PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 7259

, "Front Matter: Volume 7259," Proc. SPIE 7259, Medical Imaging 2009: Image Processing, 725901 (10 June 2009); doi: 10.1117/12.829077

Event: SPIE Medical Imaging, 2009, Lake Buena Vista (Orlando Area), Florida, United States

Medical Imaging 2009

Image Processing

Josien P. W. Pluim

Benoit M. Dawant

Editors

8–10 February 2009

Lake Buena Vista, Florida, United States

Sponsored by

SPIE

Cooperating Organizations

AAPM—American Association of Physicists in Medicine (United States)

APS—American Physiological Society (United States)

CARS—Computer Assisted Radiology and Surgery (Germany)

IS&T—The Society for Imaging Science and Technology

MIPS—Medical Image Perception Society (United States)

RSNA—Radiological Society of North America (United States)

SIIM—Society for Imaging Informatics in Medicine (United States)

SMI—The Society for Molecular Imaging

The DICOM Standards Committee (United States)

Published by

SPIE

Part One of Two Parts

Volume 7259

Proceedings of SPIE, 1605-7422, v. 7259

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

The papers included 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. The papers published in these proceedings 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 this book:

Author(s), "Title of Paper," in *Medical Imaging 2009: Image Processing*, edited by Josien P. W. Pluim, Benoit M. Dawant, Proceedings of SPIE Vol. 7259 (SPIE, Bellingham, WA, 2009) Article CID Number.

ISSN 1605-7422

ISBN 9780819475107

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2009, Society of Photo-Optical Instrumentation Engineers.

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 copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online 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. The CCC fee code is 1605-7422/09/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four 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. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID number.

Contents

xxiii	Conference Committee
xxv	Introduction
xxvii	In Memoriam: Robert F. Wagner (1938–2008)

Part One

SESSION 1 SEGMENTATION I

7259 02	Hierarchical parsing and semantic navigation of full body CT data [7259-01] S. Seifert, Siemens AG (Germany); A. Barbu, Florida State Univ. (United States); S. K. Zhou, D. Liu, Siemens Corporate Research (United States); J. Feulner, M. Huber, M. Suehling, Siemens AG (Germany); A. Cavallaro, Univ. Hospital Erlangen (Germany); D. Comaniciu, Siemens Corporate Research (United States)
7259 03	Probabilistic pairwise Markov models: application to prostate cancer detection [7259-02] J. Monaco, Rutgers Univ. (United States); J. E. Tomaszewski, M. D. Feldman, Univ. of Pennsylvania (United States); M. Moradi, P. Mousavi, A. Boag, C. Davidson, P. Abolmaesumi, Queen's Univ. (Canada); A. Madabhushi, Rutgers Univ. (United States)
7259 04	Tissue probability map constrained CLASSIC for increased accuracy and robustness in serial image segmentation [7259-138] Z. Xue, The Methodist Hospital Research Institute (United States) and Weill Cornell Medical College (United States); D. Shen, Univ. of North Carolina, Chapel Hill (United States); S. T. C. Wong, The Methodist Hospital Research Institute (United States) and Weill Cornell Medical College (United States)
7259 05	WERITAS: weighted ensemble of regional image textures for ASM segmentation (Best Student Paper Award) [7259-04] R. Toth, S. Doyle, Rutgers Univ. (United States); M. Rosen, Univ. of Pennsylvania (United States); A. Kalyanpur, Teleradiology Solutions (India); S. Pungavkar, Dr. Balabhai Nanavati Hospital (India); B. N. Bloch, E. Genega, N. Rofsky, R. E. Lenkinski, Beth Israel Deaconess Medical Ctr. (United States); A. Madabhushi, Rutgers Univ. (United States)
7259 06	Automatic left ventricle detection in MRI images using marginal space learning and component-based voting [7259-05] Y. Zheng, X. Lu, B. Georgescu, Siemens Corporate Research (United States); A. Littmann, E. Mueller, Siemens Healthcare (Germany); D. Comaniciu, Siemens Corporate Research (United States)

SESSION 2 STATISTICAL MODELS

- 7259 07 **Model driven quantification of left ventricular function from sparse single-beat 3D echocardiography** [7259-06]
M. Ma, Leiden Univ. Medical Ctr. (Netherlands); M. van Stralen, Erasmus MC (Netherlands); J. H. C. Reiber, Leiden Univ. Medical Ctr. (Netherlands); J. G. Bosch, Erasmus MC (Netherlands); B. P. F. Lelieveldt, Leiden Univ. Medical Ctr. (Netherlands)
- 7259 08 **Shape-based diagnosis of the aortic valve** [7259-07]
R. I. Ionasec, Siemens Corporate Research (United States) and Technical Univ. Munich (Germany); A. Tsymbal, Siemens Corporate Technology (Germany); D. Vitanovski, B. Georgescu, S. K. Zhou, Siemens Corporate Research (United States); N. Navab, Technical Univ. Munich (Germany); D. Comaniciu, Siemens Corporate Research (United States)
- 7259 09 **RABBIT: rapid alignment of brains by building intermediate templates** [7259-08]
S. Tang, Y. Fan, M. Kim, D. Shen, The Univ. of North Carolina at Chapel Hill (United States)
- 7259 0A **Bayes estimation of shape model with application to vertebrae boundaries** [7259-09]
A. Crimi, Univ. of Copenhagen (Denmark); A. Ghosh, Nordic Bioscience A/S (Denmark); J. Sporning, Univ. of Copenhagen (Denmark); M. Nielsen, Univ. of Copenhagen (Denmark) and Nordic Bioscience A/S (Denmark)
- 7259 0B **Automated vertebra identification in CT images** [7259-10]
M. Ehm, Philips Research Europe (Germany); T. Klinder, Philips Research Europe (Germany) and Leibniz Univ. of Hannover (Germany); R. Kneser, C. Lorenz, Philips Research Europe (Germany)
- 7259 0C **GC-ASM: synergistic integration of active shape modeling and graph-cut methods** [7259-11]
X. Chen, J. K. Udupa, D. A. Torigian, A. Alavi, Univ. of Pennsylvania (United States)

SESSION 3 STATISTICAL METHODS

- 7259 0D **Comparing the sensitivity of wavelets, Minkowski functionals, and scaling indices to higher order correlations in MR images of the trabecular bone using surrogates** [7259-12]
C. Rth, Max-Planck-Institut fr extraterrestrische Physik (Germany); J. Bauer, D. Mller, Technische Univ. Mnchen (Germany); I. Sidorenko, Max-Planck-Institut fr extraterrestrische Physik (Germany); T. M. Link, Technische Univ. Mnchen (Germany) and Univ. of California, San Francisco (United States); R. Monetti, Max-Planck-Institut fr extraterrestrische Physik (Germany)
- 7259 0E **A similarity retrieval method for functional magnetic resonance imaging (fMRI) statistical maps** [7259-13]
R. F. Tungaraza, J. Guan, S. Rolfe, I. Atmosukarto, A. Poliakov, N. M. Kleinhans, E. Aylward, Univ. of Washington (United States); J. Ojemann, Seattle Children's Hospital (United States); J. F. Brinkley, L. G. Shapiro, Univ. of Washington (United States)
- 7259 0F **LSTGEE: longitudinal analysis of neuroimaging data** [7259-73]
Y. Li, H. Zhu, Y. Chen, H. An, J. Gilmore, W. Lin, D. Shen, The Univ. of North Carolina at Chapel Hill (United States)

- 7259 OG **Medical x-ray image enhancement by intra-image and inter-image similarity** [7259-15]
A. Gooßen, Hamburg Univ. of Technology (Germany); T. Pralow, Philips Medical Systems (Germany); R.-R. Grigat, Hamburg Univ. of Technology (Germany)
- 7259 OH **A new method for thresholding and gradient optimization at different tissue interfaces using class uncertainty** [7259-16]
Y. Liu, P. K. Saha, Univ. of Iowa (United States)

SESSION 4 REGISTRATION I

- 7259 OI **Overlap invariance of cumulative residual entropy measures for multimodal image alignment** [7259-17]
N. D. Cahill, Univ. of Oxford (United Kingdom) and Carestream Health, Inc. (United States); J. A. Schnabel, J. A. Noble, Univ. of Oxford (United Kingdom); D. J. Hawkes, Ctr. for Medical Image Computing, Univ. College London (United Kingdom)
- 7259 OJ **Improved fMRI time-series registration using joint probability density priors** [7259-18]
R. Bhagalia, J. A. Fessler, B. Kim, C. R. Meyer, Univ. of Michigan (United States)
- 7259 OK **Automatic detection of registration errors for quality assessment in medical image registration** [7259-19]
S. E. A. Muenzing, K. Murphy, B. van Ginneken, J. P. W. Pluim, Univ. Medical Ctr. Utrecht (Netherlands)
- 7259 OL **A parallel-friendly normalized mutual information gradient for free-form registration** [7259-20]
M. Modat, G. R. Ridgway, Z. A. Taylor, D. J. Hawkes, N. C. Fox, S. Ourselin, Univ. College London (United Kingdom)
- 7259 OM **Curvelet-based sampling for accurate and efficient multimodal image registration** [7259-21]
M. N. Safran, M. Freiman, M. Werman, L. Joskowicz, The Hebrew Univ. of Jerusalem (Israel)
- 7259 ON **Group-wise registration of large image dataset by hierarchical clustering and alignment** [7259-22]
Q. Wang, L. Chen, Shanghai Jiao Tong Univ. (China); D. Shen, The Univ. of North Carolina at Chapel Hill (United States)

