PROCEEDINGS OF SPIE

Applications of Digital Image Processing XXXVII

Andrew G. Tescher
Editor

18–21 August 2014
San Diego, California, United States

Sponsored and Published by
SPIE

Volume 9217

Proceedings of SPIE 0277-786X, V. 9217

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Applications of Digital Image Processing XXXVII, edited by Andrew G. Tescher, Proc. of SPIE Vol. 9217, 921701
© 2014 SPIE · CCC code: 0277-786X/14/$18 · doi: 10.1117/12.2086898

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 *Applications of Digital Image Processing XXXVII*, edited by Andrew G. Tescher, Proceedings of SPIE Vol. 9217 (SPIE, Bellingham, WA, 2014) Article CID Number.

ISSN: 0277-786X
ISBN: 9781628412444

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 © 2014, 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/14/$18.00.

Printed in the United States of America.

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

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 as 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 *Authors*
ix *Conference Committee*

SESSION 1 RESTORATION AND ANALYSIS

9217 02 **High accuracy image restoration method for seeing through water** [9217-1]

9217 03 **Reconstruction algorithms for compressive hyperspectral imaging systems with separable spatial and spectral operators** [9217-2]

9217 04 **Full-body gestures and movements recognition: user descriptive and unsupervised learning approaches in GDL classifier** [9217-56]

9217 05 **Distortion operator kernel and accuracy of iterative image restoration** [9217-3]

9217 06 **Nonlinear filtering for character recognition in low quality document images** [9217-4]

9217 07 **Color image restoration based on camera microscanning** [9217-5]

9217 09 **Study of adaptive correlation filter synthesis guided by the peak and shape of the correlation output** [9217-7]

9217 0A **Digital deblurring based on linear-scale differential analysis** [9217-8]

SESSION 2 CLASSIFICATION AND EVALUATION

9217 0B **Prediction-guided quantization for video tone mapping** [9217-9]

9217 0C **Performance evaluation of objective quality metrics for HDR image compression** [9217-10]

9217 0D **Crowdsourcing evaluation of high dynamic range image compression** [9217-11]

9217 0E **Evaluation of privacy in high dynamic range video sequences** [9217-12]

9217 0F **I-vectors for image classification** [9217-13]

9217 0G **Classification and quantification of suspended dust from steel plants by using color and transmission image analysis** [9217-14]

9217 0I **System for objective assessment of image differences in digital cinema** [9217-16]

9217 0J **Open source database of images DEIMOS: extension for large-scale subjective image quality assessment** [9217-17]

9217 0K **MTF analysis for coded aperture imaging in a flat panel display** [9217-18]

9217 0L **Subjective evaluation of higher dynamic range video** [9217-86]

SESSION 3 SYSTEM ISSUES

9217 0M **Analysis of prediction algorithms for residual compression in a lossy to lossless scalable video coding system based on HEVC** [9217-19]

9217 0O **Method of automatic color rendering settings for machine vision systems** [9217-21]

9217 0P **Energy minimization of mobile video devices with a hardware H.264/AVC encoder based on energy-rate-distortion optimization** [9217-22]

9217 0Q **Comparative assessment of H.265/MPEG-HEVC, VP9, and H.264/MPEG-AVC encoders for low-delay video applications** [9217-84]

9217 0R **Joint-layer encoder optimization for HEVC scalable extensions** [9217-24]

9217 0S **Source coding for transmission of reconstructed dynamic geometry: a rate-distortion-complexity analysis of different approaches** [9217-25]

9217 0T **Research on test of product based on spatial sampling criteria and variable step sampling mechanism** [9217-26]

SESSION 4 QUALITY AND ASSESSMENT

9217 0U **Comparison of compression efficiency between HEVC/H.265 and VP9 based on subjective assessments** [9217-27]

9217 0V **Statistical feature selection for enhanced detection of brain tumor** [9217-28]

9217 10 **Facial recognition using composite correlation filters designed with multiobjective combinatorial optimization** [9217-33]

SESSION 5 RECONSTRUCTION AND TRACKING

9217 12 **Reconstruction of compressive multispectral sensing data using a multilayered conditional random field approach** [9217-35]

9217 13 **Correction of defective pixels for medical and space imagers based on Ising Theory** [9217-36]

9217 14 **Estimation of grain size in asphalt samples using digital image analysis** [9217-37]

9217 15 **Interactive alignment and image reconstruction for wafer-level multi-aperture camera systems** [9217-38]

9217 17 **Target tracking using interest point detection and correlation filtering** [9217-40]

