Contents

Screening

Agreement Between Radiologists’ Interpretations of Screening Mammograms. ................................................................. 3  
 Robert M. Nishikawa, Christopher E. Comstock, Michael N. Linver,  
 Gillian M. Newstead, Vinay Sandhir, and Robert A. Schmidt

Quality Control of Breast Tomosynthesis for a Screening Trial: Preliminary Experience .............................................................................. 11  
 Aili Maki, James Mainprize, Gordon Mawdsley, and Martin Yaffe

Summary of Outcomes from Consecutive Years of Tomosynthesis Screening at an American Academic Institution ................................. 20  
 Emily F. Conant, Andrew Oustimov, Samantha P. Zuckerman,  
 Elizabeth S. McDonald, Susan P. Weinstein, Andrew D.A. Maidment,  
 Bruno Barufaldi, Marie Synnestvedt, and Mitchell Schnall

CAD

LUT-QNE: Look-Up-Table Quantum Noise Equalization in Digital Mammograms. ................................................................. 27  
 Alessandro Bria, Claudio Marrocco, Jan-Jurre Mordang,  
 Nico Karssemeijer, Mario Molinara, and Francesco Tortorella

Automatic Microcalcification Detection in Multi-vendor Mammography Using Convolutional Neural Networks ........................................... 35  
 Jan-Jurre Mordang, Tim Janssen, Alessandro Bria, Thijs Kooi,  
 Albert Gubern-Merida, and Nico Karssemeijer

Similar Image Retrieval of Breast Masses on Ultrasonography Using Subjective Data and Multidimensional Scaling ....................................................... 43  
 Chisako Muramatsu, Tetsuya Takahashi, Takako Morita, Tokiko Endo,  
 and Hiroshi Fujita

A Comparison Between a Deep Convolutional Neural Network and Radiologists for Classifying Regions of Interest in Mammography ............. 51  
 Thijs Kooi, Albert Gubern-Merida, Jan-Jurre Mordang, Ritse Mann,  
 Ruud Pijnappel, Klaas Schuur, Ard den Heeten, and Nico Karssemeijer
Mammography, Tomosynthesis and Breast CT

Diagnostic Usefulness of Synthetic MMG (SMMG) with DBT (Digital Breast Tomosynthesis) for Clinical Setting in Breast Cancer Screening .......................... 59
  Nachiko Uchiyama, Mari Kikuchi, Minoru Machida, Yasuaki Arai, Ryusuke Murakami, Kyoichi Otsuka, Anna Jerebko, Michael Kelm, and Thomas Mertelmeier

Development of Digital Phantom for Digital Mammography with Soft-Copy Reading ................................................................. 68
  Norimitsu Shinohara, Katsuhei Horita, and Tokiko Endo

Improving the Quality of Optimisation Studies Undertaken in Mammography and General Radiology Using High Level Blended Teaching ......................................................... 75
  Alistair Mackenzie, Kenneth C. Young, Saartje Creten, Nelis Van Peteghem, and Hilde Bosmans

Simplified Method for FROC Observer Study to Evaluate the Diagnostic Accuracy of a Digital Breast Imaging System by Using a CDMAM Phantom .................................................. 83
  Rie Tanaka, Fujiyo Akita, Daisuke Fukuoka, Yusuke Bamba, and Junji Shiraishi

Equivocal Breast Findings Are Reduced with Digital Tomosynthesis .................. 89
  Maram Alakhras, Claudia Mello-Thoms, Roger Bourne, Mary Rickard, and Patrick C. Brennan

  Ai Nakajima, Misa Kato, Chizuru Okamoto, Akiko Ihori, Tsutomu Yamakawa, Shuichiro Yamamoto, Masahiro Okada, and Yoshie Kodera

Towards Optimization of Image Quality as a Function of Breast Thickness in Mammography: An Investigation of the Breast Thickness Compensation Schemes on Analogue and Digital Mammography Units ......................... 107
  Lesley J. Grattan and Adam Workman

Lower Recall Rates Reduced Readers’ Sensitivity in Screening Mammography ..................................................................................... 116
  Norhashimah Mohd Norsuddin, Claudia Mello-Thoms, Warren Reed, Patrick C. Brennan, and Sarah Lewis

Simulation of Positron Emission Mammography Imaging with Pixelated CdTe .................................................................................. 122
  Machiel Kolstein and Mokhtar Chmeissani
The International Use of PERFORMS Mammographic Test Sets

*Yan Chen, Leng Dong, Hossein Nevisi, and Alastair Gale*

Dependence of Contrast-Enhanced Lesion Detection in Contrast-Enhanced Digital Breast Tomosynthesis on Imaging Chain Design

