

*Medical Imaging 2008*

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**Image Processing**

**Joseph M. Reinhardt**

**Josien P. W. Pluim**

*Editors*

**17–19 February 2008**

**San Diego, California, USA**

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SPIE

Part One of Three Parts

**Volume 6914**

Proceedings of SPIE, 1605-7422, v. 6914

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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 2008: Image Processing*, edited by Joseph M. Reinhardt, Josien P. W. Pluim, Proceedings of SPIE Vol. 6914 (SPIE, Bellingham, WA, 2008) Article CID Number.

ISSN 1605-7422  
ISBN 9780819470980

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

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R. Jin, Huazhong Univ. of Science and Technology (China); E. Song, Huazhong Univ. of Science and Technology (China) and Jiangxi College of Chinese Medicine (China); L. Zhang, Z. Min, X. Xu, Huazhong Univ. of Science and Technology (China); C.-C. Huang, Southern Polytech State Univ. (USA)
- 6914 29 **Pyramidal flux in an anisotropic diffusion scheme for enhancing structures in 3D images** [6914-81]  
O. Acosta, H. Frimmel, ICT Ctr., CSIRO (Australia); A. Fenster, Robarts Research Institute (Canada); O. Salvado, ICT Ctr., CSIRO (Australia); S. Ourselin, ICT Ctr., CSIRO (Australia) and Univ. College London (United Kingdom)
- 6914 2A **Informative frame detection from wireless capsule video endoscopic images** [6914-82]  
M. K. Bashar, K. Mori, Y. Suenaga, T. Kitasaka, Nagoya Univ. (Japan); Y. Mekada, Chukyo Univ. (Japan) and Nagoya Univ. (Japan)

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#### POSTERS: MOTION ANALYSIS

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- 6914 2B **Automated motion correction based on target tracking for dynamic nuclear medicine studies** [6914-83]  
X. Cao, T. Tetrault, F. Fahey, T. Treves, Children's Hospital Boston, Harvard Medical School (USA)
- 6914 2C **Multi-object tracking of human spermatozoa** [6914-84]  
L. Sørensen, J. Østergaard, P. Johansen, Univ. of Copenhagen (Denmark); M. de Bruijne, Univ. of Copenhagen (Denmark) and Erasmus MC (Netherlands)
- 6914 2D **Tracking the hyoid bone in videofluoroscopic swallowing studies (Honorable Mention Poster Award)**[6914-85]  
P. M. Kellen, D. Becker, J. M. Reinhardt, D. van Daele, The Univ. of Iowa (USA)

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#### POSTERS: MRI

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- 6914 2E **Towards user-independent DTI quantification** [6914-86]  
J. Klein, H. Stuke, J. Rexilius, MeVis Research (Germany); B. Stieltjes, German Cancer Research Ctr. (Germany); H. K. Hahn, H.-O. Peitgen, MeVis Research (Germany)

- 6914 2F **An exploration of spatial similarities in temporal noise spectra in fMRI measurements** [6914-87]  
D. H. J. Poot, J. Sijbers, Univ. of Antwerp (Belgium); A. J. den Dekker, Delft Univ. of Technology (Netherlands)
- 6914 2G **White matter tractographies registration using Gaussian mixture modeling** [6914-89]  
O. Zvitia, A. Mayer, H. Greenspan, Tel Aviv Univ. (Israel)
- 6914 2H **Tensor distribution function** [6914-90]  
A. D. Leow, S. Zhu, Univ. of California, Los Angeles (USA)
- 6914 2I **Susceptibility correction for improved tractography using high field DT-EPI** [6914-91]  
W. Pintjens, D. H. J. Poot, M. Verhoye, A. Van Der Linden, J. Sijbers, Univ. of Antwerp (Belgium)
- 6914 2J **A Bayesian method with reparameterization for diffusion tensor imaging** [6914-92]  
D. Zhou, I. L. Dryden, A. Koloydenko, B. Li, Univ. of Nottingham (United Kingdom)
- 6914 2K **Automatic regional analysis of DTI properties in the developmental macaque brain** [6914-93]  
M. Styner, R. Knickmeyer, Univ. of North Carolina, Chapel Hill (USA); C. Coe, S. J. Short, Univ. of Wisconsin, Madison (USA); J. Gilmore, Univ. of North Carolina, Chapel Hill (USA)

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#### POSTERS: MULTIREOLUTION AND WAVELETS

- 6914 2L **Short basis functions for constant-variance interpolation** [6914-94]  
P. Thévenaz, T. Blu, M. Unser, École Polytechnique Fédérale de Lausanne (Switzerland)
- 6914 2M **Efficient random access high resolution region-of-interest (ROI) image retrieval using backward coding of wavelet trees (BCWT)** [6914-95]  
E. Corona, B. Nutter, S. Mitra, Texas Tech Univ. (USA); J. Guo, Beijing Institute of Technology (China); T. Karp, Texas Tech Univ. (USA)

