

Computational Imaging IV

Conference Chairs: **Charles A. Bouman**, Purdue Univ.; **Eric L. Miller**, Northeastern Univ.; **Ilya Pollak**, Purdue Univ.

Program Committee: **Thomas S. Denney, Jr.**, Auburn Univ.; **Peter C. Doerschuk**, Purdue Univ.; **Maya R. Gupta**, Univ. of Washington; **Peyman Milanfar**, Univ. of California/Santa Cruz; **Joseph A. O'Sullivan**, Washington Univ. in St. Louis; **Zygmunt Pizlo**, Purdue Univ.; **Stanley J. Reeves**, Auburn Univ.; **Yongyi Yang**, Illinois Institute of Technology; **Yibin Zheng**, Univ. of Virginia

Monday 16 January

SESSION 1

Conv. Ctr. Room A4 Mon. 8:30 to 9:00 am

Keynote Presentation I

Chair: **Charles A. Bouman**, Purdue Univ.

Keynote

8:30 am: **Keynote (Invited Paper)**, M. V. de Hoop, Purdue Univ. [6065-01]

SESSION 2

Conv. Ctr. Room A4 Mon. 9:00 to 11:10 am

Hierarchical and Graph-based Image Analysis

Chair: **Peyman Milanfar**, Univ. of California/Santa Cruz

9:00 am: **Modeling hierarchical structure of images with stochastic grammars**, W. Wang, T. Wong, I. Pollak, C. A. Bouman, M. P. Harper, Purdue Univ. [6065-02]

9:20 am: **Multiresolution analysis of digital images using the continuous extension of discrete group transforms**, M. Germain, J. Patera, A. Zaratsyan, Univ. de Montréal (Canada) [6065-03]

9:40 am: **Modeling multiscale differential pixel statistics with applications**, D. Odom, P. Milanfar, Univ. of California/Santa Cruz [6065-04]
Coffee Break 10:00 to 10:30 am

10:30 am: **Graph-based 3D object classification**, S. Baloch, A. H. Krim, North Carolina State Univ. [6065-05]

10:50 am: **Compression via optimal basis selection in large tree-structured dictionaries**, Y. Huang, Purdue Univ. [6065-06]

SESSION 3

Conv. Ctr. Room A4 Mon. 11:10 am to 12:10 pm

Reconstruction from Sparse Data

Chair: **Ilya Pollak**, Purdue Univ.

11:10 am: **Compressed sensing in noisy imaging environments**, J. Haupt, R. Castro, R. D. Nowak, Univ. of Wisconsin/Madison . . . [6065-07]

11:30 am: **Stable signal recovery from incomplete and inaccurate observations**, J. K. Romberg, California Institute of Technology [6065-08]

11:50 am: **A compressed sensing camera: new theory and an implementation using digital micromirrors**, D. Takhar, M. B. Wakin, M. Duarte, D. Baron, K. F. Kelly, R. G. Baraniuk, Rice Univ. [6065-09]

Lunch Break 12:10 to 1:40 pm

SESSION 4

Conv. Ctr. Room A4 Mon. 1:40 to 3:00 pm

Microscopy

Chair: **Peter C. Doerschuk**, Purdue Univ.

1:40 pm: **A fast algorithm for 3D reconstruction from unoriented projections and cryo-electron microscopy of viruses**, J. Lee, Y. Zheng, P. C. Doerschuk, Purdue Univ. [6065-10]

2:00 pm: **Spatially adaptive 3D inverse for optical sectioning**, D. V. Paliy, V. Katkovnik, K. O. Egiazarian, Tampere Univ. of Technology (Finland) [6065-11]

2:20 pm: **On soft clipping of Zernike moments for deblurring and enhancement of optical point spread functions**, N. Becherer, J. Hesser, Univ. Mannheim (Germany) [6065-12]

2:40 pm: **Adaptive sampling for atomic force microscopy with system level motion constraints**, H. Cheng, G. T. C. Chiu, Purdue Univ. [6065-13]

Coffee Break 3:00 to 3:30 pm

SESSION 5

Conv. Ctr. Room A4 Mon. 3:30 to 5:10 pm

Inverse Problems

Chair: **Thomas S. Denney, Jr.**, Auburn Univ.