9217 18 **An algorithm for the characterization of digital images of pigmented lesions of human skin** [9217-41]

SESSION 6 ARCHITECTURE ISSUES I

9217 19 **On the integer coding profile of JPEG XT** [9217-42]

9217 1A **Nonlinear multi-scale complex wavelet diffusion based speckle reduction approach for 3D ultrasound images** [9217-43]

9217 1B **To develop a geometric matching method for precision mold alignment** [9217-44]

SESSION 7 ARCHITECTURE ISSUES II

9217 1D **Thermographic image analysis as a pre-screening tool for the detection of canine bone cancer** [9217-46]

9217 1E **Estimation and measurement of space-variant features of imaging systems and influence of this knowledge on accuracy of astronomical measurement** [9217-47]

9217 1F **Polar format statistical image processing based fiber optic pressure sensors** [9217-48]

9217 1H **Quick-shift framework for color image segmentation based on invariant representation** [9217-50]

9217 1I **A visible light imaging device for cardiac rate detection with reduced effect of body movement** [9217-64]

SESSION 8 RECOGNITION AND VISUALIZATION I

9217 1J **On iris detection for mobile device applications** [9217-51]

9217 1K **Learning to predict where human gaze is using quaternion DCT based regional saliency detection** [9217-52]

9217 1L **Visualization of photo album on mobile devices** [9217-53]

SESSION 9 RECOGNITION AND VISUALIZATION II

9217 1N **Multiple objects tracking with HOGs matching in circular windows** [9217-57]

9217 1O **Markov random fields for static foreground classification in surveillance systems** [9217-59]

9217 1P **Single image dehazing using local adaptive signal processing** [9217-60]

SESSION 10 PROCESSING ISSUES

9217 1Q **Adaptive live multicast video streaming of SVC with UEP FEC** [9217-61]

9217 1R **Real-time SHVC software decoding with multi-threaded parallel processing** [9217-62]

9217 1T **Information embedding to a real object by projecting a checkered-pattern carrier-screen image** [9217-65]

9217 1U **Adaptive image coding based on cubic-spline interpolation** [9217-66]

POSTER SESSION

9217 1V **Heterogeneous iris image hallucination using sparse representation on a learned heterogeneous patch dictionary** [9217-55]

9217 1W **Biometric analysis of the palm vein distribution by means two different techniques of feature extraction** [9217-67]

9217 20 **Principles of image processing in machine vision systems for the color analysis of minerals** [9217-71]

9217 21 **The Empirical Mode Decomposition algorithm via Fast Fourier Transform** [9217-72]

9217 22 **Segmentation of astronomical images** [9217-73]

9217 23 **Real time soft-partition-based weighted sum filtering with GPU acceleration** [9217-74]

9217 24 **An object boundary detection system based on a 3D stereo monitor** [9217-75]

9217 26 **Machine vision based on the concept of contrast sensitivity of the human eye** [9217-77]

9217 28 **Accuracy evaluation of segmentation for high resolution imagery and 3D laser point cloud data** [9217-79]

9217 29 **MODIS images super-resolution algorithm via sparse representation** [9217-80]

9217 2A **A study on an automatic Ronchi test system** [9217-81]

9217 2B **Relay-and-antenna selection and digital transceiver design for two-way AF-MIMO multiple-relay systems** [9217-82]

9217 2C **Application of subsidence monitoring over Yangtze River marshland with ground-based SAR system IBIS** [9217-83]

9217 2D **Objective evaluation of naturalness, contrast, and colorfulness of tone-mapped images** [9217-85]

Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Alver, Muhammed Burak, 1F
Anavatti, Sreenatha G., 02
Anisimova, Elena, 1E, 22
Artemyev, Dmitry N., 21
August, Yitzhak, 03
Avraham, Tsvika, 13
Bednář, Jan, 1E
Belashenkov, Nikolai, 0A, 26
Bezzubik, Vitali, 0A, 26
Bi, Ning, 1J
Blažek, Martin, 1E
Boitard, Ronan, 0B
Bratchenko, Ivan A., 21
Brückner, Andreas, 15
Bulterman, Dick C. A., 0S
Campos Trujillo, Oliver G., 09
Castro-Ortega, R., 1W
Castro-Ramos, J., 1W
Cesar, Pablo, 0S
Chaddad, Ahmad, 0V
Chang, Chun-Li, 1B, 2A
Chen, Chun-Jen, 1B, 2A
Chen, Jianyu, 28
Chen, Ninghua, 28
Chertov, Aleksandr N., 0O, 20
Chun, Changhwan, 1L
Clausi, David A., 12
Cohen, Eliahu, 13
Colen, Rivka R., 0V
Cuevas, Andres, 10
Cunill-Rodríguez, Margarita, 18
De Simone, Francesca, 0C
Delgado-Atencio, José A., 18
Díaz Blancas, Gerardo, 09
Diaz-Escobar, Julia, 06
Díaz-Ramírez, Víctor H., 10, 17, 1N, 1P
Dong, Jie, 0R, 1R
Dufaux, Frederic, 0C
Ebrahimi, Touradj, 0D, 0E, 0L, 0U
Escalante-Torres, Manuel, 07
Fidanboylu, Kemal, 1F
Fitzsimons, Jack K., 1O
Fliegel, Karel, 0E, 0I, 1E, 22, 2D
Francois, Edouard, 0B
Fu, Jiyuan, 1D
Fukuda, Yoshinori, 0G
Furia, Bryan, 23, 24
Gaxiola, Leopoldo N., 17
Gorbunova, Elena V., 0O, 20
Grois, Dan, 0Q
Gu, Lingjia, 29
Gudumasu, Srinivas, 1R
Hachaj, Tomasz, 04
Hadar, Ofer, 0Q, 13, 1Q
Halder, Kalyan K., 02
Han, Jae-Joon, 0K
Han, Yueping, 0T
Hanhart, Philippe, 0D, 0L
He, Yong, 0R, 1R
He, Yuwen, 0R, 1R
Heindel, Andreas, 0M
Heyden, Anders, 14
Hong, Shao-Hua, 1U
Hu, Chia-Chang, 2B
Ibrahim, Abdelhameed, 1H
Janout, Petr, 1E
Ji, Dai-Yan, 1V
Jiang, Jian-Xing, 1U
Jiang, Xiaotian, 1I
Jícha, Marek, 0I
Jung, Jongpil, 0P
Jywe, Wenyuh, 1B
Källén, Hanna, 14
Kang, Donghun, 0P
Kaup, André, 0M
Kazama, Akira, 0G
Kazemzadeh, Farnoud, 12
Khramov, Alexander G., 21
Kim, Changick, 1L
Kim, Daeyeong, 1L
Klíma, Miloš, 2D
Kober, Vitaly, 05, 06, 07, 10, 1N, 1P
Kornilin, Dmitry V., 21
Korotaev, Valery V., 0O, 20
Korshunov, Pavel, 0D, 0E, 0L
Krasula, Lukáš, 0E, 0I, 2D
Kyung, Chong-Min, 0P
Lambert, Andrew J., 1A
Lasry, Amir, 1Q
Lauga, Paul, 0C
Le Callet, Patrick, 2D
Le Dauphin, Agnès, 0B
Lee, Chul-Hee, 0P
Lee, Hyukzae, 1L
Lee, Jungeon, 0P
LeLéannec, Fabrice, 0B
Lensch, Hendrik P. A., 15
Lev, Avram, 1Q