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#### POSTERS: REGISTRATION

- 6914 2N **Semi-automatic matching of OCT and IVUS images for image fusion** [6914-43]  
O. Pauly, G. Unal, G. Slabaugh, Siemens Corporate Research (USA); S. Carlier, Cardiovascular Research Foundation (USA); T. Fang, Siemens Corporate Research (USA)
- 6914 2O **Nonlinear elastic model for image registration and soft tissue simulation based on piecewise St. Venant-Kirchhoff material approximation** [6914-96]  
E. Gladilin, R. Eils, German Cancer Research Ctr. (Germany)
- 6914 2P **Validation and comparison of registration methods for free-breathing 4D lung CT** [6914-97]  
T. Vik, S. Kabus, J. von Berg, Philips Research Europe - Hamburg (Germany); K. Ens, Philips Research Europe - Hamburg (Germany) and Univ. of Lübeck (Germany); S. Dries, Philips Research Europe - Hamburg (Germany); T. Klinder, Philips Research Europe - Hamburg (Germany) and Leibniz Univ. Hannover (Germany); C. Lorenz, Philips Research Europe - Hamburg (Germany)

- 6914 2R **Non-rigid registration of 2D manifolds in 3D Euclidian space** [6914-99]  
S. Darkner, Technical Univ. of Denmark (Denmark) and Eriksholm Research Ctr. (Oticon A/S) (Denmark); M. Vester-Christensen, R. R. Paulsen, R. Larsen, Technical Univ. of Denmark (Denmark)
- 6914 2S **Model-to-image based 2D-3D registration of angiographic data** [6914-100]  
S. Mollus, Philips Research Europe (Germany); J. Lübke, University Medical Ctr. Freiburg (Germany); A. J. Walczuch, Philips Research Europe (Germany); H. Schumann, Univ. of Rostock (Germany); J. Weese, Philips Research Europe (Germany)
- 6914 2T **Robust registration for change detection** [6914-101]  
S. Darkner, Technical Univ. of Denmark (Denmark) and Eriksholm Research Ctr. (Denmark); D. Witzner Hansen, R. R. Paulsen, R. Larsen, Technical Univ. of Denmark (Denmark)
- 6914 2U **Reconstruction and registration of multispectral x-ray images for reliable alignment correction in radiation treatment devices** [6914-102]  
B. P. Selby, Medcom GmbH (Germany); G. Sakas, Fraunhofer IGD (Germany); S. Walter, Medcom GmbH (Germany); W.-D. Groch, Univ. of Applied Sciences (Germany); U. Stilla, Technische Univ. München (Germany)
- 6914 2V **Registration of standardized histological images in feature space** [6914-103]  
U. Bağci, L. Bai, The Univ. of Nottingham (United Kingdom)
- 6914 2W **A new parametric nonrigid image registration method based on Helmholtz's theorem** [6914-104]  
H.-Y. Hsiao, H. Chen, T.-H. Lin, C.-Y. Hsieh, M.-Y. Chu, G. Liao, The Univ. of Texas at Arlington (USA); H. Zhong, Virginia Commonwealth Univ. (USA)
- 6914 2X **3-D statistical cancer atlas-based targeting of prostate biopsy using ultrasound image guidance** [6914-105]  
R. Narayanan, Eigen LLC (USA); D. Shen, C. Davatzikos, Univ. of Pennsylvania (USA); E. D. Crawford, A. Barqawi, P. Werahera, Univ. of Colorado Denver (USA); D. Kumar, J. S. Suri, Eigen LLC (USA)
- 6914 2Y **Optimized GPU implementation of learning-based non-rigid multi-modal registration** [6914-107]  
Z. Fan, Stony Brook Univ. (USA); C. Vetter, C. Guetter, D. Yu, Siemens Corporate Research (USA); R. Westermann, Technische Univ. München (Germany); A. Kaufman, Stony Brook Univ. (USA); C. Xu, Siemens Corporate Research (USA)
- 6914 2Z **Efficient 3D rigid-body registration of micro-MR and micro-CT trabecular bone images** [6914-108]  
C. S. Rajapakse, J. Magland, Univ. of Pennsylvania School of Medicine (USA); S. L. Wehrli, Children's Hospital of Philadelphia (USA); X. H. Zhang, X. S. Liu, X. E. Guo, Columbia Univ. (USA); F. W. Wehrli, Univ. of Pennsylvania School of Medicine (USA)
- 6914 30 **Histopathology and MR image fusion of the prostate** [6914-109]  
H. H. Jo, J. Jung, Y. Jang, H. Hong, Seoul Women's Univ. (South Korea); H. J. Lee, Seoul National University Bundang Hospital (South Korea)

