Visual Information Processing and Communication

Amir Said
Onur G. Guleryuz
Editors

19–21 January 2010
San Jose, California, United States

Sponsored and Published by
IS&T—The Society for Imaging Science and Technology
SPIE

Volume 7543

Proceedings of SPIE, 0277-786X, v. 7543
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 publishers are 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:


ISSN 0277-786X
ISBN 9780819479365

Copublished 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
and
IS&T—The Society for Imaging Science and Technology
7003 Kilworth Lane, Springfield, Virginia, 22151 USA
Telephone +1 703 642 9090 (Eastern Time) · Fax +1 703 642 9094
imaging.org

Copyright © 2010, Society of Photo-Optical Instrumentation Engineers and The Society for Imaging Science and Technology.

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 the publishers 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/10/$18.00.

Printed in the United States of America.

---

**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

### IMAGE AND VIDEO CODING I

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>7543 03</td>
<td>Improved video coding efficiency exploiting tree-based pixelwise coding dependencies</td>
<td>G. Valenzise, Politecnico di Milano (Italy); A. Ortega, Univ. of Southern California (United States)</td>
</tr>
<tr>
<td>7543 04</td>
<td>Anisotropic multiscale sparse learned bases for image compression</td>
<td>A. Drémeau, C. Herzet, C. Guillemot, J.-J. Fuchs, INRIA-Rennes Research Ctr. (France)</td>
</tr>
<tr>
<td>7543 05</td>
<td>Variable block size transforms with higher order kernels for ultra-high definition video coding</td>
<td>B. Lee, S. Ahn, M. Kim, Korea Advanced Institute of Science and Technology (Korea, Republic of); H. Y. Kim, J. Kim, S. Y. Jeong, Electronics and Telecommunications Research Institute (Korea, Republic of)</td>
</tr>
</tbody>
</table>

### GPU-BASED PROCESSING

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>7543 06</td>
<td>Beyond pixels: applying the GPU to accelerate computer vision</td>
<td>J. Fung, NVIDIA Corp. (United States)</td>
</tr>
<tr>
<td>7543 07</td>
<td>A CUDA implementation of thumbnail-assisted decoder motion search for error concealment</td>
<td>W.-T. Tan, Hewlett-Packard Labs. (United States)</td>
</tr>
<tr>
<td>7543 08</td>
<td>GPU-aided motion adaptive video deinterlacing</td>
<td>X. Wu, J. Cao, McMaster Univ. (Canada)</td>
</tr>
<tr>
<td>7543 09</td>
<td>GPU implementation of JPEG XR</td>
<td>M.-C. Che, J. Liang, Simon Fraser Univ. (Canada)</td>
</tr>
</tbody>
</table>