SESSION 5 REGISTRATION II

- 7259 OO **Towards local estimation of emphysema progression using image registration** [7259-23]
M. Staring, M. E. Bakker, D. P. Shamonin, J. Stolk, J. H. Reiber, B. C. Stoel, Leiden Univ. Medical Ctr. (Netherlands)
- 7259 OP **Using statistical deformation models for the registration of multimodal breast images** [7259-24]
C. Tanner, J. H. Hipwell, D. J. Hawkes, Ctr. for Medical Image Computing, Univ. College London (United Kingdom)

- 7259 0Q **Nonrigid registration algorithm for longitudinal breast MR images and the preliminary analysis of breast tumor response** [7259-25]
X. Li, Vanderbilt Univ. Institute of Imaging Science (United States); B. M. Dawant, Vanderbilt Univ. (United States); E. B. Welch, Philips Healthcare Inc. (United States); A. B. Chakravarthy, D. Freehardt, I. Mayer, M. Kelley, I. Meszoely, Vanderbilt Univ. Medical Ctr. (United States); J. C. Gore, T. E. Yankeelov, Vanderbilt Univ. Institute of Imaging Science (United States)
- 7259 0R **Feature-based non-rigid volume registration of serial coronary CT angiography** [7259-26]
J. Woo, Univ. of Southern California (United States); B.-W. Hong, Chung-Ang Univ. (Korea, Republic of); D. Dey, V. Cheng, A. Ramesh, Cedars-Sinai Medical Ctr. (United States); G. Sundaramoorthi, Univ. of California, Los Angeles (United States); C.-C. J. Kuo, Univ. of Southern California (United States); D. S. Berman, G. Germano, P. J. Slomka, Cedars-Sinai Medical Ctr. (United States)
- 7259 0S **A method for registration and model-based segmentation of Doppler ultrasound images** [7259-27]
H. Kalinić, S. Lončarić, Univ. of Zagreb (Croatia); M. Čikeš, D. Miličić, I. Čikeš, Univ. Hospital Ctr. Rebrow (Croatia); G. Sutherland, St. George's Hospital (United Kingdom); B. Bijnens, Univ. Pompeu Fabra (Spain)

SESSION 6 MOTION ANALYSIS

- 7259 0T **Free-breathing intra- and intersubject respiratory motion capturing, modeling, and prediction** [7259-28]
T. Klinder, Leibniz Univ. Hannover (Germany) and Philips Research Europe (Germany); C. Lorenz, Philips Research Europe (Germany); J. Ostermann, Leibniz Univ. Hannover (Germany)
- 7259 0U **Validation and comparison of a biophysical modeling approach and non-linear registration for estimation of lung motion fields in thoracic 4D CT data** [7259-29]
R. Werner, J. Ehrhardt, A. Schmidt-Richberg, H. Handels, Univ. Medical Ctr. Hamburg-Eppendorf (Germany)
- 7259 0V **Shortest path refinement For HARP motion tracking** [7259-30]
X. Liu, Y. Bai, J. L. Prince, Johns Hopkins Univ. (United States)
- 7259 0W **Tracking left ventricular borders in 3D echocardiographic sequences using motion-guided optical flow** [7259-31]
K. Y. E. Leung, M. G. Danilouchkine, M. van Stralen, N. de Jong, A. F. W. van der Steen, J. G. Bosch, Erasmus MC (Netherlands)
- 7259 0X **4D motion modeling of the coronary arteries from CT images for robotic assisted minimally invasive surgery** [7259-32]
D. P. Zhang, E. Edwards, L. Mei, D. Rueckert, Imperial College London (United Kingdom)
- 7259 0Y **Coronary DSA: enhancing coronary tree visibility through discriminative learning and robust motion estimation** [7259-33]
Y. Zhu, Siemens Corporate Research Inc. (United States); S. Prummer, Siemens AG (Germany); T. Chen, Siemens Corporate Research Inc. (United States); M. Ostermeier, Siemens AG (Germany); D. Comaniciu, Siemens Corporate Research Inc. (United States)

SESSION 7 VASCULAR IMAGE PROCESSING

- 7259 02 **Segmentation of arteries and veins on 4D CT perfusion scans for constructing arteriograms and venograms** [7259-34]
A. Mendrik, E. Vonken, A. Waaijer, E. Smit, M. Prokop, B. van Ginneken, Univ. Medical Ctr. Utrecht (Netherlands)
- 7259 10 **A novel multiscale topo-morphometric approach for separating arteries and veins via pulmonary CT imaging** [7259-35]
P. K. Saha, Z. Gao, S. Alford, M. Sonka, E. Hoffman, Univ. of Iowa (United States)
- 7259 11 **A two-stage approach for fully automatic segmentation of venous vascular structures in liver CT images** [7259-36]
J. N. Kaftan, RWTH Aachen Univ. (Germany) and Siemens Healthcare Sector (Germany); H. Tek, Siemens Corporate Research (United States); T. Aach, RWTH Aachen Univ. (Germany)
- 7259 12 **Segmentation of lung vessel trees by global optimization** [7259-37]
P. Bruyninckx, D. Loeckx, D. Vandermeulen, P. Suetens, Katholieke Univ. Leuven (Belgium) and Univ. Hospital Gasthuisberg (Belgium)
- 7259 13 **Globally optimal 3D graph search incorporating both edge and regional information: application to aortic MR image segmentation** [7259-38]
Q. Song, X. Wu, X. Dou, M. Sonka, The Univ. of Iowa (United States)
- 7259 14 **Flow-based segmentation of the large thoracic arteries in tridirectional phase-contrast MRI** [7259-39]
M. Schmidt, R. Unterhinninghofen, Univ. of Karlsruhe (Germany); S. Ley, Univ. Hospital Heidelberg (Germany); R. Dillmann, Univ. of Karlsruhe (Germany)
- 7259 15 **Optimal graph search based image segmentation for objects with complex topologies** [7259-40]
X. Liu, D. Z. Chen, Univ. of Notre Dame (United States); X. Wu, M. Sonka, The Univ. of Iowa (United States)

SESSION 8 ATLAS-BASED METHODS

- 7259 16 **Automatic segmentation of the optic nerves and chiasm in CT and MR using the atlas-navigated optimal medial axis and deformable-model algorithm** [7259-41]
J. H. Noble, B. M. Dawant, Vanderbilt Univ. (United States)
- 7259 17 **Statistical model of laminar structure for atlas-based segmentation of the fetal brain from in utero MR images** [7259-42]
P. A. Habas, K. Kim, Biomedical Image Computing Group, Univ. of California, San Francisco (United States) and Univ. of California, San Francisco (United States); D. Chandramohan, Biomedical Image Computing Group Univ. of California, San Francisco (United States) and Univ. of California, Berkeley (United States); F. Rousseau, LSIIT, CNRS/Univ. Louis Pasteur (France); O. A. Glenn, Univ. of California, San Francisco (United States); C. Studholme, Biomedical Image Computing Group, Univ. of California, San Francisco (United States) and Univ. of California, San Francisco (United States)
- 7259 18 **System for definition of the central-chest vasculature** [7259-43]
P. Taeprasartsit, W. E. Higgins, The Pennsylvania State Univ. (United States)

- 7259 19 **A comparison study of atlas-based image segmentation: the advantage of multi-atlas based on shape clustering** [7259-44]
X. Fan, Johns Hopkins Univ. (United States) and Siemens Medical Solutions USA, Inc. (United States); Y. Zhan, G. Hermosillo Valadez, Siemens Medical Solutions USA, Inc. (United States)
- 7259 1A **Automatic segmentation of brain MRIs and mapping neuroanatomy across the human lifespan** [7259-45]
S. Keihaninejad, R. A. Heckemann, I. S. Gousias, D. Rueckert, P. Aljabar, J. V. Hajnal, A. Hammers, Imperial College London (United Kingdom)