- 6914 31 **3D-3D alignment using particle swarm optimization** [6914-110]  
S. Schafer, K. R. Hoffmann, P. B. Noël, C. L. Bloebaum, State Univ. of New York at Buffalo (USA)
- 6914 32 **Automatic alignment of renal DCE-MRI image series for improvement of quantitative tracer kinetic studies** [6914-111]  
D. Zikic, Technische Univ. München (Germany); S. Sourbron, University Hospitals Munich-Grosshadern (Germany); X. Feng, Technische Univ. München (Germany); H. J. Michaely, University Hospitals Munich-Grosshadern (Germany); A. Khamene, Siemens Corporate Research (USA); N. Navab, Technische Univ. München (Germany)
- 6914 33 **Consistent detection of mid-sagittal planes for follow-up MR brain studies** [6914-112]  
Y. Wang, Univ. of Florida (USA); L. Zhang, Siemens Corporate Research (USA)
- 6914 34 **A rapid and robust iterative closest point algorithm for image-guided radiotherapy** [6914-113]  
J. Barbiere, J. Hanley, Hackensack Univ. Medical Ctr. (USA)
- 6914 35 **Refinal image mosaicing using the radial distortion correction model** [6914-114]  
S. Lee, The Univ. of Iowa (USA); M. D. Abramoff, The Univ. of Iowa (USA) and Veterans Administration Medical Ctr. (USA); J. M. Reinhardt, The Univ. of Iowa (USA)
- 6914 36 **Deformation estimation and analysis for adaptive radiation therapy** [6914-115]  
B. Wang, J. Xuan, Virginia Polytechnic Institute and State Univ. (USA); J. Q. Wu, Duke Univ. (USA); S. Zhang, Shanghai Jiao Tong Univ. (China); Y. Wang, Virginia Polytechnic Institute and State Univ. (USA)

## Part Three

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### POSTERS: SEGMENTATION

- 6914 37 **Simultaneous segmentation and motion estimation in 4D-CT data using a variational approach** [6914-116]  
J. Ehrhardt, A. Schmidt-Richberg, H. Handels, University Medical Ctr. Hamburg-Eppendorf (Germany)
- 6914 38 **Recent advances in 3D-CSC based MR brain image segmentation** [6914-117]  
F. Schmitt, L. Priese, Univ. Koblenz-Landau (Germany)
- 6914 39 **Automatic knee cartilage delineation using inheritable segmentation** [6914-120]  
S. P. M. Dries, V. Pekar, D. Bystrov, H. S. Heese, T. Blaffert, Philips Research Europe – Hamburg (Germany); C. Bos, A. M. C. van Muiswinkel, Philips Medical Systems (Netherlands)
- 6914 3A **Computerized image analysis for acetic acid induced intraepithelial lesions** [6914-121]  
W. Li, STI Medical Systems (USA); D. G. Ferris, Medical College of Georgia (USA); R. W. Lieberman, Univ. of Michigan Medical School (USA)

- 6914 3B **Improving 3D active appearance model segmentation of the left ventricle with Jacobian tuning** [6914-122]  
K. Y. E. Leung, Erasmus Medical Ctr. (Netherlands); M. van Stralen, Erasmus Medical Ctr. (Netherlands), Interuniversity Cardiology Institute of the Netherlands (Netherlands), and Leiden University Medical Ctr. (Netherlands); M. M. Voormolen, N. de Jong, A. F. W. van der Steen, Erasmus Medical Ctr. (Netherlands) and Interuniversity Cardiology Institute of the Netherlands (Netherlands); J. H. C. Reiber, Leiden University Medical Ctr. (Netherlands); J. G. Bosch, Erasmus Medical Ctr. (Netherlands)
- 6914 3C **Novel method for digital subtraction of tagged stool in virtual colonoscopy** [6914-123]  
L. Guendel, M. Suehling, Siemens Healthcare Sector (Germany); H. Eckert, Siemens Corporate Technology (Germany)
- 6914 3D **Airway segmentation by topology-driven local thresholding** [6914-124]  
A. Szymczak, Colorado School of Mines (USA); J. Vanderhyde, IronCAD (USA)
- 6914 3E **Improving cervical region of interest by eliminating vaginal walls and cotton-swabs for automated image analysis** [6914-125]  
S. Venkataraman, W. Li, STI Medical Systems (USA)
- 6914 3F **CALM: cascading system with leaking detection mechanism for medical image segmentation** [6914-126]  
J. Liu, J. H. Lim, H. Li, Institute for Infocomm Research, A\*STAR (Singapore)
- 6914 3G **Validation of automatic landmark identification for atlas-based segmentation for radiation treatment planning of the head-and-neck region** [6914-127]  
C. Leavens, Univ. of Toronto (Canada); T. Vik, H. Schulz, Philips Research Europe (Germany); S. Allaire, J. Kim, L. Dawson, B. O'Sullivan, S. Breen, D. Jaffray, Univ. of Toronto (Canada); V. Pekar, Philips Research North America (Canada)
- 6914 3I **Segmentation in noisy medical images using PCA model based particle filtering** [6914-129]  
W. Qu, Siemens Medical Solutions USA Inc. (USA); X. Huang, Lehigh Univ. (USA); Y. Jia, Univ. of Illinois at Chicago (USA)
- 6914 3K **Semi-automatic detection of Gd-DTPA-saline filled capsules for colonic transit time assessment in MRI** [6914-131]  
C. Harrer, Technische Univ. München (Germany); S. Kirchhoff, Univ. Hospital Munich - Großhadern (Germany); A. Keil, Technische Univ. München (Germany) and Univ. Hospital Munich - Innenstadt (Germany); C. Kirchhoff, T. Mussack, Univ. Hospital Munich - Innenstadt (Germany); A. Lienemann, M. Reiser, Univ. Hospital Munich - Großhadern (Germany); N. Navab, Technische Univ. München (Germany)
- 6914 3L **A learning-based automatic spinal MRI segmentation** [6914-132]  
X. Liu, J. Samarabandu, The Univ. of Western Ontario (Canada); G. Garvin, St. Joseph's Health Care (Canada); R. Chhem, London Health Sciences Ctr. (Canada); S. Li, GE Healthcare (Canada)
- 6914 3M **Reclassification of segmentation boundary base on neighboring function** [6914-133]  
J. Chen, J. Tian, Institute of Automation (China)

