

PROCEEDINGS OF SPIE

Seventh International Conference on Machine Vision (ICMV 2014)

**Antanas Verikas
Branislav Vuksanovic
Petia Radeva
Jianhong Zhou**
Editors

**19–21 November 2014
Milan, Italy**

Organized by
Science and Engineering Institute (United States)

Sponsored by
Sichuan University (China)
Singapore Institute of Electronics (Singapore)
Halmstad University (Sweden)

Published by
SPIE

Volume 9445

Proceedings of SPIE 0277-786X, V. 9445

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

Seventh International Conference on Machine Vision (ICMV 2014), edited by Antanas Verikas,
Branislav Vuksanovic, Petia Radeva, Jianhong Zhou, Proc. of SPIE Vol. 9445, 944501
© 2015 SPIE · CCC code: 0277-786X/15/\$18 · doi: 10.1117/12.2190120

Proc. of SPIE Vol. 9445 944501-1

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 *Seventh International Conference on Machine Vision (ICMV 2014)*, edited by Antanas Verikas, Branislav Vuksanovic, Petia Radeva, Jianhong Zhou, Proceedings of SPIE Vol. 9445 (SPIE, Bellingham, WA, 2015) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628415605

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 © 2015, 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/15/\$18.00.

Printed in the United States of America.

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



SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print. Papers are published as they are submitted and meet publication criteria. A unique 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.

Contents

| | |
|------|-----------------------------|
| ix | <i>Authors</i> |
| xiii | <i>Conference Committee</i> |
| xv | <i>Introduction</i> |

PATTERN RECOGNITION

| | |
|---------|--|
| 9445 02 | Road shape recognition based on scene self-similarity [9445-9] |
| 9445 03 | A speech recognition system based on hybrid wavelet network including a fuzzy decision support system [9445-16] |
| 9445 04 | Apply lightweight recognition algorithms in optical music recognition [9445-40] |
| 9445 05 | A novel palmprint representations for palmprint recognition [9445-63] |
| 9445 06 | Feature integration with random forests for real-time human activity recognition [9445-65] |
| 9445 07 | Diamond recognition algorithm using two-channel x-ray radiographic separator [9445-67] |
| 9445 08 | Comparison of two algorithms modifications of projective-invariant recognition of the plane boundaries with the one concavity [9445-71] |
| 9445 09 | Improving text recognition by distinguishing scene and overlay text [9445-78] |
| 9445 0A | LBP and SIFT based facial expression recognition [9445-87] |
| 9445 0B | A comparative study of local descriptors for Arabic character recognition on mobile devices [9445-89] |

FEATURE DETECTION AND TARGET TRACKING

| | |
|---------|--|
| 9445 0C | Object detection using categorised 3D edges [9445-14] |
| 9445 0D | Information based universal feature extraction [9445-60] |
| 9445 0E | A rotation invariant local Zernike moment based interest point detector [9445-62] |
| 9445 0F | Stereoscopic roadside curb height measurement using V-disparity [9445-21] |
| 9445 0G | Automatic enrollment for gait-based person re-identification [9445-31] |
| 9445 0H | Feature extraction of probe mark image and automatic detection of probing pad defects in semiconductor using CSVM [9445-91] |

9445 0I **Pedestrian detection system based on HOG and a modified version of CSS** [9445-44]

9445 0J **Image boundaries detection: from thresholding to implicit curve evolution** [9445-33]

IMAGE PROCESSING

9445 0K **Improving parametric active contours by using object center of gravity distance map** [9445-48]

9445 0L **Improving color image segmentation by spatial-color pixel clustering** [9445-12]

9445 0M **Segmentation of color images using genetic algorithm with image histogram** [9445-19]

9445 0N **Interactive object segmentation using color similarity based nearest neighbor regions mergence** [9445-42]

9445 0O **Image detection and compression for memory efficient system analysis** [9445-75]

9445 0P **FPGA based image processing for optical surface inspection with real time constraints** [9445-86]

9445 0Q **Selection of optimal wavelet bases for image compression using SPIHT algorithm** [9445-98]

9445 0R **The effect of desying angle on polarimetric SAR image decomposition** [9445-43]