*David A. Scaduto, Yue-Houng Hu, Yihuan Lu, Hailiang Huang, Jingxuan Liu, Kim Rinaldi, Gene Gindi, Paul R. Fisher, and Wei Zhao*

Evaluation of the *BreastSimulator* Software Platform for Breast Tomography: Preliminary Results

*Giovanni Mettivier, Kristina Bliznakova, Francesca Di Lillo, Antonio Sarno, and Paolo Russo*

Effect of Dose on the Detection of Micro-Calcification Clusters for Planar and Tomosynthesis Imaging

*Alistair Mackenzie, Andria Hadjipanteli, Premkumar Elangovan, Padraig T. Looney, Rebecca Ealden, Lucy M. Warren, David R. Dance, Kevin Wells, and Kenneth C. Young*

Dosimetric Modeling of Mammography Using the Monte Carlo Code PENELIOPE and Its Validation

*Jason Tse, Roger Fulton, and Donald McLean*

Nonlinear Local Transformation Based Mammographic Image Enhancement

*Cuiping Ding, Min Dong, Hongjuan Zhang, Yide Ma, Yaping Yan, and Reyer Zwiggelaar*

A Hybrid Detection Scheme of Architectural Distortion in Mammograms Using Iris Filter and Gabor Filter

*Mizuki Yamazaki, Atsushi Teramoto, and Hiroshi Fujita*

Performance of Breast Cancer Screening Depends on Mammographic Compression

*Katharina Holland, Ioannis Sechopoulos, Gerard den Heeten, Ritse M. Mann, and Nico Karssemeijer*

Monte Carlo Evaluation of Normalized Glandular Dose Coefficients in Mammography

*Antonio Sarno, Giovanni Mettivier, Francesca Di Lillo, and Paolo Russo*

Breast Density Assessment Using Breast Tomosynthesis Images

*Pontus Timberg, Andreas Fieselmann, Magnus Dustler, Hannie Petersson, Hanna Sartor, Kristina Lång, Daniel Fornvik, and Sophia Zackrisson*
Detailed Analysis of Scatter Contribution from Different Simulated Geometries of X-ray Detectors ......................................................... 203
Elena Marimon, Hammadi Nait-Charif, Asmar Khan, Philip A. Marsden, and Oliver Diaz

Calibration Procedure of Three Component Mammographic Breast Imaging . . . 211
Serghei Malkov, Jesus Avila, Bo Fan, Bonnie Joe, Karla Kerlikowske, Maryellen Giger, Karen Drukteinis, Leila Kazemi, Malesa Pereira, and John Shepherd

Local Detectability Maps as a Tool for Predicting Masking Probability and Mammographic Performance ...................................................... 219
Olivier Alonzo-Proulx, James Mainprize, Heba Hussein, Roberta Jong, and Martin Yaffe

The Effect of Breast Composition on a No-reference Anisotropic Quality Index for Digital Mammography ................................................. 226

Grid-Less Imaging with Anti-scatter Correction Software in 2D Mammography: A JAFROC Study Using Simulated Lesions ......................... 234
Frédéric Bemelmans, Nelis Van Peteghem, Xenia Bramaje Adversalo, Elena Salvagnini, Chantal Van Ongeval, and Hilde Bosmans

Towards a Phantom for Multimodality Performance Evaluation of Breast Imaging: A 3D Structured Phantom with Simulated Lesions Tested for 2D Digital Mammography ................................................................. 243
Kristina Tri Wigati, Lesley Cockmartin, Nicholas Marshall, Djarwani S. Soejoko, and Hilde Bosmans

Novel Technology

Simulation and Visualization to Support Breast Surgery Planning ........... 257
Joachim Georgii, Torben Paetz, Markus Harz, Christina Stoecker, Michael Rothgang, Joseph Colletta, Kathy Schilling, Margrethe Schlooz-Vries, Ritse M. Mann, and Horst K. Hahn

Single Section Biomarker Measurement and Colocalization via a Novel Multiplexing Staining Technology ........................................... 265
Tyna Hope, Dan Wang, Sharon Nofech-Mozes, Kela Liu, Sireesha Kaanumalle, Yousef Al-Kohafi, Kashan Shaikh, Robert Filkins, and Martin Yaffe
A Pilot Study on Radiation Dose from Combined Mammography Screening in Australia ................................................................. 335
   Jason Tse, Roger Fulton, Mary Rickard, Patrick Brennan, and Donald McLean

Simulation of Dose Reduction in Digital Breast Tomosynthesis ............ 343
   Lucas R. Borges, Igor Guerrero, Predrag R. Bakic, Andrew D.A. Maidment, Homero Schiabel, and Marcelo A.C. Vieira

Non-expert Classification of Microcalcification Clusters Using Mereotopological Barcodes ..................................................... 351
   Harry Strange and Reyer Zwiggelaar