- 6914 3N **Effect of various binning methods and ROI sizes on the accuracy of the automatic classification system for differentiation between diffuse infiltrative lung diseases on the basis of texture features at HRCT** [6914-134]  
N. Kim, Asan Medical Ctr. (South Korea) and Seoul National Univ. (South Korea); J. B. Seo, Asan Medical Ctr. (South Korea); Y. S. Sung, B.-W. Park, Y. Lee, Seoul National Univ. (South Korea); S. H. Park, Y. K. Lee, Asan Medical Ctr. (South Korea); S.-H. Kang, Seoul National Univ. (South Korea)
- 6914 3O **Interactive surface correction for 3D shape-based segmentation** [6914-136]  
T. Schwarz, T. Heimann, R. Tetzlaff, A.-M. Rau, I. Wolf, H.-P. Meinzer, German Cancer Research Ctr. (Germany)
- 6914 3P **An approach to segment lung pleura from CT data with high precision** [6914-137]  
E. Angelats, RWTH Aachen Univ. (Germany); K. Chaisaowong, RWTH Aachen Univ. (Germany) and King Mongkut's Institute of Technology (Thailand); A. Knepper, RWTH Aachen Univ. (Germany); T. Kraus, Univ. Hospital Aachen (Germany); T. Aach, RWTH Aachen Univ. (Germany)
- 6914 3Q **Boundary-precise segmentation of nucleus and plasma of leukocytes** [6914-138]  
T. Zerfaß, T. Rehn, T. Wittenberg, Fraunhofer Institute for Integrated Circuits (Germany)
- 6914 3R **Fully automated segmentation of carotid and vertebral arteries from contrast-enhanced CTA** [6914-139]  
O. Cuisenaire, Philips Healthcare (France); S. Virmani, M. E. Olszewski, Philips Healthcare (USA); R. Ardon, Philips Healthcare (France)
- 6914 3S **Simultaneous detection of multiple elastic surfaces with application to tumor segmentation in CT images** [6914-140]  
K. Li, Carnegie Mellon Univ. (USA); M.-P. Jolly, Siemens Corporate Research (USA)
- 6914 3T **An efficient topology adaptation system for parametric active contour segmentation of 3D images** [6914-141]  
J. Abhau, Institut für Informatik (Austria); O. Scherzer, Institut für Informatik (Austria) and IMCC Linz (Austria)
- 6914 3U **Time-dependent joint probability speed function for level-set segmentation of rat brain slices** [6914-142]  
C. Palm, Univ. College London (United Kingdom) and Research Ctr. Jülich (Germany); U. Pietrzyk, Research Ctr. Jülich (Germany) and Univ. Wuppertal (Germany)
- 6914 3V **Multi-phase image segmentation using level sets** [6914-143]  
P. Zhilkin, M. Alexander, Institute for Biodiagnositcs (Canada)
- 6914 3W **Bidirectional segmentation of prostate capsule from ultrasound volumes: an improved strategy** [6914-144]  
L. Wei, R. Narayanan, D. Kumar, Eigen LLC (USA); A. Fenster, Imaging Research Labs. (Canada); A. Barqawi, P. Werahera, E. D. Crawford, Univ. of Colorado Hospital (USA); J. S. Suri, Imaging Research Labs. (Canada)