SESSION 9 KEYNOTE AND DIFFUSION TENSOR IMAGING

- 7259 1C **RADTI: regression analyses of diffusion tensor images** [7259-47]
Y. Li, H. Zhu, Y. Chen, J. G. Ibrahim, H. An, W. Lin, C. Hall, D. Shen, The Univ. of North Carolina at Chapel Hill (United States)
- 7259 1D **Fiber-to-bundle registration of white matter tracts** [7259-48]
Q. Xu, A. W. Anderson, J. C. Gore, Z. Ding, Vanderbilt Univ. (United States)
- 7259 1E **Segmentation of DTI based on tensorial morphological gradient** [7259-49]
L. Rittner, R. de Alencar Lotufo, Univ. of Campinas (Brazil)

SESSION 10 REGISTRATION III

- 7259 1F **Non-stationary diffeomorphic registration: application to endo-vascular treatment monitoring** [7259-50]
M. De Craene, CIBER-BBN (Spain) and Univ. Pompeu Fabra (Spain); O. Camara, Univ. Pompeu Fabra (Spain) and CIBER-BBN (Spain); B. Bijnens, ICREA (Spain), Univ. Pompeu Fabra (Spain), and CIBER-BBN (Spain); A. F. Frangi, Univ. Pompeu Fabra (Spain) and CIBER-BBN (Spain)
- 7259 1G **Non-rigid registration of small animal skeletons from micro-CT using 3D shape context** [7259-51]
D. Xiao, P. Bourgeat, J. Fripp, O. Acosta Tamayo, CSIRO, Australian e-Health Research Ctr. (Australia); M. C. Gregoire, Radiopharmaceutical Research Institute, ANSTO (Australia); O. Salvado, CSIRO, Australian e-Health Research Ctr. (Australia)
- 7259 1H **Elastic registration of multiphase CT images of liver** [7259-52]
S. Heldmann, Univ. of Lübeck (Germany); S. Zidowitz, Fraunhofer MEVIS (Germany)
- 7259 1I **Registration of 3D spectral OCT volumes using 3D SIFT feature point matching** [7259-53]
M. Niemeijer, M. K. Garvin, K. Lee, Univ. of Iowa (United States); B. van Ginneken, Univ. Medical Center Utrecht (Netherlands); M. D. Abramoff, Univ. of Iowa (United States) and Veterans Affairs Medical Ctr., Iowa City (United States); M. Sonka, Univ. of Iowa (United States)
- 7259 1J **Curvature orientation histograms for detection and matching of vascular landmarks in retinal images** [7259-54]
K. Ram, Y. Babu, J. Sivaswamy, International Institute of Information Technology (India)

SESSION 11 SEGMENTATION II

- 7259 1K **User-constrained guidewire localization in fluoroscopy** [7259-55]
P. Mazouer, Swiss Federal Institute of Technology (Switzerland); T. Chen, Y. Zhu, P. Wang, Siemens Corporate Research (United States); P. Durlak, Siemens MED-AX (Germany); J.-P. Thiran, Swiss Federal Institute of Technology (Switzerland); D. Comaniciu, Siemens Corporate Research (United States)
- 7259 1L **Hierarchical guidewire tracking in fluoroscopic sequences** [7259-56]
P. Wang, Y. Zhu, W. Zhang, T. Chen, Siemens Corporate Research (United States); P. Durlak, U. Bill, Siemens MED-AX (Germany); D. Comaniciu, Siemens Corporate Research (United States)
- 7259 1M **A comparison of line enhancement techniques: applications to guide-wire detection and respiratory motion tracking** [7259-57]
V. Bismuth, L. Vancamberg, S. Gorges, GE Healthcare France (France)
- 7259 1N **3D variational brain tumor segmentation on a clustered feature set** [7259-58]
K. Popuri, D. Cobzas, M. Jagersand, S. L. Shah, A. Murtha, Univ. of Alberta (Canada)
- 7259 1O **Simultaneous segmentation of the bone and cartilage surfaces of a knee joint in 3D** [7259-59]
Y. Yin, The Univ. of Iowa (United States); X. Zhang, Medical Imaging Applications, LLC (United States); D. D. Anderson, T. D. Brown, C. V. Hofwegen, M. Sonka, The Univ. of Iowa (United States)
- 7259 1P **Segmentation of 3D tubular structures based on 3D intensity models and particle filter tracking** [7259-60]
S. Wörz, W. J. Godinez, K. Rohr, Univ. of Heidelberg (Germany) and DKFZ Heidelberg (Germany)

POSTERS: CLASSIFICATION

- 7259 1Q **A way toward analyzing high-content bioimage data by means of semantic annotation and visual data mining** [7259-61]
J. Herold, Univ. of Bielefeld (Germany); S. Abouna, L. Zhou, S. Pelengaris, D. B. A. Epstein, M. Khan, Univ. of Warwick (United Kingdom); T. W. Nattkemper, Univ. of Bielefeld (Germany)
- 7259 1S **A comparative study in ultrasound breast imaging classification** [7259-63]
M. H. Yap, E. A. Edirisinghe, H. E. Bez, Loughborough Univ. (United Kingdom)
- 7259 1T **Probabilistic classification of intracranial gliomas in digital microscope images based on EGFR quantity** [7259-64]
M. Grzegorzec, Univ. of Koblenz-Landau (Germany); M. Buckan, S. Horn, Johannes Gutenberg Univ. of Mainz (Germany)
- 7259 1U **Integrated feature extraction and selection for neuroimage classification** [7259-65]
Y. Fan, D. Shen, Univ. of North Carolina, Chapel Hill (United States)

- 7259 1V **Estimating the body portion of CT volumes by matching histograms of visual words** [7259-66]
J. Feulner, Univ. Erlangen-Nuremberg (Germany); S. K. Zhou, Siemens Corporate Research, Inc. (United States); S. Seifert, Siemens Corporate Technology (Germany); A. Cavallaro, Imaging Science Institute Erlangen (Germany); J. Horneegger, Univ. Erlangen-Nuremberg (Germany); D. Comaniciu, Siemens Corporate Research, Inc. (United States)
- 7259 1W **Voxel-based discriminant map classification on brain ventricles for Alzheimer's disease** [7259-67]
J. Wang, G. de Haan, Philips Research Europe (Netherlands) and Eindhoven Univ. of Technology (Netherlands); D. Unay, Philips Research Europe (Netherlands); O. Soldea, Sabanci Univ. (Turkey); A. Ekin, Philips Research Europe (Netherlands)
- 7259 1X **Fast unsupervised hot-spot detection in ¹H-MR spectroscopic imaging data using ICA** [7259-68]
M. T. Harz, Fraunhofer MEVIS (Germany); V. Diehl, MR and PET Ctr. Bremen (Germany); B. Merkel, Fraunhofer MEVIS (Germany); B. Terwey, MR and PET Ctr. Bremen (Germany); H.-O. Peitgen, Fraunhofer MEVIS (Germany)

POSTERS: DIFFUSION TENSOR IMAGING

- 7259 1Y **A comparative study of diffusion tensor field transformations** [7259-69]
M. A. Ingallhalikar, V. A. Magnotta, J. Kim, The Univ. of Iowa (United States); A. L. Alexander, Univ. of Wisconsin, Madison (United States)
- 7259 1Z **Real-time magnetic resonance Q-Ball imaging using Kalman filtering with Laplace-Beltrami regularization** [7259-70]
R. Deriche, INRIA Sophia Antipolis (France); J. Calder, Queen's Univ. (Canada)
- 7259 20 **Generalized analytic expressions for the *b* matrix of twice-refocused spin echo pulse sequence** [7259-71]
Q. Zhuang, X. Liang, N. Cao, J. Zhang, Univ. of Kentucky (United States)

POSTERS: FUNCTIONAL IMAGING

- 7259 21 **An independent component analysis based tool for exploring functional connections in the brain** [7259-72]
S. M. Rolfe, L. Finney, R. F. Tuncaraza, J. Guan, L. G. Shapiro, J. F. Brinkley, Univ. of Washington (United States); A. Poliakov, Seattle Children's Hospital (United States); N. Kleinhans, E. Alyward, Univ. of Washington (United States)

POSTERS: FILTERING, RESTORATION, AND ENHANCEMENT

- 7259 22 **Optimized GPU framework for semi-implicit AOS scheme based speckle reducing nonlinear diffusion** [7259-74]
T. Cao, B. Wang, D. C. Liu, Sichuan Univ. (China)
- 7259 23 **Enhanced detection in CT colonography using adaptive diffusion filtering** [7259-75]
A. Douiri, M. Siddique, X. Ye, G. Beddoe, G. Slabaugh, Medicsight PLC (United Kingdom)