9445 0S **Atmospheric correction of hyperspectral images based on approximate solution of transmittance equation** [9445-76]

9445 0T **Independent transmission of sign language interpreter in DVB: assessment of image compression** [9445-56]

9445 0U **Orthogonal wavelet moments and their multifractal invariants** [9445-39]

IMAGE ANALYSIS AND INFORMATION ENCRYPTION

9445 0V **High-accurate and noise-tolerant texture descriptor** [9445-38]

9445 0W **Fusing the RGB channels of images for maximizing the between-class distances** [9445-30]

9445 0X **Auto-SEIA: simultaneous optimization of image processing and machine learning algorithms** [9445-37]

9445 0Y **An approach for combining multiple descriptors for image classification** [9445-61]

9445 0Z **Sub-word image clustering in Farsi printed books** [9445-84]

9445 10 **Vehicle passes detector based on multi-sensor analysis** [9445-81]

9445 11 **Vision-based industrial automatic vehicle classifier** [9445-94]

- 9445 12 **Automatic emotional expression analysis from eye area** [9445-51]
- 9445 13 **Interactive change detection based on dissimilarity image and decision tree classification**
[9445-85]

MODELING AND VISUALIZATION

- 9445 14 **SubPatch: random kd-tree on a sub-sampled patch set for nearest neighbor field estimation** [9445-28]
- 9445 15 **Disparity estimation from monocular image sequence** [9445-5]
- 9445 16 **Sparse decomposition learning based dynamic MRI reconstruction** [9445-4]

VIDEO ANALYSIS AND PROCESSING

- 9445 17 **Generalization of the Viola-Jones method as a decision tree of strong classifiers for real-time object recognition in video stream** [9445-58]
- 9445 18 **A combined vision-inertial fusion approach for 6-DoF object pose estimation** [9445-25]
- 9445 19 **Classification of similar but differently paced activities in the KTH dataset** [9445-23]
- 9445 1A **A new method for high-capacity information hiding in video robust against temporal desynchronization** [9445-13]
- 9445 1B **Video partitioning by segmenting moving object trajectories** [9445-52]
- 9445 1C **Experimental comparison of methods for estimation of the observed velocity of the vehicle in video stream** [9445-72]
- 9445 1D **Analysis to feature-based video stabilization/registration techniques within application of traffic data collection** [9445-34]
- 9445 1E **A robust SIFT-based descriptor for video classification** [9445-41]
- 9445 1F **An agglomerative approach for shot summarization based on content homogeneity**
[9445-3]

MEDICAL SIGNAL PROCESSING

- 9445 1G **Automatic identification of vessel crossovers in retinal images** [9445-79]
- 9445 1H **Filter-based feature selection and support vector machine for false positive reduction in computer-aided mass detection in mammograms** [9445-2]
- 9445 1I **The brain MRI classification problem from wavelets perspective** [9445-20]

- 9445 1J **Computer-aided diagnosis method for MRI-guided prostate biopsy within the peripheral zone using grey level histograms [9445-27]**
- 9445 1K **Semi-automated segmentation of neuroblastoma nuclei using the gradient energy tensor: a user driven approach [9445-73]**
- 9445 1L **Tumor growth model for atlas based registration of pathological brain MR images [9445-99]**
- 9445 1M **X-ray fluorescence tomography: Jacobin matrix and confidence of the reconstructed images [9445-96]**

SIGNAL PROCESSING

- 9445 1N **Escaping path approach for speckle noise reduction [9445-47]**
- 9445 1O **Optimized curvelet-based empirical mode decomposition [9445-49]**

