

PROCEEDINGS OF SPIE

Visual Information Processing XVII

Zia-ur Rahman
Stephen E. Reichenbach
Mark A. Neifeld
Editors

18–19 March 2008
Orlando, Florida, USA

Sponsored and Published by
SPIE

Volume 6978

Proceedings of SPIE, 0277-786X, v. 6978

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 *Visual Information Processing XVII*, edited by Zia-ur Rahman, Stephen E. Reichenbach, Mark A. Neifeld, Proceedings of SPIE Vol. 6978 (SPIE, Bellingham, WA, 2008) Article CID Number.

ISSN 0277-786X

ISBN 9780819471697

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 © 2008, 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 0277-786X/08/\$18.00.

Printed in the United States of America.

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



SPIEDigitalLibrary.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

vii Conference Committee

SESSION 1 ENHANCEMENT METHODS

- 6978 02 **Gaussian model-based statistical matching for image enhancement and segmentation** [6978-01]
Y. Zheng, Alcorn State Univ. (USA)
- 6978 03 **Nonlinear technique for the enhancement of extremely high contrast images** [6978-02]
N. Unaldi, Old Dominion Univ. (USA) and Aeronautics and Space Technologies Institute (Turkey); S. Arigela, V. K. Asari, Z. Rahman, Old Dominion Univ. (USA)
- 6978 04 **A multiresolution approach to image enhancement via histogram shaping and adaptive Wiener filtering** [6978-03]
T. Pace, D. Manville, H. Lee, G. Cloud, J. Puritz, DRS Sensors and Targeting Systems (USA)
- 6978 05 **Fast and robust wavelet-based dynamic range compression with local contrast enhancement** [6978-04]
N. Unaldi, Old Dominion Univ. (USA) and Aeronautics and Space Technologies Institute (Turkey); V. K. Asari, Z. Rahman, Old Dominion Univ. (USA)

SESSION 2 APPLICATIONS

- 6978 07 **A modular approach on adaptive thresholding for extraction of mammalian cell regions from bioelectric images in complex lighting environments** [6978-06]
I. K. Purohit, P. Sankaran, K. V. Asari, M. A. Karim, Old Dominion Univ. (USA)
- 6978 08 **A modular high precision digital system for hypervelocity projectile performance measurements** [6978-07]
V. V. Nagarkar, B. Singh, S. Miller, Radiation Monitoring Devices, Inc. (USA); L. Campbell, R. Bishel, R. Rushing, U.S. Air Force (USA)

SESSION 3 COMPRESSION AND METRICS

- 6978 0C **Region-of-interest-based ultra-low-bit-rate video coding** [6978-11]
W.-J. Chien, N. G. Sadaka, Arizona State Univ. (USA); G. P. Abousleman, General Dynamics C4 Systems (USA); L. J. Karam, Arizona State Univ. (USA)
- 6978 0D **Wavelet-based image registration with JPEG2000 compressed imagery** [6978-12]
D. S. Campbell, W. D. Reynolds, Jr., ITT Corp. (USA)
- 6978 0E **A structured-based image similarity measure using homogeneity regions** [6978-13]
E. P. Lam, Thales Raytheon Systems (USA)

- 6978 OF **Analysis of the general image quality equation** [6978-14]
S. T. Thurman, J. R. Fienup, The Institute of Optics, Univ. of Rochester (USA)

SESSION 4 COMPUTATIONAL IMAGING

- 6978 OG **Recent developments in coded aperture multiplexed imaging systems (Invited Paper)** [6978-15]
A. Mahalanobis, C. Reyner, T. Haberfelde, Lockheed Martin Missiles and Fire Control (USA);
M. Neifeld, Univ. of Arizona (USA); B. V. K. Vijaya Kumar, Carnegie Mellon Univ. (USA)
- 6978 OH **Scaling analysis of computational imaging systems (Invited Paper)** [6978-16]
R. A. Athale, G. W. Euliss, MITRE Corp. (USA); J. N. Mait, U.S. Army Research Lab. (USA)
- 6978 OI **Adaptive spectroscopy: towards adaptive spectral imaging (Invited Paper)** [6978-17]
M. E. Gehm, J. Kinast, Univ. of Arizona (USA)
- 6978 OJ **Application of compressive sensing theory in infrared imaging systems** [6978-18]
J. Zheng, E. Jacobs, Univ. of Memphis (USA)

SESSION 5 ANALYSIS AND ALGORITHMS

- 6978 OK **Direct, object brightness estimation from atmospheric turbulence degraded images using a new high-speed, modified phase diversity method** [6978-19]
W. W. Arrasmith, Florida Institute of Technology (USA)
- 6978 OL **Scene context dependency of pattern constancy of time series imagery** [6978-20]
G. Woodell, D. J. Jobson, NASA Langley Research Ctr. (USA); Z. Rahman, Old Dominion Univ. (USA)
- 6978 OM **Building prediction models of large hierarchical simulation models with artificial neural networks and other statistical techniques** [6978-21]
J. D. Rodriguez, K. W. Bauer, Jr., J. O. Miller, R. E. Neher, Jr., Air Force Institute of Technology (USA)
- 6978 ON **Adaptive methods of two-scale edge detection in post-enhancement visual pattern processing** [6978-22]
Z. Rahman, Old Dominion Univ. (USA); D. J. Jobson, G. A. Woodell, NASA Langley Research Ctr. (USA)