- 7259 24 **Device enhancement using rotational x-ray angiography** [7259-76]
G. A. F. Schoonenberg, Philips Healthcare (Netherlands) and Technische Univ. Eindhoven (Netherlands); P. W. van den Houten, Philips Healthcare (Netherlands); R. Florent, P. Lelong, Philips Research Paris (France); J. D. Carroll, Univ. of Colorado (United States); B. M. ter Haar Romeny, Technische Univ. Eindhoven (Netherlands)
- 7259 25 **Parameter optimization for image denoising based on block matching and 3D collaborative filtering** [7259-77]
R. Pedada, E. Kugu, J. Li, Old Dominion Univ. (United States); Z. Yue, Precision Imaging Systems (United States); Y. Shen, Old Dominion Univ. (United States)
- 7259 26 **Edge preserving image smoothing using nonlinear diffusion and a semi-local edge detection technique in digital mammography images** [7259-78]
M. M. Roden, Univ. of California, Los Angeles (United States) and iCRco, Inc. (United States); L. W. Bassett, David Geffen School of Medicine, Univ. of California, Los Angeles (United States); D. J. Valentino, David Geffen School of Medicine, Univ. of California, Los Angeles (United States) and iCRco, Inc. (United States)
- 7259 27 **Contrast enhancement of subcutaneous blood vessel images by means of visible and near-infrared hyper-spectral imaging** [7259-79]
J. Katrašnik, M. Bürmen, Univ. of Ljubljani (Slovenia); F. Pernuš, B. Likar, Univ. of Ljubljani (Slovenia) and Sensum, Computer Vision Systems (Slovenia)
- 7259 28 **An MRI-guided PET partial volume correction method** [7259-80]
H. Wang, Case Western Reserve Univ. (United States) and Emory Univ. (United States); B. Fei, Emory Univ. (United States) and Case Western Reserve Univ. (United States)
- 7259 29 **Image quality improvement based on wavelet regularization for cone beam breast CT (CBBCT)** [7259-81]
D. Yang, R. Ning, X. Zhang, R. Betancourt, Univ. of Rochester (United States); S. Liu, Koning Corp. (United States)
- 7259 2A **An approach for automatic selecting of optimal data acquisition window for magnetic resonance coronary angiography** [7259-84]
T. Sato, Nara Institute of Science and Technology (Japan); T. Okada, Kyoto Univ. (Japan); S. Kuhara, Toshiba Medical Systems Corp. (Japan); K. Togashi, Kyoto Univ. (Japan); K. Minato, Nara Institute of Science and Technology (Japan)
- 7259 2B **Improved vessel enhancement for fully automatic coronary modeling** [7259-86]
V. Auvray, Philips Healthcare (France); U. Jandt, Philips Research Europe (Germany); R. Florent, Philips Healthcare (France); D. Schäfer, Philips Research Europe (Germany)

POSTERS: MOTION

- 7259 2C **Consistency of flow quantifications in tridirectional phase-contrast MRI** [7259-87]
R. Unterhinninghofen, Univ. of Karlsruhe (Germany); S. Ley, Univ. Hospital of Heidelberg (Germany); R. Dillmann, Univ. of Karlsruhe (Germany)
- 7259 2D **Detection of non-uniform multi-body motion in image time-series using saccades-enhanced phase correlation** [7259-88]
E. Gladilin, R. Eils, German Cancer Research Ctr. (Germany)

- 7259 2E **Motion-compensated post-processing of gated cardiac SPECT images using a deformable mesh model** [7259-89]
T. Marin, M. N. Wernick, Y. Yang, J. G. Brankov, Illinois Institute of Technology (United States)
- 7259 2G **A fast and accurate method for echocardiography strain rate imaging** [7259-91]
V. Tavakoli, Univ. of Louisville (United States); N. Sahba, Islamic Azad Univ. (Iran, Islamic Republic of); N. Hajebi, Shahed Univ. (Iran, Islamic Republic of); M. S. Nambakhsh, Kings College London (United Kingdom)

POSTERS: REGISTRATION

- 7259 2H **Automatic bone registration in MR knee images for cartilage morphological analysis** [7259-92]
J. H. Yoo, S. K. Kim, H. Hong, Seoul Women's Univ. (Korea, Republic of); H. Shim, Seoul National Univ. (Korea, Republic of); C. K. Kwok, K. T. Bae, Univ. of Pittsburgh (United States)
- 7259 2I **Evaluation of moving least squares as a technique for non-rigid medical image registration** [7259-93]
V. Sathyanarayanan, R. E. Bodenheimer, Vanderbilt Univ. (United States)
- 7259 2J **Registration of EEG electrode positions to PET and fMRI images** [7259-94]
Z. Špiclin, B. Likar, F. Pernuš, Univ. of Ljubljani (Slovenia)
- 7259 2K **An image warping technique for rodent brain MRI-histology registration based on thin-plate splines with landmark optimization** [7259-95]
Y. Liu, M. Uberti, H. Dou, R. L. Mosley, H. E. Gendelman, M. D. Boska, Univ. of Nebraska Medical Ctr. (United States)

Part Two

- 7259 2L **Optimized graph-based mosaicking for virtual microscopy** [7259-96]
D. G. Steckhan, Fraunhofer Institute for Integrated Circuits IIS (Germany) and International Max-Planck Research School for Optics and Imaging (Germany); T. Wittenberg, Fraunhofer Institute for Integrated Circuits IIS (Germany)
- 7259 2M **Automated alignment of MRI brain scan by anatomic landmarks** [7259-97]
L. Zhang, Siemens Corporate Research (United States); Q. Xu, Vanderbilt Univ. (United States); C. Chen, Univ. of Illinois at Chicago (United States); C. L. Novak, Siemens Corporate Research (United States)
- 7259 2N **COLLINARUS: collection of image-derived non-linear attributes for registration using splines** [7259-98]
J. Chappelow, Rutgers Univ. (United States); B. N. Bloch, N. Rofsky, E. Genega, R. Lenkinski, W. DeWolf, Harvard Univ. (United States); S. Viswanath, A. Madabhushi, Rutgers Univ. (United States)
- 7259 2O **New GPU optimizations for intensity-based registration** [7259-99]
R. Yousfi, G. Bousquet, C. Chef-d'hotel, Siemens Corporate Research (United States)

- 7259 2P **Nonrigid correction of interleaving artefacts in pelvic MRI** [7259-100]
J. Dowling, P. Bourgeat, D. Raffelt, J. Fripp, CSIRO, Australian e-Health Research Ctr. (Australia); P. B. Greer, Calvary Mater Newcastle Hospital (Australia) and Univ. of Newcastle (Australia); J. Patterson, Calvary Mater Newcastle Hospital (Australia); J. Denham, Calvary Mater Newcastle Hospital (Australia) and Univ. of Newcastle (Australia); S. Gupta, C. Tang, Calvary Mater Newcastle Hospital (Australia); P. Stanwell, Brigham and Woman's Hospital, Harvard Medical School (United States); S. Ourselin, Ctr. for Medical Imaging Computing, Univ. College London (United Kingdom); O. Salvado, CSIRO, Australian e-Health Research Ctr. (Australia)
- 7259 2Q **Gene to mouse atlas registration using a landmark-based nonlinear elasticity smoother** [7259-101]
T. Lin, Univ. of California, Los Angeles (United States); C. Le Guyader, Institut National des Sciences Appliquées de Rennes (France); E.-F. Lee, I. D. Dinov, P. M. Thompson, A. W. Toga, UCLA School of Medicine (United States); L. A. Vese, Univ. of California, Los Angeles (United States)
- 7259 2R **Mass preserving registration for lung CT (Cum Laude Poster Award)** [7259-102]
V. Gorbunova, P. Lo, Univ. of Copenhagen (Denmark); M. Loeve, H. A. Tiddens, Erasmus Medical Ctr. Sophia Children's Hospital (Netherlands); J. Sparring, Univ. of Copenhagen (Denmark); M. Nielsen, Univ. of Copenhagen (Denmark) and Nordic Bioscience A/S (Denmark); M. de Bruijne, Univ. of Copenhagen (Denmark) and Erasmus MC - Univ. Medical Ctr. Rotterdam (Netherlands)
- 7259 2S **Bead-based mosaicing of single plane illumination microscopy images using geometric local descriptor matching** [7259-103]
S. Preibisch, S. Saalfeld, Max Planck Institute of Molecular Cell Biology and Genetics (Germany); T. Rohlfing, SRI International (United States); P. Tomancak, Max Planck Institute of Molecular Cell Biology and Genetics (Germany)
- 7259 2T **Linear time algorithms for exact distance transform: elaboration on Maurer et al. algorithm** [7259-104]
K. C. Ciesielski, West Virginia Univ. (United States) and Univ. of Pennsylvania (United States); J. K. Udupa, X. Chen, Univ. of Pennsylvania (United States); G. J. Grevera, Univ. of Pennsylvania (United States) and Saint Joseph's Univ. (United States)
- 7259 2U **A simple penalty that encourages local invertibility and considers sliding effects for respiratory motion** [7259-105]
S. Y. Chun, J. A. Fessler, M. L. Kessler, Univ. of Michigan (United States)
- 7259 2V **Hierarchical unbiased group-wise registration for atlas construction and population comparison** [7259-106]
Y. Chen, D. Shen, H. Zhu, H. An, J. Gilmore, W. Lin, Univ. of North Carolina at Chapel Hill (United States)
- 7259 2W **A new method for assessing PET-MRI coregistration** [7259-107]
C. DeLorenzo, A. Klein, A. Mikhno, N. Gray, Columbia Univ. (United States); F. Zanderigo, New York State Psychiatric Institute (United States); J. J. Mann, R. V. Parsey, Columbia Univ. (United States) and New York State Psychiatric Institute (United States)

