

*Medical Imaging 2024*

---

# **Image Perception, Observer Performance, and Technology Assessment**

**Claudia R. Mello-Thoms**

**Yan Chen**

*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 12929**

Proceedings of SPIE, 1605-7422, V. 12929

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

Medical Imaging 2024: Image Perception, Observer Performance, and Technology Assessment,  
edited by Claudia R. Mello-Thoms, Yan Chen, Proc. of SPIE Vol. 12929, 1292901  
© 2024 SPIE · 1605-7422 · doi: 10.1117/12.3030951

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: Image Perception, Observer Performance, and Technology Assessment*, edited by Claudia R. Mello-Thoms, Yan Chen, Proc. of SPIE 12929, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510671621  
ISBN: 9781510671638 (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

vii *Conference Committee*

---

## BREAST I

---

- 12929 03 **Artificial intelligence can improve cancer detection in a double reading screening mammography scenario** [12929-2]
- 12929 04 **CNN-based transfer learning with 10-fold cross-validation: a novel approach for customized education of mammography training** [12929-3]
- 12929 05 **Deep learning analysis of breast arterial calcifications: a study on predicting cardiovascular disease in women** [12929-4]
- 12929 06 **Ordering mammograms for improved mammography screening performance** [12929-6]

---

## OBSERVER PERFORMANCE

---

- 12929 07 **Modeling human observer detection for varying data acquisition in undersampled MRI for two-alternative forced choice (2-AFC) and forced localization tasks** [12929-7]
- 12929 08 **Radiologists' performance in diagnosing silicosis on high-resolution computed tomography (HRCT) scans: an online platform** [12929-9]
- 12929 09 **Comparing multiple-target search performance and the satisfaction of search effect between 2D and segmented-3D search** [12929-10]
- 12929 0A **Recognition of radiological decision errors from eye movement during chest x-ray readings** [12929-11]

---

## MODEL OBSERVERS

---

- 12929 0B **A hybrid CNN-Swin Transformer network as deep learning model observer to predict human observer performance in 2AFC trial** [12929-12]
- 12929 0C **Adaptive learning approach to improve generalization performance of a domain-aware CNN-based ideal model observer** [12929-13]
- 12929 0D **Addition of a threshold mechanism to model observers for medical image quality assessment** [12929-14]

- 12929 OE **Investigation of different model observers for including signal-detectability in the training of CNNs for CT image reconstruction** [12929-15]
- 12929 OF **Computed tomography optimization using a volumetric channelized Hotelling observer approach for energy integrating and photon-counting CT scanners** [12929-16]

---

**JOINT SESSION WITH CONFERENCES 12927 AND 12929**

---

- 12929 OG **Sequestration of imaging studies in MIDRC: using load factor to minimize algorithm performance overestimation and image reuse** [12929-17]
- 12929 OH **Ambient-Pix2PixGAN for translating medical images from noisy data** [12929-18]

---

**BREAST II**

---

- 12929 OJ **Predicting the gist of breast cancer on a screening mammogram using global radiomic features** [12929-20]
- 12929 OK **Contrast enhanced mammography (CEM): is experience necessary? an inter and intra-reader agreement study for lesion classification and breast density** [12929-21]
- 12929 OL **Cancer-rates in completion-time defined batches of screening DBT images** [12929-23]
- 12929 OM **Exploring varied time intervals on diagnostic performances of radiologists and trainees via test sets** [12929-24]

---

**TECHNOLOGY ASSESSMENT AND STATISTICS**

---

- 12929 ON **Unsupervised deep learning for the matching of vascular anatomy in multiple digital subtraction angiograms** [12929-25]
- 12929 OO **Can patient-specific acquisition protocol improve performance on defect detection task in myocardial perfusion SPECT?** [12929-26]
- 12929 OP **Use of equivalent relative utility to evaluate artificial intelligence-based rule-out devices** [12929-27]
- 12929 OQ **An alternative parameterization for the binormal ROC curve, with applications to sizing and simulation studies** [12929-28]
- 12929 OR **A bivariate binormal model for modelling double reading of screening mammograms** [12929-29]