- 6914 3X **Robust segmentation using kernel and spatial based fuzzy c-means methods on breast x-ray images** [6914-145]  
X. Sun, D. Goldgof, Univ. of South Florida (USA); W. Land, Binghamton Univ. (USA)
- 6914 3Y **Hierarchical segmentation of malignant gliomas via integrated contextual filter response** [6914-147]  
S. Dube, J. J. Corso, A. Yuille, T. F. Cloughesy, S. El-Saden, U. Sinha, Univ. of California, Los Angeles (USA)
- 6914 3Z **Local control of speed function in level set segmentation using interactive interface for CT images** [6914-148]  
S. Tate, N. Tsumura, T. Nakaguchi, Y. Miyake, Chiba Univ. (Japan)
- 6914 40 **Automated retinal layer segmentation in OCT images using spatially variant filtering** [6914-149]  
A. M. Bagci, R. Ansari, M. Shahidi, Univ. of Illinois at Chicago (USA)
- 6914 41 **Neuronal nuclei localization in 3D using level set and watershed segmentation from laser scanning microscopy images** [6914-150]  
Y. Zhu, Syracuse Univ. (USA); E. Olson, SUNY Upstate Medical Univ. (USA); A. Subramanian, Syracuse Univ. (USA); D. Feiglin, SUNY Upstate Medical Univ. (USA); P. K. Varshney, Syracuse Univ. (USA); A. Krol, SUNY Upstate Medical Univ. (USA)
- 6914 42 **Prostate segmentation on pelvic CT images using a genetic algorithm** [6914-151]  
P. Ghosh, Portland State Univ. (USA); M. Mitchell, Portland State Univ. (USA) and Santa Fe Institute (USA)
- 6914 43 **Robust segmentation of tubular structures in medical images** [6914-152]  
R. Fahmi, Siemens Medical Solutions (USA) and Univ. of Louisville (USA); A. Jerebko, M. Wolf, Siemens Medical Solutions (USA); A. A. Farag, Univ. of Louisville (USA)
- 6914 44 **Segmentation of large periapical lesions toward dental computer-aided diagnosis in cone-beam CT scans (Honorable Mention Poster Award)** [6914-153]  
S. Rysavy, A. Flores, San Francisco State Univ. (USA); R. Enciso, Univ. of Southern California (USA); K. Okada, San Francisco State Univ. (USA)
- 6914 45 **Segmentation of sonographic breast lesions: fuzzy cell-competition algorithm and bias field reduction** [6914-154]  
C.-Y. Lee, C.-C. Hsieh, C.-M. Chen, National Taiwan Univ. (Taiwan)
- 6914 47 **Three-dimensional segmentation of bones from CT and MRI using fast level sets** [6914-156]  
J. Krátký, J. Kybic, Czech Technical Univ. (Czech Republic)
- 6914 48 **3-D segmentation of articular cartilages by graph cuts using knee MR images from osteoarthritis initiative** [6914-157]  
H. Shim, Univ. of Pittsburgh (USA); S. Lee, B. Kim, Seoul National Univ. (South Korea); C. Tao, S. Chang, Univ. of Pittsburgh (USA); I. D. Yun, Hankuk Univ. of Foreign Studies (South Korea); S. U. Lee, Seoul National Univ. (South Korea); K. Kwok, K. Bae, Univ. of Pittsburgh (USA)