- 7259 2X **Nonrigid registration framework for bronchial tree labeling using robust point matching** [7259-108]
A. S. Roy, GE Global Research (India); U. Patil, Manipal Hospital (India); B. Das, GE Global Research (India)
- 7259 2Y **Intra-operative adaptive FEM-based registration accommodating tissue resection** [7259-109]
P. Risholm, E. L. Melvær, K. Mørken, Univ. of Oslo (Norway); E. Samset, Univ. of Oslo (Norway) and Rikshospitalet Univ. Hospital (Norway)
- 7259 2Z **Feature detector and descriptor for medical images** [7259-110]
D. Sargent, STI Medical Systems (United States); C.-I. Chen, C.-M. Tsai, Y.-F. Wang, Univ. of California, Santa Barbara (United States); D. Koppel, STI Medical Systems (United States)
- 7259 30 **Mapping ventricular expansion and its clinical correlates in Alzheimer's disease and mild cognitive impairment using multi-atlas fluid image alignment** [7259-111]
Y.-Y. Chou, N. Leporé, C. Avedissian, S. K. Madsen, X. Hua, Univ. of California, Los Angeles (United States); C. R. Jack, Jr., Mayo Clinic College of Medicine (United States); M. W. Weiner, Univ. of California, San Francisco (United States); A. W. Toga, P. M. Thompson, Univ. of California, Los Angeles (United States)
- 7259 31 **Freesurfer-initialized large deformation diffeomorphic metric mapping with application to Parkinson's disease** [7259-112]
J. Chen, Simon Fraser Univ. (Canada); S. J. Palmer, Brain Research Ctr., Univ. of British Columbia (Canada); A. R. Khan, Simon Fraser Univ. (Canada); M. J. McKeown, Brain Research Ctr., Univ. of British Columbia (Canada); M. F. Beg, Simon Fraser Univ. (Canada)
- 7259 32 **Improving an affine and non-linear image registration and/or segmentation task by incorporating characteristics of the displacement field** [7259-113]
K. Ens, Univ. of Lübeck (Germany) and Philips Research Europe (Germany); S. Heldmann, Univ. of Lübeck (Germany); J. Modersitzki, McMaster Univ. (Canada); B. Fischer, Univ. of Lübeck (Germany)
- 7259 33 **Design of a synthetic database for the validation of non-linear registration and segmentation of magnetic resonance brain images** [7259-114]
K. Ens, Univ. of Lübeck (Germany) and Philips Research Europe (Germany); F. Wenzel, S. Young, Philips Research Europe (Germany); J. Modersitzki, McMaster Univ. (Canada); B. Fischer, Univ. of Lübeck (Germany)
- 7259 34 **Improving inter-fragmentary alignment for virtual 3D reconstruction of highly fragmented bone fractures** [7259-115]
B. Zhou, A. Willis, Y. Sui, The Univ. of North Carolina at Charlotte (United States); D. Anderson, T. Thomas, T. Brown, The Univ. of Iowa (United States)
- 7259 35 **Evaluation of the accuracy of deformable registration of prostate MRI for targeted prostate cancer radiotherapy** [7259-116]
K. Krishnan, Kitware, Inc. (United States); R. Cheung, The Univ. of Texas M.D. Anderson Cancer Ctr. (United States)
- 7259 36 **Validation of nonrigid registration for multi-tracer PET-CT treatment planning in rectal cancer radiotherapy** [7259-117]
P. Slagmolen, S. Roels, D. Loeckx, K. Haustermans, F. Maes, Univ. of Gasthuisberg (Belgium)

- 7259 37 **A tool for registration verification based on gradient correspondence** [7259-118]
P. Markelj, F. Pernuš, B. Likar, Univ. of Ljubljani (Slovenia)
- 7259 38 **Worst-case analysis of target localization errors in fiducial-based rigid body registration**
[7259-119]
R. R. Shamir, L. Joskowicz, The Hebrew Univ. of Jerusalem (Israel)
- 7259 39 **Recent improvements in tensor scale computation and its applications to medical imaging**
[7259-120]
Z. Xu, M. Sonka, P. K. Saha, Univ. of Iowa (United States)

POSTERS: SEGMENTATION

- 7259 3A **Segmentation of brain PET-CT images based on adaptive use of complementary information** [7259-03]
Y. Xia, The Univ. of Sydney (Australia) and Hong Kong Polytechnic Univ. (Hong Kong, China); L. Wen, The Univ. of Sydney (Australia), Hong Kong Polytechnic Univ. (Hong Kong, China), and Royal Prince Alfred Hospital (Australia); S. Eberl, M. Fulham, The Univ. of Sydney (Australia) and Royal Prince Alfred Hospital (Australia); D. Feng, The Univ. of Sydney (Australia) and Hong Kong Polytechnic Univ. (Hong Kong, China)
- 7259 3B **Level-set segmentation of pulmonary nodules in radiographs using a CT prior** [7259-121]
J. S. Schildkraut, S. Chen, M. Heath, Carestream Health, Inc. (United States); W. G. O'Dell, P. Okunieff, M. C. Schell, Univ. of Rochester Medical Ctr. (United States); N. Paul, Toronto General Hospital (Canada)
- 7259 3D **A topology-oriented and tissue-specific approach to detect pleural thickenings from 3D CT data** [7259-123]
C. Buerger, RWTH Aachen Univ. (Germany); K. Chaisaowong, RWTH Aachen Univ. (Germany) and King Mongkut's Univ. of Technology (Thailand); A. Knepper, RWTH Aachen Univ. (Germany); T. Kraus, Univ. Hospital Aachen (Germany); T. Aach, RWTH Aachen Univ. (Germany)
- 7259 3F **Automated detection and delineation of lung tumors in PET-CT volumes using a lung atlas and iterative mean-SUV threshold** [7259-125]
C. Ballangan, X. Wang, Univ. of Sydney (Australia); S. Eberl, Univ. of Sydney (Australia) and Royal Prince Alfred Hospital (Australia); M. Fulham, Univ. of Sydney (Australia) and Royal Prince Alfred Hospital (Australia); D. Feng, Univ. of Sydney (Australia) and Hong Kong Polytechnic Univ. (Hong Kong, China)
- 7259 3G **A combined watershed and level set method for segmentation of brightfield cell images**
[7259-126]
S. Tse, L. Bradbury, J. W. L. Wan, Univ. of Waterloo (Canada); H. Djambazian, R. Sladek, McGill Univ. and Genome Quebec Innovation Ctr. (Canada); T. Hudson, Ontario Institute for Cancer Research (Canada)
- 7259 3I **Pleural effusion segmentation in thin-slice CT** [7259-128]
R. Donohue, A. Shearer, National Univ. of Ireland, Galway (Ireland); J. Bruzzi, H. Khosa, Univ. College Hospital, Galway (Ireland)