INFORMATION SYSTEMS AND IMAGE PROCESSING APPLICATIONS

- 9445 1P **Error analysis of rigid body posture measurement system based on circular feature points [9445-11]**
- 9445 1Q **Optical flow based velocity estimation for mobile robots [9445-53]**
- 9445 1R **Autonomous landing of a helicopter UAV with a ground-based multisensory fusion system [9445-100]**
- 9445 1S **A computer control system using a virtual keyboard [9445-8]**
- 9445 1T **Unified framework of face hallucination across multiple modalities [9445-24]**
- 9445 1U **Search-free license plate localization based on saliency and local variance estimation [9445-29]**
- 9445 1V **Seam tracking with adaptive image capture for fine-tuning of a high power laser welding process [9445-50]**
- 9445 1W **Accurate and robust spherical camera pose estimation using consistent points [9445-74]**
- 9445 1X **Method of center localization for objects containing concentric arcs [9445-93]**
- 9445 1Y **High-speed segmentation-driven high-resolution matching [9445-77]**
- 9445 1Z **A one-bit approach for image registration [9445-1]**
- 9445 20 **Remotely sensed image restoration using partial differential equations and watershed transformation [9445-97]**
- 9445 21 **Kernel weights optimization for error diffusion halftoning method [9445-7]**

- 9445 22 **Genetic algorithms for mesh surface smoothing** [9445-15]
- 9445 23 **A review of state-of-the-art speckle reduction techniques for optical coherence tomography fingertip scans** [9445-6]
- 9445 24 **Evaluating word semantic properties using Sketch Engine** [9445-32]
- 9445 25 **Noncontact surface roughness measurement using a vision system** [9445-36]
- 9445 26 **A unified approach for development of Urdu Corpus for OCR and demographic purpose** [9445-55]
- 9445 27 **Memory-efficient large-scale linear support vector machine** [9445-57]
- 9445 28 **On improvements of neural network accuracy with fixed number of active neurons** [9445-59]
- 9445 29 **Measuring the engagement level of children for multiple intelligence test using Kinect** [9445-64]
- 9445 2A **Real time rectangular document detection on mobile devices** [9445-80]
- 9445 2B **An iterative undersampling of extremely imbalanced data using CSVM** [9445-90]

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.

Adami, Nicola, 14
Ahlberg, Carl, 1Y
Ahmed, Mushtaq, 1B, 26
Akhoury, Sharat Saurabh, 23
Akkoç, Betül, 12
Akoushideh, Alireza, 0V
Alimi, Adel M., 0B
Alrajeh, Abdullah, 27
Ambros, Peter F., 1K
Amiri, Mohammad, 0D
Aoki, Yoshimitsu, 06
Arslan, Ahmet, 12
Asiltürk, İlhan, 25
Azmedroub, Boussad, 0R
Badal, Tapas, 1B
Balla-Árabé, Souleymane, 0J
Barreira, N., 1G
Batool, Wajiha, 0Q
Bayraktar, Mustafa, 0O
Belov, A. M., 0S
Ben Amar, Chokri, 03, 1S
Bendib, Mohamed Mokhtar, 1I
Benini, Sergio, 14
Bernardos, Ana M., 18
Bernas, Martin, 0T
Bhurchandi, Kishor M., 0M
Bilgi, Ahmet Seçkin, 0W
Blackburn, William, 19
Blaha, Johanna, 1K
Bocharov, D., 10
Bodenhagen, Leon, 0C
Bodenstorfer, Ernst, 0P
Brause, Rüdiger, 0D
Brodersen, Jörg, 0P
Brost, Vincent, 0J
Buch, Anders Glent, 0C
Bulatov, Konstantin, 07
Cancela, B., 1G
Casar, José R., 18
Chasanis, Vasileios, 1F
Chernov, Timofey, 07
Choudhary, Prakash, 26
Chukalina, Marina, 1M
Ciarelli, Patrick Marques, 0I
Connan, James, 23
Cosmo, Daniel Luis, 0I
Couto Gava, Christiano, 1W
Crouzil, Alain, 13
Cui, Jishan, 1P

