IS&T/SPIE's 9th Annual Symposium

EI '97

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Engineering Exhibition

9-14 February 1997
San Jose Convention Center
San Jose, California USA

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General Chairs:
Vasudev Bhaskaran, Hewlett-Packard Labs.
Andrew G. Tescher, Lockheed Martin Palo Alto
Advanced Research Technology Ctr.

Sponsored by

ΔIS&T The Society for Imaging Science and Technology
SPIE The International Society for Optical Engineering
Monday 10 February

SESSION 1  Mon.10:10 am to 12:10 pm
Perceptual Models for Image Processing
Chair: Bernice E. Rogowitz,
IBM Thomas J. Watson Research Ctr.

Digital images and human vision (Invited Paper),
A. B. Watson, NASA Ames Research Ctr.  [3016-01]

Five types of visual masking (Invited Paper), S. A. Klein,
Univ. of California/Berkeley; T. Carney, Univ. of
California/Berkeley and Neurometrics Institute;
L. Barghout-Stein, Univ. of California/Berkeley and
Smith-Kettlewell Eye Research Institute; C. W. Tyler,
Smith-Kettlewell Eye Research Institute.  [3016-02]

Partitioning mechanisms of masking: contrast
transducer versus divisive inhibition, L. Barghout-Stein,
Smith-Kettlewell Eye Research Institute and Univ.
of California/Berkeley; C. Tyler, Smith-Kettlewell Eye
Research Institute; S. A. Klein, Univ. of California/
Berkeley.  [3016-03]

Image discrimination models: detection in fixed and
random noise, A. J. Ahumada, Jr., NASA Ames
Research Ctr.; B. L. Beard, Univ. of California/
Berkeley.  [3016-04]

Image discrimination models predict signal detection
in natural medical image backgrounds, M. P. Eckstein,
Cedar-Sinai Medical Ctr.; A. J. Ahumada, Jr.*
A. B. Watson, NASA Ames Research Ctr.  [3016-05]

Lunch Break

SESSION 2  Mon. 1:50 to 3:10 pm
Image Quality and Multiresolution Models
Chair: Thrasyvoulos N. Pappas,
Lucent Technologies, Bell Labs.

Image quality assessment with a gabor pyramid model of
the human visual system, C. Taylor, Z. Pizlo.
J. P. Allebach, C. A. Bouman, Purdue Univ.  [3016-06]

Quality metrics for low-bit-rate coding, T. Eude, Univ.
de Bourgogne (France); H. Chenfil, CNRS-TSI
(Paris).  [3016-07]

Biologically inspired analog wavelet analyzer,
G. W. Brooks, Air Force Wright Lab. and Florida State
Univ.  [3016-08]

Rules for invisible sampling, A. Pelah, Univ. of
Cambridge (UK).  [3016-09]

SESSION 3  Mon. 3:30 to 4:30 pm
Perception and Watermarking
Chair: Thrasyvoulos N. Pappas,
Lucent Technologies, Bell Labs.

Review of watermarking and the importance of
perceptual modeling (Invited Paper), I. J. Cox, J. Kilian,
NEC Research Institute; F. T. Leighton, Massachusetts
Institute of Technology; T. Shamoan, NEC Research
Institute.  [3016-10]

Digital image watermarking using visual models,
C. I. Podilchuk, Lucent Technologies, Bell Labs.
W. Zeng, Princeton Univ.  [3016-11]

Panel Discussion
Mon. 4:50 to 6:30 pm
Perceptual Models: What’s Next?
Panel Moderator:
Bernice E. Rogowitz,
IBM Thomas J. Watson Research Ctr.

Tuesday 11 February

SESSION 4  Tues. 8:10 to 10:10 am
Color Image Coding and Quality
Chair: Bernice E. Rogowitz,
IBM Thomas J. Watson Research Ctr.