SESSION 6 SECURITY AND SURVEILLANCE

- 6978 OP **Detection of building facades in urban environments** [6978-24]
P. David, U.S. Army Research Lab. (USA)
- 6978 OQ **A grayscale skin and facial detection mechanism for use in conjunction with security system technology via graphical block methodologies on field programmable gate arrays** [6978-25]
A. J. Tickle, J. S. Smith, Q. H. Wu, The Univ. of Liverpool (United Kingdom)

- 6978 OR **Adaptive skin pixel classification technique based on hybrid color spaces** [6978-26]
R. R. Maaram, S. Gundimada, K. V. Asari, Old Dominion Univ. (USA)
- 6978 OS **Intelligent pre-processing for fast moving object detection** [6978-28]
C. Poppe, S. De Bruyne, G. Martens, P. Lambert, R. Van de Walle, Ghent Univ. (Belgium)

SESSION 7 ATR

- 6978 OT **The ATR Center and ATRpedia (Invited Paper)** [6978-29]
G. Arnold, T. Ross, L. Westerkamp, Air Force Research Lab. (USA); L. Carin, Duke Univ. (USA)
and Signal Innovations Group, Inc. (USA); R. Moses, Ohio State Univ. (USA)

POSTER SESSION

- 6978 OU **A secure workflow-based automated research manager** [6978-30]
J. K. Riek, B. D. Wemett, D. A. Keefer, R. J. Weetman, A. F. Mazzola, VirtualScopics, Inc. (USA); R. A. Leathers, T. V. Downes, U.S. Naval Research Lab. (USA)
- 6978 OV **Feasibility of a portable morphological scene change detection security system for field programmable gate arrays (FPGA)** [6978-31]
A. J. Tickle, J. S. Smith, Q. H. Wu, The Univ. of Liverpool (United Kingdom)
- 6978 OW **Feasibility of a morphological forensic document recovery system for burnt documents on field programmable gate arrays (FPGA)** [6978-32]
A. J. Tickle, J. Sun, J. S. Smith, Q. H. Wu, The Univ. of Liverpool (United Kingdom)
- 6978 OX **Next generation network based intermediate-view reconstruction using variable block matching algorithm** [6978-33]
K. Bae, J. Lee, C. Park, Samsung Thales Co., Ltd. (South Korea)
- 6978 OY **Optimization and application of Retinex algorithm in aerial image processing** [6978-34]
B. Sun, J. He, H. Li, Beijing Normal Univ. (China)
- 6978 11 **Visual surveillance in maritime port facilities** [6978-37]
M. D. Rodriguez Sullivan, M. Shah, Univ. of Central Florida (USA)
- 6978 13 **Statistical simulation of deformations using wavelet independent component analysis** [6978-40]
A. Elsafi, R. Zewail, N. Durdle, Univ. of Alberta (Canada)

Author Index

Conference Committee

Symposium Chair

Larry B. Stotts, Defense Advanced Research Projects Agency (USA)

Symposium Cochair

Ray O. Johnson, Lockheed Martin Corporation (USA)

Program Track Chair

Andrew R. Pirich, ACP Consulting (USA)

Conference Chairs

Zia-ur Rahman, Old Dominion University (USA)

Stephen E. Reichenbach, University of Nebraska, Lincoln (USA)

Mark A. Neifeld, The University of Arizona (USA)

Program Committee

Gary W. Euliss, The MITRE Corporation (USA)

Richard D. Juday, NASA Johnson Space Center (USA)

Ram M. Narayanan, The Pennsylvania State University (USA)

John M. Pellegrino, Army Research Laboratory (USA)

Robert A. Schowengardt, The University of Arizona (USA)

Joseph van der Gracht, HoloSpex, Inc. (USA)

Session Chairs

- 1 Enhancement Methods
Glenn A. Woodell, NASA Langley Research Center (USA)
- 2 Applications
Zia-ur Rahman, Old Dominion University (USA)
- 3 Compression and Metrics
Gary W. Euliss, The MITRE Corporation (USA)
- 4 Computational Imaging
Mark A. Neifeld, The University of Arizona (USA)

- 5 Analysis and Algorithms
Zia-ur Rahman, Old Dominion University (USA)
- 6 Security and Surveillance
Glenn A. Woodell, NASA Langley Research Center (USA)
- 7 ATR
Ram M. Narayanan, The Pennsylvania State University (USA)