Çunkaş, Mehmet, 22
Darlow, Luke Nicholas, 23
Debeir, Olivier, 0Y
Deklerck, Rudi, 0Y
Diaba, Fatma, 1I
Dong, Jiwen, 05
Durmuş, Efkân, 0W
Dvořák, Lukáš, 0T
Ejbalı, Ridha, 03, 1S
Ekstrand, Fredrik, 1Y
Ekström, Mikael, 1Y
Ezzeddine, Zagrouba, 1L
Fedoseev, Victor A., 1A, 2I
Frackiewicz, Mariusz, 0L
Ghassemian, Hassan, 20
Gladkov, Andrey, 07
Gökmen, Muhittin, 0E
Gribaudo, Marco, 20
Grigoryev, Anton, 1I
Güneş, Ali, 0W
Gunes, Ece Olcay, 0A
Hasani, Ylber, 0P
Hashimoto, Kiyoshi, 06
Horozoğlu, Erhan, 25
Hosseini, Mahshid Alsadat, 1E
Houacine, A., 0K
Huo, Ju, 1P
Ioannidis, Antonis, 1F
Iocchi, Luca, 0X
Jansen, Bart, 0Y
Jemai, Olfa, 03
Jia, Songmin, 1Q
Kabir, Ehsanollah, 0Z
Kahu, Samruddhi, 0M
Kalkan, Habil, 0W
Kamata, Sei-ichiro, 15, 16, 1O
Karimian, Mahmood, 1E
Kasaei, Shohreh, 1E
Kataoka, Hirokatsu, 06
Khanipov, Timur, 1I
Kiforenko, Lilita, 0C
Kim, Jaehong, 29
Koçer, Erdinç, 25
Konovalevko, Ivan, 10, 1C
Koptelov, Ivan, 10, 1I
Kozyrev, V., 17
Krohina, Darya A., 02
Krolla, Bernd, 1W
Kromp, Florian, 1K

Krüger, Norbert, 0C
 Kumar, Pawan, 0M
 Kuznetsova, Elena G., 11, 1C, 1X
 Lahdenoja, Olli, 1V
 Laiho, Mika, 1V
 Lambert, Andrew, 1Z
 Lebourgeois, Franck, 0B
 Lee, Dongjin, 29
 Lee, Jee-Hyong, 0H, 2B
 Lee, Jeong-Hoon, 0H
 Lee, Jong Bum, 2B
 Leonardi, Riccardo, 14
 Li, Hengjian, 05
 Li, Jinping, 05
 Li, Juan, 18
 Li, Wenmin, 1T
 Li, Xiuzhi, 1Q
 Likas, Aristidis, 1F
 Liu, Junhui, 1T
 Ma, Xiang, 1T
 Malcolm, Paul, 1J
 Malinnikov, V. A., 0U
 Marouf, A., 0K
 Martín-Félez, Raúl, 0G
 Matu, Florin Octavian, 0F
 Mayer, Konrad J., 0P
 Mazloom-Nezhad Maybodi, Babak, 0V
 Merouani, Hayet Farida, 1I
 Minkina, A., 17
 Mitekin, Vitaly, 1A
 Moalla, Ikram, 0B
 Moeslund, Thomas, 0F
 Mollineda, Ramón A., 0G
 Moualhi, Wafa, 1L
 Myasnikov, V. V., 0S
 Nain, Neeta, 1B, 26
 Nasrollahi, Kamal, 0F
 Nazari, Avishan, 20
 Negro Maggio, Valentina, 0X
 Nguyen, An Hung, 1Z
 Nguyen, D. T., 1H
 Nguyen, Hai-Dang, 04
 Nguyen, T. D., 1H
 Nguyen, V. D., 1H
 Nguyen-Khac, Tung-Anh, 04
 Nikolaev, Dmitrii P., 07, 08, 11, 17, 1M,
 1X, 28, 2A
 Nikolaev, Petr P., 08
 Niranjana, Mahesan, 27
 Ojha, Piyush, 19
 Okuda, Masahiro, 14
 Ortells, Javier, 0G
 Ouazzeddine, Mounira, 0R
 Özbülak, Gökhan, 0E
 Özsağlam, Mehmet Yasin, 22
 Paasio, Ari, 1V
 Palus, Henryk, 0L
 Park, C. H., 29
 Park, Chan kyu, 29
 Pedersoli, Fabrizio, 14
 Penedo, M. G., 1G
 Pham, Viet-Khoi, 04
 Phan, V. A., 1H
 Pickering, Mark, 1Z
 Poikonen, Jonne K., 1V
 Polevoy, Dmitry, 28, 2A
 Postnikov, Vassili V., 02
 Pritula, Mikhail, 08
 Pritula, Natalia, 08
 Prun, Victor E., 02
 Puel, Jean-Baptiste, 13
 Qin, Baoling, 1Q
 Quehl, Bernhard, 09
 Radlak, Krystian, 1N
 Rampun, Andrik, 1J
 Rehman, Maria, 0Q
 Reiter, Michael, 1K
 Sack, Harald, 09
 Sadat, Mojtaba T., 1D
 Safaei, Amin, 1U
 Salarifard, Raziye, 1E
 Salles, Evandro Ottoni Teatini, 0I
 Sánchez, L., 1G
 Sanei, S., 1U
 Sántti, Tero, 1V
 Schwarz, Magdalena, 1K
 Sengupta, Shreya, 19
 Shen, Lincheng, 1R
 Sheshkus, Alexander, 08, 2A
 Shvets, Evgeny A., 1X
 Sidorchuk, D., 10
 Simkova, Maria, 24
 Skoryukina, Natalya, 2A
 Sneha Latha, P., 0M
 Soheili, Mohammad Reza, 0Z
 Sokolova, Natalia, 28
 Souissi, Boularbah, 0R
 Spampinato, Giacomo, 1Y
 Stoykova, Velislava, 24
 Stricker, Didier, 0Z, 1W
 Sumer, Omer, 0A
 Szczepanski, Marek, 1N
 Takeda, Akiko, 27
 Tang, H. L., 1U
 Tarrío, Paula, 18
 Taschner-Mandl, Sabine, 1K
 Thøgersen, Mikkel, 0F
 Tounsi, Maroua, 0B
 Touqir, Imran, 0Q
 Tran, Duc Toan, 0Y
 Tran, Minh-Triet, 04
 Truong, Q. D., 1H
 Uchaev, D. V., 0U
 Uchaev, Dm. V., 0U
 Usilin, S., 17
 Viti, Francesco, 1D
 Vlaykov, Iskren, 0F
 Wang, Hui, 19
 Wang, Lei, 05
 Wang, Yan, 13