3:30 pm: **Bayesian image reconstruction from Fourier-domain samples using prior edge information: convergence and parameter sensitivity**, T. S. Denney, Jr., S. J. Reeves, Auburn Univ. [6065-14]

3:50 pm: **Thin digital imaging systems using focal plane coding**, A. D. Portnoy, J. P. Guo, N. P. Pitsianis, D. J. Brady, Duke Univ.; M. A. Fiddy, Univ. of North Carolina/Charlotte; M. R. Feldman, R. D. Te Kolste, Digital Optics Corp. [6065-15]

4:10 pm: **3D reconstructions from spherically averaged Fourier transform magnitude and solution x-ray scattering experiments**, Y. Hwang, P. C. Doerschuk, Purdue Univ. [6065-16]

4:30 pm: **Computed spectroscopy using segmented apertures**, R. T. Hoctor, F. W. Wheeler, GE Global Research; E. B. Barrett, Lockheed Martin Corp. [6065-17]

4:50 pm: **Preconditioned conjugate gradient without linesearch: a comparison with the half-quadratic approach for edge-preserving image restoration**, C. Labat, J. Idier, Institute of Research in Communications and Cybernetics of Nantes (France) [6065-18]

Tuesday 17 January

SESSION 9

Plenary Speaker **Tues. 8:30 to 9:15 am**
Marriott Ballroom 1-6
Image Processing: Interconnections
Thomas S. Huang, Beckman Institute for Advanced Science and Technology, Univ. of Illinois at Urbana-Champaign
See p. 7 for details.

Conv. Ctr. Room A4 **Tues. 3:30 to 5:50 pm**

Tomography

Chair: Joseph A. O'Sullivan, Washington Univ. in St. Louis

- 3:30 pm: **Image reconstruction algorithms for a novel PET system with a half-ring insert**, D. Pal, J. A. O'Sullivan, H. Wu, M. Janecek, Y. C. Tai, Washington Univ. in St. Louis [6065-29]
- 3:50 pm: **Improved sampling of parallel projection in cylindrical PET scanners**, B. Farsaii, SUNY/Univ. at Buffalo [6065-30]
- 4:10 pm: **A Bayesian approach to tomography of multiply scattered beams**, Z. H. Levine, National Institute of Standards and Technology [6065-31]
- 4:30 pm: **Progress in multiple-image radiography**, M. N. Wernick, J. G. Brankov, Y. Yang, G. Khelashvili, Illinois Institute of Technology; D. Chapman, Univ. of Saskatchewan (Canada); I. Mondal, B. Marquet, Illinois Institute of Technology; Z. Zhong, Brookhaven National Lab. ... [6065-32]
- 4:50 pm: **A recursive filter for noise reduction in tomographic imaging**, J. Thibault, GE Medical Systems; C. A. Bouman, Purdue Univ.; J. Hsieh, GE Medical Systems; K. D. Sauer, Univ. of Notre Dame [6065-33]
- 5:10 pm: **A branch-less distance driven projection and backprojection algorithm**, S. Basu, General Electric Co.; B. De Man, GE Global Research [6065-34]
- 5:30 pm: **Cupping artifacts analysis and correction for a FPD-based cone-beam CT**, L. Zhang, H. Gao, Z. Chen, S. Li, Y. Xing, Tsinghua Univ. (China) [6065-35]

SESSION 6

Conv. Ctr. Room A4 **Tues. 9:30 to 10:00 am**

Keynote Presentation II

Chair: Eric L. Miller, Northeastern Univ.

- 9:30 am: **Computational methods for image restoration, image segmentation, and texture modeling (Invited Paper)**, G. Chung, T. M. Le, L. H. Lieu, N. Tanushev, L. Vese, Univ. of California/Los Angeles [6065-19]

SESSION 7

Conv. Ctr. Room A4 **Tues. 10:00 am to 12:10 pm**

Image and Video Analysis

Chair: Mireille Boutin, Purdue Univ.

- 10:00 am: **An adaptive model for restoration of optically distorted video frames**, D. Li, Georgia Institute of Technology; M. J. T. Smith, Purdue Univ.; R. M. Mersereau, Georgia Institute of Technology . [6065-20]
- Coffee Break 10:20 to 10:50 am
- 10:50 am: **Resource-driven content adaptation**, Y. Lu, D. S. Ebert, E. J. Delp III, Purdue Univ. [6065-21]
- 11:10 am: **Algebraic methods for structure from motion**, M. Boutin, J. Zhang, D. G. Aliaga, Purdue Univ. [6065-22]
- 11:30 am: **A maximum entropy kernel density estimator with applications to function interpolation and texture segmentation**, N. Balakrishnan, D. Schonfeld, Univ. of Illinois at Chicago [6065-23]
- 11:50 am: **Multiple watermarking: a vector space projection approach**, O. Altun, G. Sharma, M. Bocko, Univ. of Rochester [6065-24]
- Lunch/Exhibition Break 12:10 to 1:40 pm