Predicting just-noticeable hue differences from cone
excitation, R. Munger, A. R. Robertson, National
Research Council Canada.  [3016-12]

Optimal quantization of true-color images in
MacAdam uniform color space, I. M. Bockstein,
Institute for Information Transmission Problems (Russia);
F. J. Fieners, Institute for Information Process
(Austria).  [3016-13]

Evaluation of the effects of image compression on the
quality of images on a soft display, R. E. Jacobson,
A. M. Ford, G. C. Attridge, Univ. of Westminster
(UK).  [3016-14]

Perceptually lossy compression of documents,
G. B. Kartha, V. Bhuskaran, K. Konstantinides, B. K.
Natarajan, Hewlett-Packard Labs.  [3016-15]

Developing color metrics for printer characterization,
J. Zable, D. J. Adams, IBM Corp.  [3016-16]

Human sensitivity to within-page color uniformity,
N. B. Goodman, Xerox Corp.  [3016-17]

Plenary Speaker
Tuesday 5:15 to 6:00 pm
Riding the New Integrated Media Systems Wave
Dr. Chrystostomos L. (Max) Nikias,
Univ. of Southern California
See p. 5 for more details.

Electronic Imaging Working Group Meeting
Tuesday 11 February  7:30 to 9:30 pm
Chair: Arthur R. Weeks, Univ. of Central Florida
See p. 58 for more details.
SESSION 7 ....... Wed. 8:50 am to Noon
Color Motion and Video
Chair: Christine I. Podilchuk, Lucent Technologies, Bell Labs.

Continuous assessment of time-varying image quality (Invited Paper), R. Harnberg, H. de Riddler, Institute for Perception Research (Netherlands) ....... [3016-29]

Spatiotemporal model of human vision for digital video compression, S. J. P. Wesen, R. L. Lagendijk, J. Biemond, Delft Univ. of Technology (Netherlands) ........... [3016-30]

Test patterns and quality metrics for digital video compression, C. Fenimore, C. Van DeGrift, B. F. Field, National Institute of Standards and Technology ............... [3016-31]

Spatiotemporal multiplexing: color decoding from single-array image representations, E. Martinez-Urelias, H. D. Crane, J. D. Peters, SRI International ............ [3016-32]

Application of temporal error diffusion to motion JPEG, J. B. Mulligan, NASA Ames Research Ctr. (Canada) .... [3016-33]

Perceived image quality of MPEG-2 stereoscopic sequences, W. J. Tarn, L. B. Steimach, Communications Research Ctr. (Canada) .... [3016-34]

Assessing the similarity of mechanisms in motion and color processing for synchronization of visual pathways, H. K. Rising Ill, Iterated Systems, Inc. ............... [3016-35]

Lunch/Plenary Break

Plenary Speaker
Wednesday • 1:00 to 1:45 pm
Digital Libraries for the Past, Present, and Future
Dr. Fredrick Mintzer,
IBM Thomas J. Watson Research Ctr.
See p. 5 for more details.

SESSION 8 ....... Wed. 2:00 to 3:00 pm
Emotion and Expression in Electronic Imaging
Chair: Bernice E. Rogowitz,
IBM Thomas J. Watson Research Ctr.

Seeing and scribbling: a computer representation of the relationship between perception and action in young children’s drawing, E. Burton, Middlesex Univ. (UK) ........... [3016-36]

Analysis of perplex situations in word processor work using facial image sequence, T. Kamitani, M. Yamamoto, Y. Matsumi, Osaka Sangyo Univ. (Japan) ............... [3016-37]

Human sense utilization method on real-time computer graphics, H. Haehra, H. Ohgashi, T. Hirata, Mitsubishi Electric Corp. (Japan) ............... [3016-38]

SESSION 9 ....... Wed. 3:30 to 5:50 pm
Computer Vision Approaches to Characterizing Images
Chair: Thrasos N. Pappas,
Lucent Technologies, Bell Labs.