### MULTIVIEW IMAGING AND 3D

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>7543 0A</td>
<td>Geometry-based block partitioning for efficient intra prediction in depth video coding</td>
<td>M.-K. Kang, Gwangju Institute of Science and Technology (Korea, Republic of); J. Lee, J. Y. Lee, Samsung Electronics Co., Ltd. (Korea, Republic of); Y.-S. Ho, Gwangju Institute of Science and Technology (Korea, Republic of)</td>
</tr>
<tr>
<td>7543 0B</td>
<td>Depth map coding with distortion estimation of rendered view</td>
<td>W.-S. Kim, A. Ortega, Univ. of Southern California (United States); P. Lai, D. Tian, C. Gomila, Thomson Corporate Research (United States)</td>
</tr>
</tbody>
</table>
| 7543 0C | **Multiple description coding of 3D dynamic meshes based on temporal subsampling**  
[7543-12]  
M. O. Bici, G. B. Akar, Middle East Technical Univ. (Turkey) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DISTRIBUTED CODING</strong></td>
<td></td>
</tr>
</tbody>
</table>
| 7543 0D | **Compression efficiency analysis of Wyner-Ziv video coding with motion compensated side information interpolation**  
[7543-13]  
J. Ascenso, Instituto Superior de Engenharia de Lisboa, Instituto de Telecomunicações (Portugal); C. Brites, F. Pereira, Instituto Superior Técnico, Instituto de Telecomunicações (Portugal) |
| **IMAGE AND VIDEO CODING II** |  |
| 7543 0F | **A second-order-residual (SOR) coding approach to high-bit-rate video compression**  
[7543-16]  
Q. Zhang, S.-H. Kim, Y. Dai, C.-C. J. Kuo, Univ. of Southern California (United States) |
| **H.264/AVC VIDEO CODING I** |  |
| 7543 0H | **Phase refinement for image prediction based on sparse representation**  
[7543-18]  
A. Martin, IRISA, Univ. de Rennes I (France) and Thomson Corporate Research (France); J.-J. Fuchs, C. Guillemot, IRISA, Univ. de Rennes I (France); D. Thoreau, Thomson Corporate Research (France) |
| 7543 0I | **Prediction matching for video coding**  
[7543-20]  
Y. Zheng, P. Yin, Thomson Corporate Research (United States); Ò. Divorra Escoda, Telefónica Research (Spain); J. Solé, C. Gomila, Thomson Corporate Research (United States) |
| **COMPUTER VISION AND TRACKING** |  |
| 7543 0J | **Automatic pose initialization of swimmers in videos**  
[7543-21]  
C. X. Ries, R. Lienhart, Univ. of Augsburg (Germany) |
| 7543 0K | **A kinematic model for Bayesian tracking of cyclic human motion**  
[7543-22]  
T. Greif, R. Lienhart, Univ. of Augsburg (Germany) |
| 7543 0L | **A Viterbi tracker for local features**  
[7543-23]  
G. Baugh, A. Kokaram, Trinity College Dublin (Ireland) |
| 7543 0M | **Object tracking initialization using automatic moving object detection**  
[7543-24]  
K. K. Ng, E. J. Delp, Purdue Univ. (United States) |
KEYNOTE SESSION II

7543 0N Image analysis and compression: renewed focus on texture (Keynote Paper) [7543-40]
T. N. Pappas, J. Zujovic, Northwestern Univ. (United States); D. L. Neuhoff, Univ. of Michigan (United States)

H.264/AVC VIDEO CODING II

7543 0O Texture refinement framework for improved video coding [7543-25]
F. Racapé, Institut d'Electronique et des Télécommunications de Rennes (France) and Thomson R&D France (France); M. Babel, O. Déforges, Institut d'Electronique et des Télécommunications de Rennes (France); D. Thoreau, J. Viéron, E. François, Thomson R&D France (France)

7543 0P Smoothed reference inter-layer texture prediction for bit depth scalable video coding [7543-26]
Z. Ma, Polytechnic Institute of NYU (United States); J. Luo, P. Yin, C. Gomila, Thomson Corporate Research (United States); Y. Wang, Polytechnic Institute of NYU (United States)

7543 0Q An enhancement of H.264 coding mode for R-D optimization of ultra-high-resolution video coding under low bit rate [7543-27]
T. Yoshino, S. Naito, S. Sakazawa, S. Matsumoto, KDDI R&D Labs., Inc. (Japan)

IMAGE AND VIDEO PROCESSING

7543 0R Image deblurring and denoising with non-local regularization constraint [7543-28]
P. van Beek, Sharp Labs of America, Inc. (United States); J. Yang, Univ. of Illinois at Chicago (United States); S. Yamamoto, Y. Ueda, Sharp Corp. (Japan)

7543 0S Image reconstruction from videos distorted by atmospheric turbulence [7543-29]
X. Zhu, P. Milanfar, Univ. of California, Santa Cruz (United States)

7543 0T Adaptive motion estimation using warping for video frame rate up-conversion [7543-30]
Y. Chen, M. J.T. Smith, E. Delp, Purdue Univ. (United States)

