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Milan Sonka
J. Michael Fitzpatrick
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Introduction

The Proceedings you hold in your hands contains papers presented at the Image Processing conference of the 2002 SPIE Medical Imaging Symposium, held in the Town and Country Hotel in San Diego, California.

As is the case at any conference, a successful program is mostly an accomplishment of the program committee. Our program committee of 21 members reviewed over 270 abstracts. Out of these, a strong program was formed, consisting of 82 talks and 131 posters. It is pleasing to be able to make a statement that is becoming a tradition in recent years: The quality of our conference continues to improve both in its breadth and in its depth.

This conference is organized by SPIE's professional staff, whom we are happy to thank for the smooth organization of the entire meeting, as well as for providing a friendly working atmosphere that is a hallmark of the Medical Imaging Symposium. The logistic support is extremely important and is very much appreciated.

The first highlight of this year's Image Processing conference was a keynote lecture delivered by Michael Unser from the Swiss Federal Institute of Technology Lausanne in Switzerland. Dr. Unser is an expert in sampling theories, multiresolution algorithms, wavelets, and the use of splines for image processing. His talk, entitled "Splines: A Perfect Fit for Medical Imaging," clearly demonstrated that splines are an approach of choice any time that a continuous model of signals or images is needed. Multiresolution properties of splines were discussed and the close relationship between splines and wavelets was highlighted. Discussed applications included image reconstructions from projections, sampling grid conversions, geometric corrections, visualization, image registration, feature extraction, and active contour models.

This year our conference addressed the ever important topic of image segmentation with a workshop entitled "Level Set Techniques and Fast Marching Methods for Image Processing and Segmentation." The workshop was organized by Benoit Dawant (Vanderbilt University), with presentations by James A. Sethian, Ravikanth Malladi, and Thomas Deschamps from University of California/Berkeley and Lawrence Berkeley National Laboratory. Dr. Sethian introduced the main ideas and concepts on which level set methods and fast marching methods are built. Dr. Malladi covered a spectrum of applications on which he and Sethian have worked, ranging from image segmentation to perceptual boundary estimation. Dr. Deschamps showed how level set methods have been used for virtual colonoscopy. Dr. Dawant addressed difficulties that are encountered when trying to apply level set methods to the segmentation of three-dimensional images with thick slices. He presented his group's modified speed function that increases the robustness of level set methods for images with weak edges and presented quantitative results on CT liver images. During an enlightening question and

answer session following the presentations, attendees discussed the methods and results with the speakers.

The poster sessions were divided into two parts with the total of four days devoted to poster presentations. Because of an increased number of submissions and a higher rejection rate, the quality of the posters was extremely high. The entire conference time could have easily been spent just viewing the posters. Look for the award-winning poster papers that are marked in the Proceedings. Two Cum Laude awards and eight Honorable Mentions were given.

Milan Sonka
J. Michael Fitzpatrick

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G. R. Tack, S. Y. Lee, Konkuk Univ. (Korea); K. C. Shin, Hanyang Univ. (Korea); S. J. Lee, Inje Univ. (Korea)

860 **Investigation of using bone texture analysis on bone densitometry images** [4684-94]
M. R. Chinander, M. L. Giger, R. D. Shah, T. J. Vokes, Univ. of Chicago (USA)

864 **Genetic algorithm and expectation maximization for parameter estimation of mixture Gaussian model phantom** [4684-95]
N. Majdi Nasab, M. Analoui, Indiana Univ. School of Dentistry (USA)

872 **Optimized statistical modeling of MS lesions as MRI voxel outliers for monitoring the effect of drug therapy** [4684-96]
Z. Ge, S. Mitra, Texas Tech Univ. (USA)

883 **Determination of biplane geometry and centerline curvature in vascular imaging** [4684-97]
D. P. Nazareth, K. R. Hoffmann, A. Walczak, J. Dmochowski, L. R. Guterman, S. Rudin, D. R. Bednarek, Univ. at Buffalo (USA)

893 **Thinning algorithim on 2D gray-level images** [4684-98]
C.-M. Ma, S.-Y. Wan, Chang Gung Univ. (Taiwan)

901 **Three-dimensional imaging using low-end C-arm systems** [4684-99]
J. Lütjens, Philips Research Labs. (Germany) and Univ. of Surrey (UK); R. Koppe, E. Klotz, M. Grass, V. Rasche, Philips Research Labs. (Germany)

913 **Feasibility of an automated technique for detection of large misregistrations** [4684-100]
C. E. Rodríguez-Carranza, M. H. Loew, George Washington Univ. (USA)

923 **Mixture of principal axes registration: a neural computation approach** [4684-101]
R. Srikanchana, J. Xuan, K. Huang, The Catholic Univ. of America (USA); M. T. Freedman, Georgetown Univ. Medical Ctr. (USA); Y. Wang, The Catholic Univ. of America (USA)

933 **Adaptive-bases algorithm for nonrigid image registration** [4684-102]
G. K. Rohde, Vanderbilt Univ. (USA) and NICHD/National Institutes of Health (USA); A. Aldroubi, B. M. Dawant, Vanderbilt Univ. (USA)