- 7259 3L **3D contour based local manual correction of tumor segmentations in CT scans** [7259-131]
F. Heckel, J. H. Moltz, L. Bornemann, V. Dicken, Fraunhofer MEVIS (Germany); H.-C. Bauknecht, Charité, Institute for Radiology (Germany); M. Fabel, Christian-Albrechts- Univ. (Germany); M. Hittinger, Ludwig-Maximilians-Univ. (Germany); A. Kießling, Philipps-Univ. Marburg (Germany); S. Meier, Johannes Gutenberg Univ. (Germany); M. Püsken, Westfälische Wilhelms-Univ. Münster (Germany); H.-O. Peitgen, Fraunhofer MEVIS (Germany)
- 7259 3M **Cell boundary analysis using radial search for dual staining techniques** [7259-132]
S. Iftikhar, A. A. Bharath, Imperial College London (United Kingdom)
- 7259 3N **Maximize uniformity summation heuristic (MUSH): a highly accurate simple method for intracranial delineation** [7259-133]
R. Pierson, G. Harris, H. J. Johnson, S. Dunn, V. A. Magnotta, Univ. of Iowa (United States)
- 7259 3O **Robust model-based centerline extraction of vessels in CTA data** [7259-134]
T. Beck, Siemens Healthcare (Germany) and Univ. of Karlsruhe (Germany); C. Biermann, Siemens Healthcare (Germany) and Eberhard-Karls-Univ. of Tuebingen (Germany); D. Fritz, Siemens Healthcare (Germany); R. Dillmann, Univ. of Karlsruhe (Germany)
- 7259 3P **Simultaneous 3D segmentation of three bone compartments on high resolution knee MR images from osteoarthritis initiative (OAI) using graph cuts** [7259-135]
H. Shim, Seoul National Univ. (Korea, Republic of); C. K. Kwoh, Univ. of Pittsburgh (United States); I. D. Yun, Hankuk Univ. of Foreign Studies (Korea, Republic of); S. U. Lee, Seoul National Univ. (Korea, Republic of); K. Bae, Univ. of Pittsburgh (United States)
- 7259 3Q **User-assisted aortic aneurysm analysis** [7259-136]
A. Ouyard, Siemens Corporate Research (United States); R. Renapurkar, R. M. Setser, S. Flamm, The Cleveland Clinic Foundation (United States); T. O'Donnell, Siemens Corporate Research (United States)
- 7259 3R **Efficient multigrid solver for the 3D random walker algorithm** [7259-137]
X. Wang, German Cancer Research Ctr. (Germany); T. Heimann, INRIA Sophia Antipolis (France); A. Naegel, G. Wittum, Ruprecht-Karls-Univ. of Heidelberg (Germany); H.-P. Meinzer, German Cancer Research Ctr. (Germany)
- 7259 3S **Automated segmentation and recognition of the bone structure in non-contrast torso CT images using implicit anatomical knowledge** [7259-139]
X. Zhou, T. Hayashi, M. Han, H. Chen, T. Hara, H. Fujita, Gifu Univ. School of Medicine (Japan); R. Yokoyama, M. Kanematsu, Gifu Univ. Hospital (Japan); H. Hoshi, Gifu Univ. School of Medicine (Japan)
- 7259 3T **Curve evolution with a dual shape similarity and its application to segmentation of left ventricle** [7259-140]
J. Woo, Univ. of Southern California (United States); B.-W. Hong, Chung-Ang Univ. (Korea, Republic of); A. Ramesh, G. Germano, Cedars-Sinai Medical Ctr. (United States); C.-C. Jay Kuo, Univ. of Southern California (United States); P. Slomka, Cedars-Sinai Medical Ctr. (United States)

- 7259 3U **Pulmonary airways tree segmentation from CT examinations using adaptive volume of interest** [7259-141]
S. C. Park, Univ. of Pittsburgh (United States); W. P. Kim, Chosun College of Science and Technology (Korea, Republic of); B. Zheng, J. K. Leader, J. Pu, J. Tan, D. Gur, Univ. of Pittsburgh (United States)
- 7259 3V **Left ventricle endocardium segmentation for cardiac CT volumes using an optimal smooth surface** [7259-142]
Y. Zheng, B. Georgescu, Siemens Corporate Research (United States); F. Vega-Higuera, Siemens Healthcare (Germany); D. Comaniciu, Siemens Corporate Research (United States)
- 7259 3W **Computer-assisted scheme for automated determination of imaging planes in cervical spinal cord MRI** [7259-143]
M. Tsurumaki, Nakajo Central Hospital (Japan); D.-Y. Tsai, Y. Lee, M. Sekiya, School of Health Sciences, Niigata Univ. (Japan); K. Kazama, Nakajo Central Hospital (Japan)
- 7259 3X **Multi-channel MRI segmentation with graph cuts using spectral gradient and multidimensional Gaussian mixture model** [7259-144]
J. Lecoœur, INRIA, IRISA (France), Univ. of Rennes I, CNRS IRISA (France), and INSERM, IRISA (France); J. Ferré, Pontchaillou Univ. Hospital (France), INRIA, IRISA (France), and Univ. of Rennes I, CNRS IRISA (France); D. L. Collins, Montreal Neurological Institute, McGill Univ. (Canada); S. P. Morrisey, Pontchaillou Univ. Hospital (France), INRIA, IRISA (France), and Univ. of Rennes I, CNRS IRISA (France); C. Barillot, INRIA, IRISA (France), Univ. of Rennes I, CNRS IRISA (France), and INSERM, IRISA (France)
- 7259 3Y **Employing anatomical knowledge in vertebral column labeling** [7259-145]
J. Yao, R. M. Summers, National Institutes of Health (United States)
- 7259 3Z **A coupled level-set framework for bladder wall segmentation with application to MRI-based virtual cystoscopy** [7259-146]
C. Duan, Peking Univ. (China) and SUNY at Stony Brook (United States); S. Bao, Peking Univ. (China); Z. Liang, SUNY at Stony Brook (United States)
- 7259 40 **Segmentation of low contrast-to-noise ratio images applied to functional imaging using adaptive region growing** [7259-147]
J. Cabello, A. Bailey, I. Kitchen, Univ. of Surrey (United Kingdom); M. Guy, Royal Surrey County Hospital (United Kingdom); K. Wells, Univ. of Surrey (United Kingdom)
- 7259 41 **Novel level-set based segmentation method of the lung at HRCT images of diffuse interstitial lung disease (DILD)** [7259-148]
J. Lee, Catholic Univ. of Korea (Korea, Republic of); J. B. Seo, N. Kim, S. O. Park, Univ. of Ulsan College of Medicine (Korea, Republic of); H. Lee, Y. G. Shin, Seoul National Univ. (Korea, Republic of); S.-H. Kim, Sangmyung Univ. (Korea, Republic of)
- 7259 42 **Brain tissue segmentation of neonatal MR images using a longitudinal subject-specific probabilistic atlas** [7259-149]
F. Shi, Y. Fan, S. Tang, J. Gilmore, W. Lin, D. Shen, Univ. of North Carolina, Chapel Hill (United States)

- 7259 43 **Evaluation of atlas based mouse brain segmentation** [7259-150]
J. Lee, Univ. of North Carolina, Chapel Hill (United States); J. Jomier, S. Aylward, Kitware, Inc. (United States); M. Tyska, California Institute of Technology (United States); S. Moy, Univ. of North Carolina, Chapel Hill (United States); J. Lauder, School of Medicine, Univ. of North Carolina, Chapel Hill (United States); M. Styner, Univ. of North Carolina, Chapel Hill (United States)
- 7259 44 **Decision algorithm for 3D blood vessel loop based on a route edit distance** [7259-151]
D. Kobayashi, Saitama Univ. (Japan); H. Yokota, RIKEN (Japan); S. Morishita, Univ. of Tokyo (Japan); K. Hiraoka, Saitama Univ. (Japan); K. Fukasaku, Himon-ya Hospital (Japan); R. Himeno, T. Mishima, Saitama Univ. (Japan)
- 7259 45 **Automated probabilistic segmentation of tumors from CT data using spatial and intensity properties** [7259-152]
J. L. Foo, Iowa State Univ. (United States); T. Lobe, Blank Children's Hospital (United States); E. Winer, Iowa State Univ. (United States)
- 7259 46 **Probabilistic boosting trees for automatic bone removal from CT angiography images (Honorable Mention Poster Award)** [7259-153]
A. Militzer, Friedrich-Alexander Univ. Erlangen-Nuremberg (Germany) and Siemens Healthcare (Germany); F. Vega-Higuera, Siemens Healthcare (Germany)
- 7259 47 **Mammography mass detection: a multi-stage hybrid approach** [7259-154]
N. Sahba, Islamic Azad Univ. (Iran, Islamic Republic of); V. Tavakoli, Univ. of Louisville (United States); A. Ahmadian, M. Giti, Tehran Univ. (Iran, Islamic Republic of)
- 7259 48 **An automated image segmentation and classification algorithm for immunohistochemically stained tumor cell nuclei** [7259-155]
H. Yeo, V. Sheinin, IBM Thomas J. Watson Research Ctr. (United States); Y. Sheinin, Mayo Clinic and Foundation (United States)
- 7259 49 **Reconstruction from a flexible number of projections in cone-beam computed tomography via active shape models** [7259-156]
P. B. Noël, J. J. Corso, J. Xu, K. R. Hoffmann, S. Schafer, A. M. Walczak, SUNY at Buffalo (United States)
- 7259 4A **Prostate contouring in MRI-guided biopsy** [7259-157]
S. Vikal, Queen's Univ. (Canada); S. Haker, C. Tempany, Brigham and Women's Hospital (United States); G. Fichtinger, Queen's Univ. (Canada)
- 7259 4B **A minimal path searching approach for active shape model (ASM)-based segmentation of the lung** [7259-158]
S. Guo, B. Fei, Emory Univ. (United States)
- 7259 4C **A fast quantum mechanics based contour extraction algorithm** [7259-159]
T. Lan, Y. Sun, M. Ding, Huazhong Univ. of Science and Technology (China)