INTERACTIVE PAPER SESSION

7543 0U Adaptation of H.264/AVC predictions for enabling fast transrating [7543-31]
P. Bordes, S. Cherigui, Thomson Corporate Research (France)

7543 0V Exact JPEG recompression [7543-32]
A. B. Lewis, M. G. Kuhn, Univ. of Cambridge (United Kingdom)

7543 0W Seamless heterogeneous tessellation via smoothing and mosaicking in the DWT domain [7543-33]
K. Hayat, W. Puech, LIRMM, CNRS, Univ. of Montpellier II (France); G. Gesquiere, LSIS, CNRS, Aix-Marseille Univ. (France)
Video coding mode decision as a classification problem [7543-34]
R. Jillani, Florida Atlantic Univ. (United States); U. Joshi, C. Bhattacharya, Indian Institute of Science, Bangalore (India); H. Kalva, Florida Atlantic Univ. (United States); R. K. Ramakrishnan, Indian Institute of Science, Bangalore (India)

JP3D compressed-domain watermarking of volumetric medical data sets [7543-35]
A. Ouled Zaid, A. Makhloufi, Tunisian National Engineering School (Tunisia); C. Olivier, XLIM, CNRS, Poitiers Univ. (France)

Improved quantization index modulation based watermarking integrated to JPEG2000 coding scheme [7543-36]
A. Ouled Zaid, A. Makhloufi, Tunisian National Engineering School (Tunisia); C. Olivier, XLIM, CNRS, Poitiers Univ. (France)

Dynamic algorithm for correlation noise estimation in distributed video coding [7543-37]
K. Thambu, X. Fernando, L. Guan, Ryerson Univ. (Canada)

A novel embedding technique for dirty paper trellis codes watermarking [7543-38]
M. Chaumont, Univ. of Nîmes (France) and Lab. LIRMM, CNRS, Univ. of Montpellier II (France)

A sliced synchronous iteration architecture for real-time global stereo matching [7543-39]
S. Kwon, C. Lee, Y.-C. Lim, J.-H. Lee, Daegu Gyeongbuk Institute of Science & Technology (Korea, Republic of)

Author Index
Conference Committee

Symposium Chair

Jan P. Allebach, Purdue University (United States)

Symposium Cochair

Sabine Süsstrunk, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Conference Chairs

Amir Said, Hewlett-Packard Laboratories (United States)
Onur G. Guleryuz, DoCoMo Communications Laboratories USA, Inc. (United States)

Program Committee

John G. Apostolopoulos, Hewlett-Packard Laboratories (United States)
Vasudev Bhaskaran, Qualcomm, Inc. (United States)
Mireille Boutin, Purdue University (United States)
Chang Wen Chen, University at Buffalo (United States)
Gerard de Haan, Philips Research Nederland B.V. (Netherlands)
Edward J. Delp III, Purdue University (United States)
Eric Dubois, University of Ottawa (Canada)
Frederic Dufaux, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
Touradj Ebrahimi, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
Marta Karczewicz, Qualcomm, Inc. (United States)
Janusz Konrad, Boston University (United States)
C.-C. Jay Kuo, University of Southern California (United States)
Dan Lelescu, Micron Technology, Inc. (United States)
Ligang Lu, IBM Thomas J. Watson Research Center (United States)
Peyman Milanfar, University of California, Santa Cruz (United States)
Antonio Ortega, University of Southern California (United States)
Thrasyvoulos N. Pappas, Northwestern University (United States)
William A. Pearlman, Rensselaer Polytechnic Institute (United States)
Fernando Pereira, Universidade Técnica de Lisboa (Portugal)
Béatrice Pesquet-Popescu, Telecom ParisTech (France)
Majid Rabbani, Eastman Kodak Company (United States)
Dan Schonfeld, University of Illinois at Chicago (United States)
Gaurav Sharma, University of Rochester (United States)
Robert L. Stevenson, University of Notre Dame (United States)