945 **Analysis of a new method for consistent large-deformation elastic image registration** [4684-104]
J. He, G. E. Christensen, J. T. Rubenstein, G. Wang, Univ. of Iowa (USA)

955 **Pose estimation of teeth through crown-shape matching** [4684-105]
V. W. Y. Mok, S. H. Ong, K. W. C. Foong, T. Kondo, National Univ. of Singapore

965 **Automatic quantification of liver-heart cross-talk for quality assessment in SPECT myocardial perfusion imaging** [4684-107]
G.-Q. Wei, Siemens Corporate Research, Inc. (USA); A. Madabhushi, Univ. of Pennsylvania (USA); J. Qian, Siemens Corporate Research, Inc. (USA); J. Engdahl, Siemens Medical Systems, Inc. (USA)

973 **Automatic quality assessment of JPEG and JPEG 2000 compressed images** [4684-108]
W. F. Good, G. S. Maitz, X.-H. Wang, Univ. of Pittsburgh (USA)

980 **JPEG domain watermarking** [4684-109]
W. Luo, Univ. of New Mexico (USA); G. L. Heileman, Univ. of New Mexico (USA) and Elisar Software Corp. (USA); C. E. Pizano, Elisar Software Corp. (USA)

986 **Optimizing feature selection across a multimodality database in computerized classification of breast lesions** [4684-110]
K. Horsch, A. F. Ceballos, M. L. Giger, I. R. Bonta, Z. Huo, C. J. Vyborny, Univ. of Chicago (USA); E. R. Hendrick, Northwestern Univ. (USA); L. Lan, Univ. of Chicago (USA)

993 **Fuzzy clustering of fMRI data: toward a theoretical basis for choosing the fuzziness index** [4684-111]
M. Buerki, Univ. Hospital of Bern (Switzerland); H. Oswald, T-Systems Health Care Systems AG (Switzerland); G. Schroth, Univ. Hospital of Bern (Switzerland)

1002 **Quantitative study of renormalization transformation method to correct the inhomogeneity in MR images** [4684-112]
Q. Ji, W. E. Reddick, J. O. Glass, E. Krynetskiy, St. Jude Children's Research Hospital (USA)

1010 **Spatiotemporal multiscale vessel enhancement for coronary angiograms** [4684-113]
T. Aach, C. Mayntz, Medical Univ. of Lübeck (Germany); P. M. Rongen, Philips Medical Systems (Netherlands); G. Schmitz, Philips Research Labs. (Germany); H. Stegehuis, Philips Medical Systems (Netherlands)

1022 **EM-IntraSPECT algorithm with ordered subsets (OSEMIS) for nonuniform attenuation correction in cardiac imaging** [4684-114]
A. Krol, SUNY/Upstate Medical Univ. (USA); I. Echeruo, Syracuse Univ. (USA); R. B. Salgado, SUNY/Upstate Medical Univ. (USA) and Syracuse Univ. (USA); A. S. Hardikar, Syracuse Univ. (USA); J. E. Bowsher, Duke Univ. Medical Ctr. (USA); D. H. Feiglin, F. D. Thomas, SUNY/Upstate Medical Univ. (USA); E. Lipson, I. L. Coman, Syracuse Univ. (USA)

1028 **Adaptive robust filters in MRI** [4684-115]
F. A. Barrios, L. González-Santos, Univ. Nacional Autónoma de México; G. R. Favila, Univ. Nacional Autónoma de México and Univ. Autónoma Metropolitana (Mexico); R. Rojas, Hospital ABC (Mexico)

1034 **Contrast improvements in digital radiography using a scatter-reduction processing algorithm** [4684-116]
K. M. Ogden, SUNY/Upstate Medical Univ. (USA); C. R. Wilson, Medical College of Wisconsin (USA); R. W. Cox, NIMH/National Institutes of Health (USA)

1048 **Effective dose reduction in dual-energy flat panel x-ray imaging: technique and clinical evaluation** [4684-119]
G. B. Avinash, K. N. Jabri, R. Uppaluri, A. Rader, GE Medical Systems (USA); F. Fischbach, J. Ricke, U. Teichgräber, Charite Campus Virchow-Klinikum (Germany)

1060 **Additional processing for phase unwrapping of magnetic resonance thermometry imaging** [4684-120]
Suprijanto, F. M. Vos, Delft Univ. of Technology (Netherlands); M. W. Vogel, Erasmus Univ. Medical Ctr. (Netherlands); A. M. Vossepoel, Delft Univ. of Technology (Netherlands); H. A. Vrooman, Erasmus Univ. Medical Ctr. (Netherlands)

1068 **Sequential approach to three-dimensional geometric image correction** [4684-121]
F. J. Crosby, Naval Surface Warfare Ctr. (USA); A. P. Nelson, Nelson Medical Associates (USA)