Role of brightness distortions in shape-from-shading and the perceived quality of materials, C. W. Tyler, Smith-Kettlewell Eye Research Institute ........... [3016-39]

Effect of lighting direction on the perception of shape in graphics displays, R. A. Browse, J. C. Rodger, R. Addeley, Queen’s Univ. (Canada) .......... [3016-40]

Detection of color transparency, P. Colantononi, Univ. de Saint Etienne (France); M. D’Zmura, Univ. of California/Irvine; K. Knoblauch, B. Latge, Univ. de Saint Etienne (France) .......... [3016-41]

Photometric stereo without multiple images, M. S. Drew, Simon Fraser Univ. (Canada) .......... [3016-42]

Wayfinding and eye movements, N.-G. Kim, Univ. of Connecticut .......... [3016-43]

Image features from phase congruency, P. Kovash, Univ. of Western Australia (Australia) .......... [3016-44]


Discussion Session .......... Wed. 6:00 to 7:30 pm

SESSION 10. Thurs. 9:30 am to 12:20 pm
Perceptual Organization of Spatial Information
Chair: Bernice E. Rogowitz,
IBM Thomas J. Watson Research Ctr.

Gestalt laws of grouping revisited and quantified (Invited Paper), M. Kubovy, Univ. of Virginia .......... [3016-46]


Grouping in sparse random-dot patterns: linear and nonlinear, K. S. Kashi, Lucent Technologies, Bell Labs.; T. V. Papathomas, Rutgers Univ.; A. Corea, Univ. Rene Descartes (France) .......... [3016-48]

What is the visual information loss in a spatial point pattern statistical characterization?, C. Dussert, INSERM (France) .......... [3016-49]

Generation of blue noise arrays by genetic algorithm, J. L. Newburn, V. M. Bove, Jr., MIT Media Lab. .......... [3016-50]

Dynamic visualization of hierarchical data, H. Senay, J. Saltz, IP Morgan .......... [3016-51]

SESSION 11 ....... Thurs. 1:30 to 6:00 pm
Object Similarity, Characterization, and Retrieval
Chair: John C. Dalton, Apple Computer, Inc.


Representation of scenes from collections of images (Invited Paper), J. R. Bergen, David Samoff Research Ctr. .......... [3016-53]

Representation of three-dimensional object similarity in human vision, F. Cutzu, A. Tarr, Brown Univ. .......... [3016-54]

Methodology for designing image similarity metrics based on human visual system models, T. Frese, C. A. Bouman, J. P. Allebach, Purdue Univ. .......... [3016-55]

Synthetic characterization of appearance and its application to image retrieval, R. Mannath, S. S. Ravela, Univ. of Massachusetts/Amherst .......... [3016-56]

Image retrieval based on image similarity, R. J. Safranek, Lucent Technologies, Bell Labs .......... [3016-57]

Tools for texture/color-based search of images, W. Y. Ma, B. S. Manjunath, Univ. of California/Santa Barbara .......... [3016-58]

Perceptual techniques for visualizing metadata, B. E. Rogowitz, D. A. Rabenhorst, E. B. Kalin, IBM Thomas J. Watson Research Ctr. .......... [3016-59]

Computer vision for a robot sculptor, M. Brand, MIT Media Lab. .......... [3016-60]

Image similarity models and the perception of artistic representations of natural images, J. C. Dalton, Apple Computer, Inc. .......... [3016-61]

Panel Discussion
Thurs. 6:20 to 7:30 pm

Perceptual Approaches to Image Retrieval Systems
Panel Moderators:
Bernice E. Rogowitz,
IBM Thomas J. Watson Research Ctr.;
Thrasos N. Pappas,
Lucent Technologies, Bell Labs.

Panel Members:
Christine I. Podilchuk,
Lucent Technologies, Bell Labs.;
John C. Dalton, Apple Computer, Inc.;
Robert J. Safranek,
Lucent Technologies, Bell Labs.;
Dragutin Petkovic,
IBM Almaden Research Ctr.;
Ramesh Jain,
Univ. of California/San Diego

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Short Course of Related Interest

SC50 Attention and Cognition: Implications for Display Design
Presented by: John W. Senders,
Sunday, 8:30 am to 5:30 pm
See p. 47 for course description and details.
Digital Images and Human Vision

Andrew B. Watson

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Processing of digital images destined for visual consumption raises many interesting questions regarding human visual sensitivity. This talk will survey some of these questions, including some that have been answered and some that have not. There will be an emphasis upon visual masking, and a distinction will be drawn between masking due to contrast gain control processes, and due to processes such as hypothesis testing, pattern recognition, and visual search.