Mammographic Segmentation and Density Classification: A Fractal Inspired Approach .......................................................... 359
   Wenda He, Sam Harvey, Arne Juette, Erika R.E. Denton, and Reyer Zwiggelaar

Whole Mastectomy Volume Reconstruction from 2D Radiographs and Its Mapping to Histology .................................................. 367
   Thomy Mertzanidou, John H. Hipwell, Sara Reis, Babak Ehteshami Bejnordi, Meyke Hermsen, Mehmet Dalmis, Suzan Vreemann, Bram Platel, Jeroen van der Laak, Nico Karssemeijer, Ritse Mann, Peter Bult, and David J. Hawkes

Image Processing, CAD, Breast Density and New Technology

Accurate Quantification of Glandularity and Its Applications with Regard to Breast Radiation Doses and Missed Lesion Rates During Individualized Screening Mammography .............................................. 377
   Mika Yamamuro, Kanako Yamada, Yoshiyuki Asai, Koji Yamada, Yoshiaki Ozaki, Masao Matsumoto, and Takamichi Murakami

A Preliminary Study on Breast Cancer Risk Analysis Using Deep Neural Network ................................................................. 385
   Wenqing Sun, Tzu-Liang (Bill) Tseng, Bin Zheng, and Wei Qian

A Novel Breast Cancer Risk Assessment Scheme Design Using Dual View Mammograms .......................................................... 392
   Wenqing Sun, Tzu-Liang (Bill) Tseng, Bin Zheng, Jiangying Zhang, and Wei Qian

Automated Multimodal Computer Aided Detection Based on a 3D-2D Image Registration .......................................................... 400
   T. Hopp, B. Neupane, and N.V. Ruiter
Contrast-Enhanced Imaging

Development of Fully-3D CT in a Hybrid SPECT-CT Breast Imaging System .................................................. 567
Martin P. Tornai, Jainil P. Shah, Steve D. Mann, and Randolph L. McKinley

Volumetric Breast-Density Measurement Using Spectral Photon-Counting Tomosynthesis: First Clinical Results. ................................................................. 576
Erik Fredenberg, Karl Berggren, Matthias Bartels, and Klaus Erhard

Texture Analysis of Contrast-Enhanced Digital Mammography (CEDM) Images ................................................................. 585
Maria-Julieta Mateos, Alfonso Gastelum, Jorge Márquez, and Maria-Ester Brandan

Kristen C. Lau, Raymond J. Acciavatti, and Andrew D.A. Maidment

Phase Contrast Breast Imaging

Contrast Detail Phantoms for X-ray Phase-Contrast Mammography and Tomography ................................................................. 611
Kristina Bliznakova, Giovanni Mettivier, Paolo Russo, and Ivan Buliev

Image Quality and Radiation Dose in Propagation Based Phase Contrast Mammography with a Microfocus X-ray Tube: A Phantom Study. ................................. 618
Roberta Castriconi, Giovanni Mettivier, and Paolo Russo

Phase-Contrast Clinical Breast CT: Optimization of Imaging Setups and Reconstruction Workflows ................................................................. 625

Improving Breast Mass Segmentation in Local Dense Background: An Entropy Based Optimization of Statistical Region Merging Method ................................. 635
Shelda Sajeev, Mariusz Bajger, and Gobert Lee
Simulations and Virtual Clinical Trials

System Calibration for Quantitative Contrast-Enhanced Digital Breast Tomosynthesis (CEDBT) ........................................... 645
   Melissa L. Hill, James G. Mainprize, and Martin J. Yaffe

Rapid Generation of Structured Physical Phantoms for Mammography and Digital Breast Tomosynthesis ............................. 654
   Lynda Ikejimba, Christian Graff, and Stephen Glick

A Novel 3D Stochastic Solid Breast Texture Model for X-Ray Breast Imaging ................................................................. 660
   Zhijin Li, Agnès Desolneux, Serge Muller, and Ann-Katherine Carton

OPTIMAM Image Simulation Toolbox - Recent Developments and Ongoing Studies ......................................................... 668
   Premkumar Elangovan, Andria Hadjipanteli, Alistair Mackenzie, David R. Dance, Kenneth C. Young, and Kevin Wells

Impact of Clinical Display Device on Detectability of Breast Masses in 2D Digital Mammography: A Virtual Clinical Study .......... 676
   Alaleh Rashidnasab, Frédéric Bemelmans, Nicholas W. Marshall, Tom Kimpe, and Hilde Bosmans

Author Index ........................................................................... 685
Breast Imaging
Tingberg, A.; Lång, K.; Timberg, P. (Eds.)
2016, XVIII, 688 p. 322 illus., Softcover
ISBN: 978-3-319-41545-1