- 6914 49 **Segmentation and volumetric measurement of renal cysts and parenchyma from MR images of polycystic kidneys using multi-spectral analysis method** [6914-158]  
K. T. Bae, Univ. of Pittsburgh (USA); P. K. Commean, B. S. Brunsden, Washington Univ. in St. Louis (USA); D. A. Baumgarten, Emory Univ. School of Medicine (USA); B. F. King, Jr., Mayo Foundation (USA); L. H. Wetzel, Univ. of Kansas Medical Ctr. (USA); P. J. Kenney, Univ. of Alabama at Birmingham (USA); A. B. Chapman, Emory Univ. School of Medicine (USA); V. E. Torres, Mayo Foundation (USA); J. J. Grantham, Univ. of Kansas Medical Ctr. (USA); L. M. Guay-Woodford, Univ. of Alabama at Birmingham (USA); C. Tao, Univ. of Pittsburgh (USA); J. P. Miller, Washington Univ. in St. Louis (USA); C. M. Meyers, National Institutes of Health (USA); W. M. Bennett, Northwest Renal Clinic (USA)
- 6914 4A **Semi-automated segmentation of the prostate gland boundary in ultrasound images using a machine learning approach** [6914-159]  
K. Díaz, Pontificia Univ. Católica del Perú (Peru); B. Castaneda, Pontificia Univ. Católica del Perú (Peru) and Univ. of Rochester (USA)
- 6914 4B **Multiscale support vector clustering** [6914-160]  
M. S. Hansen, Technical Univ. of Denmark (Denmark); D. A. Holm, Technical Univ. of Denmark (Denmark) and Danish Research Ctr. for Magnetic Resonance, Copenhagen Univ. Hospital (Denmark); K. Sjöstrand, Technical Univ. of Denmark (Denmark); C. D. Ley, Institute for Molecular Pathology (Denmark); I. J. Rowland, Danish Research Ctr. for Magnetic Resonance, Copenhagen Univ. Hospital (Denmark); R. Larsen, Technical Univ. of Denmark (Denmark)
- 6914 4C **Fast approximate surface evolution in arbitrary dimension** [6914-161]  
J. Malcolm, Georgia Institute of Technology (USA); Y. Rathi, Brigham and Women's Hospital (USA); A. Yezzi, A. Tannenbaum, Georgia Institute of Technology (USA)
- 6914 4D **An accurate segmentation method for volumetry of brain tumor in 3D MRI** [6914-162]  
J. Wang, Q. Li, Duke Univ. (USA); T. Hirai, S. Katsuragawa, Kumamoto Univ. (Japan); F. Li, K. Doi, The Univ. of Chicago (USA)
- 6914 4E **Automated segmentation of middle hepatic vein in non-contrast x-ray CT images based on an atlas-driven approach** [6914-163]  
T. Kitagawa, X. Zhou, T. Hara, H. Fujita, Gifu Univ. Graduate School of Medicine (Japan); R. Yokoyama, Gifu Univ. School of Medicine (Japan); H. Kondo, Gifu Univ. Hospital (Japan); M. Kanematsu, Gifu Univ. School of Medicine (Japan); H. Hoshi, Gifu Univ. Graduate School of Medicine (Japan)
- 6914 4F **A deformable model-based minimal path segmentation method for kidney MR images** [6914-164]  
K. Li, B. Fei, Case Western Reserve Univ. (USA)
- 6914 4G **Automated lung tumor detection and quantification for respiratory gated PET/CT images** [6914-165]  
J. Wang, M. del Valle, Florida International Univ. (USA); J. Franquiz, Radiological Physics of South Florida, Inc. (USA); A. McGoron, Florida International Univ. (USA)

- 6914 4H **Efficient curvature estimations for real-time (25Hz) segmentation of volumetric ultrasound data** [6914-166]  
C. R. Wagner, Cybernet Systems Corp. (USA); D. P. Perrin, Harvard Medical School (USA)
- 6914 4I **Semi-automatic segmentation and modeling of the cervical spinal cord for volume quantification in multiple sclerosis patients from magnetic resonance images** [6914-167]  
P. Sonkova, I. E. Evangelou, A. Gallo, F. K. Cantor, J. Ohayon, H. F. McFarland, F. Bagnato, National Institutes of Health (USA)
- 6914 4J **Integrating local voxel classification and global shape models for medical image segmentation** [6914-168]  
E. M. van Rikxoort, University Medical Ctr. Utrecht (Netherlands); M. de Bruijne, Univ. of Copenhagen (Denmark) and Erasmus Medical Ctr. (Netherlands); B. van Ginneken, University Medical Ctr. Utrecht (Netherlands)
- 6914 4K **Lung lobe and segmental lobe extraction from 3D chest CT datasets based on figure decomposition and Voronoi division** [6914-169]  
K. Mori, Y. Nakada, T. Kitasaka, Y. Suenaga, Nagoya Univ. (Japan); H. Takabatake, Sapporo-Minami-sanjo Hospital (Japan); M. Mori, Sapporo-Kosei General Hospital (Japan); H. Natori, Keiwakai Nishioka Hospital (Japan)

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#### POSTERS: SHAPE

- 6914 4M **A novel approach to fracture-risk-assessment in osteoporosis by ROI-oriented application of the Minkowski-functionals to dual x-ray absorptiometry scans of the hip** [6914-171]  
H. F. Boehm, A. Panteleon, T. Vogel, D. Burklein, M. Reiser, Univ. of Munich (Germany)
- 6914 4N **Reconstructing liver shape and position from MR image slices using an active shape model** [6914-172]  
M. Fenchel, Siemens Medical Solutions (Germany) and Eberhard-Karls-Univ. (Germany); S. Thesen, Siemens Medical Solutions (Germany); A. Schilling, Eberhard-Karls-Univ. (Germany)
- 6914 4O **Tracheal stent prediction using statistical deformable models of tubular shapes** [6914-173]  
R. Pinho, T. Huysmans, Univ. of Antwerp (Belgium); W. Vos, University Hospital of Antwerp (Belgium); J. Sijbers, Univ. of Antwerp (Belgium)
- 6914 4P **Vertebral classification using localized pathology-related shape model** [6914-174]  
R. Zewail, A. Elsafi, N. Durdle, Univ. of Alberta (Canada)
- 6914 4Q **Local curvature scale: a new concept of shape description** [6914-175]  
S. Rueda, The Univ. of Nottingham (United Kingdom); J. K. Udupa, Univ. of Pennsylvania (USA); L. Bai, The Univ. of Nottingham (United Kingdom)
- 6914 4R **Conditional-mean initialization using neighboring objects in deformable model segmentation (Honorable Mention Poster Award)** [6914-176]  
J.-Y. Jeong, J. V. Stough, J. S. Marron, S. M. Pizer, Univ. of North Carolina, Chapel Hill (USA)