1077 **Denoising of cone beam CT image using wavelet transform** [4684-122]
Y.-Q. Yang, N. Nakamori, Y. Yoshida, Kyoto Institute of Technology (Japan); T. Tsunoo, M. Endo, National Institute of Radiological Sciences (Japan); K. Sato, Sony Corp. (Japan)

1085 **Tree-structured wavelet transform signature for classification of melanoma** [4684-123]
S. V. Patwardhan, A. P. Dhawan, New Jersey Institute of Technology (USA); P. A. Relue, Univ. of Toledo (USA)

1092 **Line vector quantization using noninteger subsampled wavelet pyramids and its application in medical imaging** [4684-124]
V. Kustov, A. M. Zador, Finline Technologies Ltd. (Canada)

1103 **Scale-based method for correcting background intensity variation in acquired images** [4684-125]
Y. Zhuge, J. K. Udupa, J. Liu, P. K. Saha, T. Iwanaga, Univ. of Pennsylvania (USA)

1112 **Interslice interpolation of anisotropic 3D images using multiresolution contour correlation** [4684-126]
J.-D. Lee, S.-Y. Wan, C.-M. Ma, Chang Gung Univ. (Taiwan)

1123 **Multiscale application of the N3 method for intensity correction of MR images** [4684-127]
C. K. Jones, E. B. Wong, Univ. of British Columbia (Canada)

1130 **Multiwavelet grading of prostate pathological images** [4684-128]
H. Soltanian-Zadeh, Henry Ford Health System (USA) and Univ of Tehran (Iran); K. Jafari-Khouzani, Wayne State Univ. (USA)

1139 **Soft parametric curve matching in scale-space** [4684-129]
B. B. Avants, J. C. Gee, Univ. of Pennsylvania (USA)

1151 **Wavelet median denoising of ultrasound images** [4684-130]
K. E. Macey, Univ. of California/Los Angeles (USA); W. H. Page, Open Networks Ltd. (New Zealand)

1161 **Application of an adaptive control grid interpolation technique to MR data set augmentation aimed at morphological vascular reconstruction** [4684-131]
D. H. Frakes, C. M. Sinotte, C. P. Conrad, T. M. Healy, Georgia Institute of Technology (USA); S. Shiva, Egleston Children's Hospital (USA); M. A. Fogel, Children's Hospital of Philadelphia (USA); J. W. Monaco, M. J. T. Smith, A. P. Yoganathan, Georgia Institute of Technology (USA)

1168 **Analysis of myocardial motion in tagged MR images using nonrigid image registration** [4684-132]
R. Chandrashekara, Imperial College of Science, Technology and Medicine (UK); R. H. Mohiaddin, Royal Bromptom and Harefield NHS Trust (UK); D. Rueckert, Imperial College of Science, Technology and Medicine (UK)

1180 **Characterization and evaluation of inversion algorithms for MR elastography** [4684-133]
A. Manduca, T. E. Oliphant, D. S. Lake, M. A. Dresner, R. L. Ehman, Mayo Clinic (USA)

1186 **Visualization of cardiac wavefronts using data fusion** [4684-134]
D. B. Kynor, A. J. Dietz, E. M. Friets, J. N. Peterson, U. C. Bergstrom, Creare Inc. (USA); J. K. Triedman, P. E. Hammer, Children's Hospital Boston (USA)

1195 **Multiple-isovalue selection by clustering gray values of the boundary surfaces within volume image** [4684-135]
L. Wang, Tsinghua Univ. (China) P.-A. Heng, T.-T. Wong, Chinese Univ. of Hong Kong; J. Bai, Tsinghua Univ. (China)

1204 **Identifying image structures for content-based retrieval of digitized spine x rays** [4684-136]
L. R. Long, NLM/National Institutes of Health (USA); D. M. Krainak, The Catholic Univ. of America (USA), G. R. Thoma, NLM/National Institutes of Health (USA)

1215 **Automatic localization and delineation of collimation fields in digital and film-based radiographs** [4684-137]
T. M. Lehmann, S. Goudarzi, N. I. Linnenbrügger, D. Keysers, B. B. Wein, RWTH-Aachen (Germany)

1224 **Knowledge-based image understanding and classification system for medical image databases** [4684-138]
H. Luo, Univ. at Buffalo (USA); R. S. Gaborski, Rochester Institute of Technology (USA); R. S. Acharya, The Pennsylvania State Univ. (USA)

Part Three

POSTER SESSION II

1235 **Computer-aided diagnosis in CT colonography: detection of polyps based on geometric and texture features** [4684-139]
H. Yoshida, J. J. Näppi, H. Frimmel, A. H. Dachman, Univ. of Chicago (USA)

1246 **Connective tissue representation for detection of microcalcifications in digital mammograms** [4684-140]
K. J. McLoughlin, P. J. Bones, Univ. of Canterbury (New Zealand); P. D. Kovesi, Univ. of Western Australia

1257 **New deformable human brain atlas for computer-aided diagnosis** [4684-141]
A. J. Lahtinen, Tampere Univ. of Technology (Finland); H. Frey, Tampere Univ. (Finland); H. Eskola, Tampere Univ. of Technology (Finland)