask transfer learning based on multiview MRI images for diagnosis of patellar instability [13407-133]

13407 3G Toward non-invasive diagnosis of Bankart lesions with deep learning [13407-134]

# DIGITAL POSTER SESSION

13407 3H	Towards synergistic deep learning models for volumetric cirrhotic liver segmentation in MRIs [13407-5]
13407 31	Ensembled YOLO for multiorgan detection in chest x-rays [13407-24]
13407 3J	Al-assisted prostate cancer detection and localisation on biparametric MR by classifying radiologist-positives [13407-64]
13407 3K	Interpretable deep learning model for distinguishing tumor pseudoprogression from true progression using MRI imaging of glioblastoma patients [13407-72]
13407 3L	Semantic segmentation of TB in chest x-rays: a new dataset and generalization evaluation [13407-97]
13407 3M	Weighted ensemble learning for accurate COVID-19 CT image segmentation [13407-101]
13407 3N	Vision transformer for efficient chest x-ray and aastrointestinal image classification

13407 3N Vision transformer for efficient chest x-ray and gastrointestinal image classification [13407-111]