- 7259 4D **Accurate, fast, and robust vessel contour segmentation of CTA using an adaptive self-learning edge model** [7259-160]
S. Grosskopf, Siemens Healthcare Sector (Germany); C. Biermann, Siemens Healthcare Sector (Germany) and Eberhard-Karls-Univ. of Tuebingen (Germany); K. Deng, Wuhan Union Hospital, HUST Tongji Medical School (China); Y. Chen, Shandong Medical Imaging Research Institute (China)
- 7259 4E **Tumor segmentation of multiecho MR T₂-weighted images with morphological operators** [7259-161]
W. Torres, Fundación Instituto de Ingeniería (Venezuela) and Univ. Central de Venezuela (Venezuela); M. Martín-Landrove, Univ. Central de Venezuela (Venezuela) and Ctr. de Diagnóstico Docente Las Mercedes (Venezuela); M. Paluszny, Univ. Nacional de Colombia (Colombia); G. Figueroa, G. Padilla, Univ. Central de Venezuela (Venezuela)
- 7259 4F **Morpho-geometrical approach for 3D segmentation of pulmonary vascular tree in multi-slice CT** [7259-162]
C. Fetita, TELECOM SudParis (France); P.-Y. Brillet, Univ. Paris 13, Avicenne Hospital (France); F. Prêteux, TELECOM SudParis (France)
- 7259 4G **Detection of clusters of microcalcification based on associated differential and morphological filters in full mammogram** [7259-163]
E. C. Silva, Jr., Univ. de São Paulo (Brazil) and Faculty de Technology of São José do Rio Preto (Brazil); H. Schiabel, L. Ventura, Univ. de São Paulo (Brazil)
- 7259 4H **Automatic quantification of neo-vasculature from Micro-CT** [7259-164]
Y. Mallya, A. K. Narayanan, Philips Electronics India Ltd. (India); L. Zagorchev, Philips Research North America (United States), Dartmouth Medical School (United States), and Dartmouth College (United States)
- 7259 4I **Automatic brain cropping enhancement using active contours initialized by a PCNN** [7259-165]
M. M. Swathanthira Kumar, J. M. Sullivan, Jr., Worcester Polytechnic Institute (United States)
- 7259 4J **Sphere extraction in MR images with application to whole-body MRI** [7259-166]
C. Wachinger, S. Baumann, Technische Univ. München (Germany); J. Zeltner, Siemens Medical Solutions (Germany); B. Glocker, N. Navab, Technische Univ. München (Germany)
- 7259 4K **Ridge-branch-based blood vessel detection algorithm for multimodal retinal images** [7259-167]
Y. Li, Univ. of Miami Miller School of Medicine (United States); N. Hutchings, Univ. of Waterloo (Canada); R. W. Knighton, G. Gregori, Univ. of Miami Miller School of Medicine (United States); B. J. Lujan, Univ. of California, Berkeley (United States); J. G. Flanagan, Univ. of Waterloo (Canada) and Univ. of Toronto (Canada)
- 7259 4L **A multi-modality segmentation framework: application to fully automatic heart segmentation** [7259-168]
C. Meyer, O. Ecabert, J. Peters, R. Kneser, Philips Research Europe (Germany); R. Manzke, R. C. Chan, Philips Research North America (United States); J. Weese, Philips Research Europe (Germany)
- 7259 4M **Automated determination of spinal centerline in CT and MR images** [7259-169]
D. Štern, T. Vrtovec, F. Pernuš, B. Likar, Univ. of Ljubljani (Slovenia)

- 7259 4N **A statistical approach to contour extraction based on quantum mechanics** [7259-170]
Y. Sun, T. Lan, X. Fu, M. Ding, Huazhong Univ. of Science and Technology (China)
- 7259 4O **Segmentation of 2D gel electrophoresis spots using a Markov random field** [7259-171]
C. S. Hoefflich, J. J. Corso, Univ. at Buffalo (United States)
- 7259 4P **Automatic anatomy recognition via multi-object-oriented active shape models** [7259-172]
X. Chen, J. K. Udupa, X. Zheng, Univ. of Pennsylvania (United States); A. Alavi, D. A. Torigian, Hospital of the Univ. of Pennsylvania (United States)
- 7259 4Q **Dependent component analysis based approach to robust demarcation of skin tumors** [7259-173]
I. Kopriva, A. Peršin, Ruđer Bošković Institute (Croatia); N. Puizina-Ivić, L. Mirić, Clinical Hospital and School of Medicine (Croatia)
- 7259 4S **Robust segmentation using non-parametric snakes with multiple cues for applications in radiation oncology** [7259-175]
J. Kalpathy-Cramer, Oregon Health & Science Univ. (United States); U. Ozertem, Yahoo! Inc. (United States); W. Hersh, M. Fuss, Oregon Health & Science Univ. (United States); D. Erdogmus, Northeastern Univ. (United States)
- 7259 4T **A machine learning approach to extract spinal column centerline from three-dimensional CT data** [7259-176]
C. Wang, Y. Li, W. Ito, K. Shimura, FUJIFILM Corp. (Japan); K. Abe, Nihon Univ. (Japan)
- 7259 4U **Affinity functions: recognizing essential parameters in fuzzy connectedness based image segmentation** [7259-177]
K. C. Ciesielski, West Virginia Univ. (United States) and Univ. of Pennsylvania (United States); J. K. Udupa, Univ. of Pennsylvania (United States)
- 7259 4V **Image segmentation using joint spatial-intensity-shape features: application to CT lung nodule segmentation** [7259-178]
X. Ye, M. Siddique, A. Douiri, G. Beddoe, G. Slabaugh, Medicsight PLC (United Kingdom)
- 7259 4W **Validation tools for image segmentation** [7259-179]
D. Padfield, J. Ross, GE Global Research (United States)
- 7259 4X **Segmentation of mosaicism in cervicographic images using support vector machines** [7259-180]
Z. Xue, L. R. Long, S. Antani, National Library of Medicine, NIH (United States); J. Jeronimo, Program for Appropriate Technology in Healthcare (United States); G. R. Thoma, National Library of Medicine, NIH (United States)

POSTERS: SHAPE AND TEXTURE

- 7259 4Y **Method for fast and accurate segmentation processing from prior shape: application to femoral head segmentation on x-ray images** [7259-181]
R. Chav, T. Cresson, Hôpital Notre-Dame (Canada), Ecole de technologie supérieure (Canada), and Univ. de Montréal (Canada); C. Kauffmann, Univ. de Montréal (Canada); J. A. de Guise, Hôpital Notre-Dame (Canada), Ecole de technologie supérieure (Canada), and Univ. de Montréal (Canada)

- 7259 4Z **Vertebral segmentation using contourlet-based salient point matching and localized multiscale shape prior** [7259-182]
R. Zewail, A. Elsafi, N. Durdle, Univ. of Alberta (Canada)
- 7259 50 **Volumetric topological analysis: a novel method for trabecular bone characterization on the continuum between plates and rods** [7259-183]
P. K. Saha, Y. Xu, G. Liang, H. Duan, Univ. of Iowa (United States)
- 7259 51 **A comparison of local and global scale approaches in characterizing shapes (Cum Laude Poster Award)** [7259-184]
S. Rueda, Univ. of Nottingham (United Kingdom); J. K. Udupa, Univ. of Pennsylvania (United States); L. Bai, Univ. of Nottingham (United Kingdom)
- 7259 52 **Automatic 3D shape severity quantification and localization for deformational plagiocephaly** [7259-185]
I. Atmosukarto, L. G. Shapiro, Univ. of Washington (United States); M. L. Cunningham, M. Speltz, Univ. of Washington (United States) and Seattle Children's Hospital (United States)
- 7259 53 **Texture analysis using lacunarity and average local variance** [7259-186]
D. C. Manikka-Baduge, G. Dougherty, California State Univ. Channel Islands (United States)
- 7259 54 **Preliminary study report: topological texture features extracted from standard radiographs of the heel bone are correlated with femoral bone mineral density** [7259-187]
H. F. Boehm, J. Lutz, M. Koerner, M. Notohamiprodjo, M. Reiser, Ludwig-Maximilians-Univ. Munich (Germany)

Author Index

Conference Committee

Symposium Chairs

Armando Manduca, Mayo Clinic College of Medicine (United States)
Kevin Cleary, Georgetown University Medical Center (United States)

Conference Chairs

Josien P. W. Pluim, Universitair Medisch Centrum Utrecht (Netherlands)
Benoit M. Dawant, Vanderbilt University (United States)