- 6914 4S **A multi-modal prostate segmentation scheme by combining spectral clustering and active shape models** [6914-177]  
R. Toth, P. Tiwari, Rutgers Univ. (USA); M. Rosen, Univ. of Pennsylvania (USA); A. Kalyanpur, Teleradiology Solutions (India); S. Pungavkar, Dr. Balabhai Nanavati Hospital (India); A. Madabhushi, Rutgers Univ. (USA)
- 6914 4T **Comparison of statistical shape models built on correspondence probabilities and one-to-one correspondences** [6914-178]  
H. Hufnagel, University Medical Ctr. Hamburg-Eppendorf (Germany); X. Pennec, INRIA Sophia Antipolis (France); J. Ehrhardt, University Medical Ctr. Hamburg-Eppendorf (Germany); N. Ayache, INRIA Sophia Antipolis (France); H. Handels, University Medical Ctr. Hamburg-Eppendorf (Germany)

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**POSTERS: TEXTURE**

- 6914 4U **Studying the effect of noise on the performance of 2D and 3D texture measures for quantifying the trabecular bone structure as obtained with high resolution MR imaging at 3 tesla** [6914-179]  
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- 6914 4V **Comparison and combination of scaling index method and Minkowski functionals in the analysis of high resolution magnetic resonance images of the distal radius in vitro** [6914-180]  
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## Introduction

These proceedings contain the papers presented at the Image Processing conference of the 2008 SPIE Medical Imaging Symposium, held 16–21 February at the Town and Country Hotel in San Diego, California. A total of 120 posters and 63 oral presentations were selected from 264 submissions. The high quality of the submissions made the paper selection process extremely difficult, and in the end we were limited by the available timeslots for oral presentations and space for poster presentations. The acceptance rate this year was 69%. The total number of submissions increased by 15% compared to 2007. Of the 183 accepted papers, 170 were presented at the meeting and are included in these proceedings.

The first day of the conference ended with the evening workshop entitled “DICOM Working Group 23 and Application Hosting: What They Mean for Research in Medical Image Analysis,” organized and chaired by Dr. David Haynor, of the University of Washington. Dr. Haynor opened the workshop by describing how difficult it can be to bring a new research image processing application into a clinical radiology environment; the reading workstations are typically locked down so that no new software can be added, necessitating that a new computer be added to the reading room to deploy a new application. Four speakers from academia, industry, and government discussed different aspects of application hosting. Dr. Lawrence Tarbox, of Washington University in St. Louis, described the work done by DICOM Working Group 23 to define a standard application hosting framework that provides a “plug-in” interface so that new applications could be loaded into a workstation at runtime, and could run in a safe, protected environment. He described the development of the eXtensible Imaging Platform (XIP), an open-source environment for rapidly developing medical imaging applications. Dr. Gianluca Paladini, of Siemens Corporate Research, discussed the Siemens OpenXIP environment for rapid application development. OpenXIP provides easy access to image processing and display libraries such as ITK and VTK. Mr. Chris Wood, of Clario Medical Imaging, described a Clario application hosting environment, and discussed how researchers might work with Clario to distribute and support their image processing applications. Dr. Laurence Clarke, of the National Cancer Institute (NCI) at the NIH, discussed the NCI’s interest in application hosting, portable plug-ins, and, more generally, open-source software. After the four speakers delivered their prepared remarks, there was an interesting panel discussion and question-and-answer session. Various practical considerations of using application hosting and plug-ins in a clinical environment, such as FDA approval, liability, and royalties were discussed. After the workshop, the five panelists and many audience members moved to a conference room for a hands-on session with the XIP environments.

Our keynote speaker this year was Dr. James Duncan, from Yale University. Dr. Duncan is well known in the medical imaging community for his work in many areas of medical image processing, and for his founding and leadership of the Image Processing and Analysis Group (IPAG) at Yale University. Dr. Duncan's keynote talk was entitled "Model-based biomedical image analysis." He described the challenges associated with accurately and reproducibly extracting useful quantitative information from medical images, including image acquisition limitations, the variability of normal human anatomy and physiology, and the presence of disease or other abnormal conditions. Dr. Duncan argued that robust and reproducible image analysis solutions combine both image-derived information and model-based information. He discussed research performed at IPAG to use shape, geometry, and biomechanical models to guide image analysis and to constrain the range of plausible solutions in the presence of uncertainty, and described key applications of these concepts in the areas of cardiac and neurological image analysis.