Li, Ruihong, 0T
Li, Ting, 1K
Li, Yung-Hui, 1V
Lin, Tsung-Ching, 1U
Lindh, Per, 14
Liu, Ming, 1I
Liu, Po-Tsun, 1V
Loants, Maoz, 1Q
López-Martínez, José L., 07
Loughin, Catherine A., 1D
Lu, Thomas T., 1O
Makovetskii, Artyom, 05
Marchese, Margaret, 1A
Marino, Dominic J., 1D
Marpe, Detlev, 0Q
Mekuria, Rufael N., 0S
Mera-González, Laura Y., 18
Miramontes-Jaramillo, Daniel, 1N
Mohamed, Magdi A., 1J
Myakinin, Oleg O., 21
Myslík, Jiří, 0I
Nguyen, Tung, 0Q
Ni, Nina, 28
Oberdörster, Alexander, 15
Ogiela, Marek R., 04
Oiknine, Yaniv, 03
Olivier, Yannick, 0B
Padilla-Vivanco, A., 1W
Pang, Yue, 29
Park, Dusik, 0K
Páta, Petr, 0I, 1E, 22
Pecák, Josef, 0I
Petukhova, Daria B., 20
Pickering, Mark R., 1A
Qi, Yingyong, 1J
Qiu, Zhiwei, 2C
Ren, Ruizhi, 29
Řeřábek, Martin, 0E, 0U
Richter, Thomas, 19
Ryu, Eun-Seok, 1R
Sackman, Joseph, 1D
Sarkis, Michel, 1J
Shafiee, Mohammad J., 12
Shitov, Denis D., 0O
Shnitser, Moriel, 13
Shogenji, Rui, 1T
Smith, David C., 0F
Solís-Villarreal, J., 1W
Stern, Adrian, 03
Stuart, Iain, 1A
Su, Hao-Hsian, 2B
Subedi, Samrat, 1D
Suh, Sungjoo, 0K
Sun, Jian, 29
Švihlík, Jan, 1E, 22
Tahtali, Murat, 02, 1A
Tang, Kang-Tsao, 2B
Tapia, Juan J., 17
Thoreau, Dominique, 0B
Tien, Chung-Hao, 1V
Toker, Onur, 1F
Toxqui-Quitl, C., 1W
Trujillo, Leonardo, 10
Truong, Trieu-Kien, 1U
Tsai, Chia-Ming, 0R
Uddin, Muhammad Shahin, 1A
Umbaugh, Scott E., 1D
Umegaki, Yoshiyuki, 0G
Valderrama, Jesus A., 1P
Valdiviezo-Navarro, Juan C., 18
Valenzise, Giuseppe, 0C
Vdovin, Gleb V., 0A, 26
Vítek, Stanislav, 0J, 1E, 22
Wang, Lin, 1U
Wang, Xueqin, 2C
Wige, Eugen, 0M
Wong, Alexander, 12
Wu, Wen-Hong, 2A
Xiu, Xiaoyu, 0R, 1R
Xu, Yi, 1K
Ye, Yan, 0R, 1R
Yuan, Lin, 0E
Yue, Jianping, 2C
Zakharov, Valery P., 21
Zhang, Chongyang, 1K
Zhang, Shuqun, 23, 24
Zhao, Yuejin, 1I
Zheng, Bo-Ren, 1V
Zhong, Xin, 1J

Conference Committee

Program Track Chair

Khan M. Iftekharuddin, Old Dominion University (United States)

Conference Chair

Andrew G. Tescher, AGT Associates (United States)

Conference Program Committee

Vasudev Bhaskaran, Qualcomm Inc. (United States)
Wo L. Chang, National Institute of Standards and Technology (United States)
Frederic Dufaux, Télécom ParisTech (France)
Touradj Ebrahimi, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
Ali Habibi, Consultant (United States)
Arianne T. Hinds, CableLabs (United States)
T. Russell Hsing, Telcordia Technologies, Inc. (United States)
Chun-Chieh J. Kuo, The University of Southern California (United States)
Dan Lelescu, Pelican Imaging Corporation (United States)
Ofer Hadar, Ben-Gurion University of the Negev (Israel)
Marek R. Ogiela, AGH University of Science and Technology (Poland)
Andre J. Oosterlinck, Kuleuven R & D (Belgium)
Sethuraman Panchanathan, Arizona State University (United States)
Fernando Pereira, Instituto de Telecomunicações (Portugal)
Yuriy A. Reznik, InterDigital, Inc. (United States)
Thomas Richter, Universität Stuttgart (Germany)
John A. Saghri, California Polytechnic State University, San Luis Obispo (United States)
Peter Schelkens, Vrije Universiteit Brussel (Belgium)
Gary J. Sullivan, Microsoft Corporation (United States)
Mihaela van der Schaar, University of California, Los Angeles (United States)
Anthony Vetro, Mitsubishi Electric Research Laboratories (United States)
Wenwu Zhu, Tsinghua University (China)

Session Chairs

1 Restoration and Analysis
Andrew G. Tescher, AGT Associates (United States)

2 Classification and Evaluation
Frederic Dufaux, Télécom ParisTech (France)

3 System Issues
Gary J. Sullivan, Microsoft Corporation (United States)
Ofer Hadar, Ben-Gurion University of the Negev (Israel)

4 Quality and Assessment
Peter Schelkens, Vrije Universiteit Brussel (Belgium)

5 Reconstruction and Tracking
Touradj Ebrahimi, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

6 Architecture Issues I
Thomas Richter, Universität Stuttgart (Germany)

7 Architecture Issues II
Thomas Richter, Universität Stuttgart (Germany)

8 Recognition and Visualization I
Vasudev Bhaskaran, Qualcomm Inc. (United States)
Yuriy A. Reznik, InterDigital, Inc. (United States)

9 Recognition and Visualization II
Vasudev Bhaskaran, Qualcomm Inc. (United States)
Yuriy A. Reznik, InterDigital, Inc. (United States)

10 Processing Issues
Andrew G. Tescher, AGT Associates (United States)
Andre J. Oosterlinck, Kuleuven R & D (Belgium)