Program Committee

Mostafa Analoui, Pfizer Inc. (United States)
Kyongtae Ty Bae, University of Pittsburgh (United States)
Christian Barillot, Institut de Recherche en Informatique et Systèmes
Aléatoires (France)
Aaron Fenster, Robarts Research Institute (Canada)
Bernd Fischer, Universität zu Lübeck (Germany)
Alejandro F. Frangi, Universidad Pompeu Fabra (Spain)
James C. Gee, University of Pennsylvania (United States)
Guido Gerig, The University of Utah (United States)
David R. Haynor, University of Washington (United States)
Tianhu Lei, University of Pennsylvania (United States)
Boudewijn P. F. Lelieveldt, Leids Universitair Medisch Centrum
(Netherlands)
Bostjan Likar, Univerza v Ljubljani (Slovenia)
Murray H. Loew, The George Washington University (United States)
Cristian Lorenz, Philips Research Laboratories (Germany)
Frederik Maes, Katholieke Universiteit Leuven (Belgium)
Vincent A. Magnotta, The University of Iowa (United States)
Sunanda D. Mitra, Texas Tech University (United States)
Kensaku Mori, Nagoya University (Japan)
Mads Nielsen, University of Copenhagen (Denmark) and Nordic
Bioscience A/S (Denmark)
Sébastien Ourselin, Center for Medical Imaging Computing, University
College London (United Kingdom)
Joseph M. Reinhardt, The University of Iowa (United States)
Daniel Rueckert, Imperial College London (United Kingdom)
Punam K. Saha, The University of Iowa (United States)
Olivier Salvado, Commonwealth Scientific and Industrial Research
Organisation, Australian e-Health Research Center (Australia)
Julia A. Schnabel, University of Oxford (United Kingdom) and St. Hilda's
College (United Kingdom)

Colin Studholme, University of California, San Francisco (United States)
Martin A. Styner, The University of North Carolina at Chapel Hill
(United States)
Philippe Thévenaz, Ecole Polytechnique Fédérale de Lausanne
(Switzerland)
Jayaram K. Udupa, University of Pennsylvania (United States)
Andreas Wahle, The University of Iowa (United States)

Session Chairs

- 1 Segmentation I
Cristian Lorenz, Philips Research Laboratories (Germany)
- 2 Statistical Models
Martin A. Styner, The University of North Carolina at Chapel Hill (United States)
- 3 Statistical Methods
Mads Nielsen, University of Copenhagen (Denmark) and Nordic Bioscience A/S (Denmark)
- 4 Registration I
Bernd Fischer, Universität zu Lübeck (Germany)
- 5 Registration II
Daniel Rueckert, Imperial College London (United Kingdom)
- 6 Motion Analysis
Bram van Ginneken, Universitair Medisch Centrum Utrecht (Netherlands)
- 7 Vascular Image Processing
Kyongtae Ty Bae, University of Pittsburgh (United States)
- 8 Atlas-based Methods
Sébastien Ourselin, Center for Medical Imaging Computing, University College London (United Kingdom)
- 9 Keynote and Diffusion Tensor Imaging
Josien P. W. Pluim, Universitair Medisch Centrum Utrecht (Netherlands)
Benoit M. Dawant, Vanderbilt University (United States)
James C. Gee, University of Pennsylvania (United States)
- 10 Registration III
Murray H. Loew, The George Washington University (United States)
- 11 Segmentation II
Vincent A. Magnotta, The University of Iowa (United States)

Introduction

The 2009 SPIE Medical Imaging conference was held at "a magical place": Disney's Coronado Springs Resort in Florida. The symposium ran February 7–12, with the Image Processing conference spanning February 8–10. Despite the temptations of the Disney parks and the glorious Florida weather, the quality of the conference program lured the attendees indoors. A total of 274 abstracts were submitted to the Image Processing conference, a small increase over last year. Based on the reviews of our program committee, we selected 59 abstracts for oral presentation and 127 for poster presentation. This puts the acceptance rate this year at 68%.

The conference program contained several special highlights. Sunday evening saw the traditional workshop. This year's topic was "Image Processing Challenges in Small Animal Imaging." The workshop organization was in the hands of Dr. Boudewijn Lelieveldt of Leiden University Medical Center (The Netherlands). Together with Drs. David Wilson of Case Western Reserve University and Baowei Fei of Emory University School of Medicine, Dr. Lelieveldt facilitated a broad and informative workshop on the many image processing tasks required for small animal imaging and the corresponding specific difficulties in comparison to human imaging.

The Monday program ended with the poster session. The spacious poster hall offered ample opportunity for discussion of results with the authors, all while enjoying a drink and empanadas. A tie was presented to the two Cum Laude Student Poster Award winners. Their two papers, as well as the Honorable Mention award papers, are marked in these proceedings. The Michael B. Merickel Best Student Paper Award went to an author from the Image Processing conference: Robert J. Toth of Rutgers University.

Tuesday saw the excellent keynote speech by Dr. Peter Bassler of the National Institute of Child Health and Human Development, NIH. His presentation, entitled "Frontiers in Diffusion Imaging," covered the topic of diffusion imaging from the basic principles of imaging to the most recent advances and future expectations in the field.

Before concluding, we would like to express our gratitude to the people we have relied on to put together the Image Processing 2009 conference. We are grateful to our program committee members, who reviewed the submissions, chaired the sessions, judged the posters, and advise us on how to improve and innovate for future conferences. We would also like to thank the staff at SPIE for their efforts throughout the year in organizing the Medical Imaging symposium.

**Josien P. W. Pluim
Benoit M. Dawant**

In Memoriam
Robert F. Wagner
1938–2008

**A founding scientist and prolific contributor
to modern medical imaging science and SPIE**

Robert F. "Bob" Wagner was a tremendous innovator in the field of medical imaging and image assessment methodologies. He was a key figure in the creation of the SPIE Medical Imaging symposium. An SPIE Fellow since 1988, Bob was active on the program committee of the Physics of Medical Imaging conference at the Medical Imaging symposium, and author of numerous technical papers published by SPIE.

"The medical imaging community has lost one of its founding fathers and most highly regarded members," said Kyle Myers, director of the Division of Imaging and Applied Mathematics at the Center for Devices and Radiological Health (CDRH), U.S. Food and Drug Administration (FDA). "Bob's career was dedicated to the development of consensus measurement methods for the assessment of medical imaging systems, quantitative medical imaging and tissue characterization, and computer-aided diagnosis. He earned an international reputation in these areas and applied his expertise to a wide range of regulatory issues central to the FDA's mission. He enlightened the scientific community within the agency as well as the international scientific community through the many invited presentations and tutorials he gave in and outside of the FDA, his numerous publications, his many professional society activities, and his assistance in regulatory decision making."

At this 2009 Medical Imaging symposium, a joint keynote session hosted by the CAD and Image Perception conferences honored Bob's many contributions from the early 1970s to the present through a series of presentations by some of his closest collaborators.

David Brown (CDRH/FDA) recalled Bob's early years in the field, relating that after graduate and post-graduate work on the physics of nuclear interactions with radiation, Bob was hired by the Bureau of Radiological Health [a precursor to CDRH] to assess the dose reduction potential of radiographic intensifying screens made with phosphors developed in the color TV industry. Within three months he published a review of the relevant imaging literature from the medical, defense, consumer, and scientific communities, together with a charter for a laboratory program. Soon after, Bob introduced digital noise analysis to radiography, and showed that the new technology offered a 1.6- to 2.5-fold exposure reduction without compromising imaging performance. He then launched a program of inter-laboratory comparison of measurements on radiographic film samples that were circulated among fifteen commercial, government, and academic laboratories worldwide. In the process he became the prime mover for work toward consensus methodology for quantitative imaging performance measurements.

Mike Insana (Univ. of Illinois at Urbana-Champaign) shared memories of his years as Bob's post-doctoral student, working with Bob on the statistical characterization of ultrasound images. He described Bob as an exemplary mentor who shared his passion and joy for science.

Myers agreed, "Bob's greatest legacy may be the many young scientists he nurtured, who either worked directly under his tutelage at the FDA or otherwise benefitted from his unfailing patience and unselfish ease of availability."

Harry Barrett (Univ. of Arizona) began his presentation by relating noise-equivalent quanta (NEQ)—a concept central to Bob's unified approach to objective image performance assessment—to historical information-theoretic methods for evaluation of imaging systems. Barrett went on to describe the many ways in which NEQ was extended to address problems beyond the simple signal-known-exactly, background-known-exactly (SEK/BKE) task.

Ken Hanson (Los Alamos National Lab.) described his years of collaboration with Bob. He said they worked together, first in the area of noise characterization of radiographic and CT images and later on the evaluation of images confounded by artifacts. In this latter work, Bob and Ken pioneered the application of a decision theoretic approach to the assessment of image reconstruction algorithms, demonstrating that the common mean-square-error metric did not predict visual task performance as measured by detectability.

Bob's contemporary work, as described by Myers, "involved the consideration of the random effects associated with multiple readers of medical images and the logical extension of this work to the problem of the evaluation of multiple competing classifiers in statistical pattern recognition. Bob tackled problems of increasing complexity over the course of his career, relying throughout on the application of a unified, decision theoretic framework. In the process he brought about consensus on the importance of a task-based approach to the objective assessment of imaging systems."

During more than forty years of professional life, Bob Wagner made numerous contributions to the field of medical imaging that significantly impacted academia, industry, and the FDA. His brilliant mind, incredible intuition, passion for science, sense of humor, charm, and warm friendship will be greatly missed.