---

## TECHNOLOGY ASSESSMENT II

---

- 12929 OS **Understanding the generalizability of a convolutional neural network-based model observer for breast tomosynthesis images with different volume glandular fractions** [12929-30]
- 12929 OT **3D echocardiogram visualization: a new method based on focus + context** [12929-31]
- 12929 OU **SkinSAM: adapting the segmentation anything model for skin cancer segmentation** [12929-32]
- 12929 OV **Image texture-based classification methods to mimic perceptual models of search and localization in medical images** [12929-34]
- 12929 OW **How accurately can quantitative imaging methods be ranked without ground truth: an upper bound on no-gold-standard evaluation** [12929-35]

---

## POSTER SESSION

---

- 12929 OX **Stimulus design for 3D-CSF measurements and evaluation of its impact on the human visual system** [12929-36]
- 12929 OY **Structured radiology report text analysis using natural language processing for automatic billing** [12929-37]
- 12929 OZ **A foveated channelized Hotelling observer model extended to anatomical liver CT images (Image Perception, Observer Performance, and Technology Assessment Poster Award)** [12929-38]
- 12929 10 **Computer vision-based guidance tool for correct radiographic hand positioning** [12929-39]
- 12929 11 **Analysis of uncertainty in accuracy of the reference segmentation of ultrasound images of breast tumors** [12929-40]
- 12929 13 **AmbientCycleGAN for establishing interpretable stochastic object models based on mathematical phantoms and medical imaging measurements** [12929-42]
- 12929 14 **Modeling decision making in breast cancer screening using deep learning: usability of a Gabor convolutional layer** [12929-43]
- 12929 16 **Deep learning-based auto-segmentation of paraganglioma for growth monitoring** [12929-45]

---

## DIGITAL POSTER SESSION

---

- 12929 17 **The performance of breast screening readers in a specificity-focused test set-based assessment scheme in a national breast screening program** [12929-5]



# Conference Committee

## *Symposium Chairs*

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

## *Conference Chairs*

**Claudia R. Mello-Thoms**, University Iowa Carver College of Medicine  
(United States) and University of Pittsburgh (United States)  
**Yan Chen**, The University of Nottingham (United Kingdom)

## *Conference Program Committee*

**Craig K. Abbey**, University of California, Santa Barbara (United States)  
**Stephen Adamo**, University of Central Florida (United States)  
**Mark A. Anastasio**, Washington University in St. Louis (United States)  
**Susan M. Astley**, The University of Manchester (United Kingdom)  
**Jongduk Baek**, Yonsei University (Korea, Republic of)  
**François O. Bochud**, Centre Hospitalier Universitaire Vaudois  
(Switzerland)  
**Jovan G. Brankov**, Illinois Institute of Technology (United States)  
**Brandon D. Gallas**, U.S. Food and Drug Administration (United States)  
**Howard C. Gifford**, University of Houston (United States)  
**Stephen L. Hillis**, The University of Iowa (United States)  
**Elizabeth A. Krupinski**, Emory University School of Medicine  
(United States)  
**Matthew A. Kupinski**, College of Optical Sciences, The University of  
Arizona (United States)  
**Miguel A. Lago**, U.S. Food and Drug Administration (United States)  
**Sarah J. Lewis**, The University of Sydney (Australia)  
**Mark F. McEntee**, University College Cork (Ireland)  
**Robert M. Nishikawa**, University of Pittsburgh (United States)  
**Ljiljana Platšša**, Universiteit Gent (Belgium)  
**Ingrid S. Reiser**, The University of Chicago (United States)  
**Frank W. Samuelson**, U.S. Food and Drug Administration  
(United States)  
**Sian Taylor-Phillips**, The University of Warwick (United Kingdom)  
**Pontus A. Timberg**, Scania's Universiteit Hospital (Sweden)  
**Weimin Zhou**, Shanghai Jiao Tong University (China)