The image processing posters were displayed on Sunday and Monday this year. At the Monday night poster reception, one cum laude poster and three honorable mention posters were recognized as the winners of the student poster competition. The award-winning poster papers are marked in these proceedings.

Many people contributed time and energy toward making the conference a success. We would like to thank the members of the Image Processing Conference program committee for their efforts before and during the meeting in reviewing paper submissions, chairing sessions, and judging posters. We would also like to thank the staff at SPIE for their work in organizing the meeting and publishing the proceedings. And, of course, we are grateful to all of the authors, for they are the ones that produced and presented the exciting research that makes these proceedings possible.

**Joseph M. Reinhardt**  
**Josien P.W. Pluim**



## **In Memoriam**

### **Sam Dwyer**

**1932–2008**



#### **Inspirational planner for SPIE Medical Imaging symposia and chair of 15 conferences from 1983 to 1996**

Sam Dwyer was a leading light in the swift growth of the field of medical imaging. At this 2008 Medical Imaging symposium, several colleagues expressed their appreciation of his professional achievements and the legacy of his contributions.

Andre Duerinckx recalls Sam's first big step into the limelight. "Sam chaired the Second International PACS meeting sponsored by SPIE in 1983. He stepped in when my professional direction shifted and I could not continue. Over the following years Sam became a leading force in the development of this new science and technology as the conferences developed and grew."

"He had an ability to predict important technology trends in medical imaging," says Steven Horii, a long-time SPIE Medical Imaging contributor and past conference chair.

Another past Medical Imaging conference chair with years of experience, Roger Schneider elaborates, "The growth of the initial conferences was phenomenal. They quickly expanded and outgrew several facilities. Topic areas increased. For example, we had been dealing with perception in sessions on image statistics. Sam first suggested that the field of perception theory and experiment was expanding so rapidly that it deserved its own conference. We also added conferences on image processing hardware, display, functional imaging, and special topics in ultrasound transducers."

"Sam was a true pioneer in our field," continues Schneider. "He was one of the first to envision the impact of digital technology on the storage, retrieval, communication, and

display of medical images, and one of the most active early explorers of the possibilities. He led the PACS conference into the merger with SPIE's image science conference to form the current Medical Imaging Symposium which many consider to be the premiere technical program on medical imaging in the world."

Murray Loew, another past conference chair, adds his observation, "Sam's academic, industrial, and clinical experience provided the perspective that enabled him to set priorities and give advice that helped many of us to make our own contributions. We all benefited greatly from his insights and his practical approach."

Schneider agrees. "Through all, Sam was an excellent partner and leader, calm, gentle yet persuasive, always congenially nudging everyone toward a better future. His ambitions were not for himself, but for the mutual enterprise. He was a very enthusiastic mentor and supporter of students and researchers new to the field without any concern for the possibility that their work might compete with his and was himself a superbly competent contributor."

An example of this is illustrated by John Strauss." Already well accomplished at the time of our first meeting, Sam made the time to take an eager but inexperienced student under his wing. I was not an 'assigned' grad student or research assistant from the University to which he had an obligation. I was a product manager from a vendor-partner. Over the years, from answering technical questions in an understandable way, to providing unassuming career guidance, as well as a sympathetic ear to the challenges of fatherhood or life's many challenges and struggles, Sam was always there for me."

"There are many things about Sam Dwyer that I recall with great fondness, like his always friendly and enthusiastic manner. His advice led me to my years of satisfying work on the ACR-NEMA Committee," adds Horii.

All agree that Sam had many other admirable traits. His wit and sense of humor were legendary, as one of Schneider's favorite memories illustrates. "At the opening of one conference Sam announced, from the podium, that it was the birthday of an important attendee. He said SPIE had requested that the Blue Angels do a flyover—but they already had something scheduled. As a substitute birthday recognition, Sam suggested we take our morning coffee break out on the terrace and watch the landscaping crew circle the flagpole on their riding lawnmowers."

Strauss describes the footprint left by Sam, "While Sam left a legacy through his professional accomplishments, perhaps more lasting is the heritage of leadership he has left behind. He felt it his obligation to pass on his knowledge and wisdom to the next generation, and I was blessed as a recipient. I have and will continue to honor Sam by sharing with those that come after me."

Sam Dwyer was a person of rare quality who will be sorely missed. His name has a permanent place in the annals of medical imaging, and his contributions continue in the flourishing growth of knowledge presented and discussed in the annual Medical Imaging conferences.