SESSION 8

Conv. Ctr. Room A4 **Tues. 1:40 to 3:00 pm**

Biomedical Imaging

Chair: Miles N. Wernick, Illinois Institute of Technology

- 1:40 pm: **Spherical harmonics for shape-based inverse problems, as applied to electrical impedance tomography**, S. Babaeizadeh, D. H. Brooks, Northeastern Univ. [6065-25]
- 2:00 pm: **3D nonlinear multigrid algorithm for direct reconstruction of chromophore concentrations in diffuse optical tomography**, J. C. Ye, Korea Advanced Institute of Science and Technology (South Korea) [6065-26]
- 2:20 pm: **Adaptation of fast marching methods to subcellular modeling**, A. Chikando, J. M. Kinser, George Mason Univ. [6065-27]
- 2:40 pm: **Machine learning of human responses to images**, M. N. Wernick, Y. Yang, J. G. Brankov, L. Wei, Illinois Institute of Technology; I. M. El-Naqa, Washington Univ. in St. Louis; N. P. Galatsanos, Univ. of Ioannina (Greece) [6065-28]
- Coffee Break 3:00 to 3:30 pm

✓ Posters and Demonstrations-Tuesday

Demonstrations **5:30 to 8:30 pm**

A symposium-wide demonstration session will be open to attendees 5:30 to 8:30 pm Tuesday evening in Conv. Ctr. Exhibit Hall 1. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

Posters **5:30 to 7:00 pm**

Posters will be placed on display after 10:00 am in Exhibit Hall 1. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

- ✓ **A block-iterative deterministic annealing algorithm for Bayesian tomographic reconstruction**, S. Lee, Paichai Univ. (South Korea) [6065-44]
- ✓ **Deinterlacing in spatial and temporal domain**, I. Kim, C. Lee, Yonsei Univ. (South Korea) [6065-46]
- ✓ **Cosine transform generalized to lie groups SU(2)xSU(2), O(5) and SU(2)xSU(2)xSU(2): application to digital image processing**, M. Germain, J. Patera, Univ. de Montréal (Canada) [6065-47]
- ✓ **A prioritized and adaptive approach to volumetric seeded region growing using texture descriptors**, N. J. Backman, Whitworth College; B. W. Whitney, Northern Kentucky Univ.; J. D. Furst, D. S. Raicu, DePaul Univ. [6065-48]
- ✓ **A fast MAP-based superresolution algorithm for general motion**, M. Tanaka, M. Okutomi, Tokyo Institute of Technology (Japan) .. [6065-49]
- ✓ **Image deblurring by the combined use of a superresolution technique and inverse filtering**, Y. Yamada, K. Nakamae, Osaka Univ. (Japan); H. Fujioka, Fukui Univ. of Technology (Japan) [6065-50]

Wednesday 18 January

Plenary Speaker Wed. 8:30 to 9:15 am

Marriott Ballroom 1-6

Computational Imaging Methods for Functional Brain Mapping and Molecular Imaging

Richard Leahy, Univ. of Southern California

See p. 7 for details.

SESSION 10

Conv. Ctr. Room A4 Wed. 9:30 to 10:30 am

Color

Chair: Stanley J. Reeves, Auburn Univ.

9:30 am: **Estimation of color filter array data from JPEG images for improved demosaicing**, W. Feng, S. J. Reeves, Auburn Univ. . . [6065-36]

9:50 am: **Separation of irradiance and reflectance from observed color images by logarithmical nonlinear diffusion process**, T. Saito, H. Takahashi, T. Komatsu, Kanagawa Univ. (Japan) [6065-37]

10:10 am: **Novel scanner characterization method for color measurement and diagnostics applications**, B. Lee, Thomson Corporate Research; R. Bala, Xerox Corp.; G. Sharma, Univ. of Rochester . [6065-38]

Coffee Break 10:30 to 11:00 am

SESSION 11

Conv. Ctr. Room A4 Wed. 11:00 am to 12:20 pm

Image Modeling and Analysis

Chair: Zygmunt Pizlo, Purdue Univ.

11:00 am: **Elastic surface registration by parameterization optimization in spectral space**, F. G. Vadakkumpadan, Y. Tong, Y. Sun, Purdue Univ. [6065-39]

11:20 am: **Mosaicking of astronomical images with MOPEX**, D. Makovoz, I. Khan, F. J. Masci, California Institute of Technology . [6065-40]

11:40 am: **Image processing using parallel GPU units**, K. A. Bjorke, NVIDIA Corp. [6065-41]

12:00 pm: **Partial shape similarity of contours is needed for object recognition**, Z. Pizlo, Purdue Univ.; L. J. Latecki, Temple Univ. . [6065-42]