Weiss, Tamara, 1K
Wu, Renjie, 1O
Yan, Chengping, 1R
Yang, Ailin, 1Q
Yang, Fan, 0J
Yang, Haojin, 09
Yang, Ning, 1P
Yoon, H., 29
Yun, Woo han, 29
Zaied, Mourad, 03, 1S
Zatloukal, Petr, 0T
Zehtabian, Amin, 20
Zhang, Daibing, 1R
Zhang, Jun, 0N
Zhang, Qieshi, 0N, 15, 16, 1O
Zhao, Guanrong, 1Q
Zhong, Zhiwei, 1R
Zhou, Dianle, 1R
Zhu, Peifei, 16
Zwiggelaar, Reyer, 1J

Conference Committee

Honorary Chair

Petia Radeva, Universitat de Barcelona (Spain)

Conference Chairs

Antanas Verikas, Halmstad University (Sweden)

Branislav Vuksanovic, University of Portsmouth (United Kingdom)

Garcia-Teodoro, Periodista Daniel Saucedo Aranda (Spain)

Program Committee

Enrique Nava, Universidad de Málaga (Spain)

Andreas Nuchter, Universität Würzburg (Germany)

Alexander Bernstein, Russian Academy of Sciences (Russian Federation)

Klaus Simon, Swiss Federal Laboratories for Materials Testing and Research (Switzerland)

Sei-ichiro Kamata, Waseda University (Japan)

Technical Committee

Aristidis Likas, University of Ioannina (Greece)

Mourad Zaied, University of Sfax (Tunisia)

Reyer Zwiggelaar, Aberystwyth University (United Kingdom)

Dmitry P. Nikolaev, Institute for Information Transmission Problems (Russian Federation)

Luca Iocchi, Università degli Studi di Roma La Sapienza (Italy)

Francesco Viti, University of Luxembourg (Luxembourg)

Manuel F. González Penedo, Universidade da Coruña (Spain)

Qin Zhang, Communication University of China (China)

Jianxiong Wang, Guangzhou University (China)

Wafa AlSharafat, Al al-Bayt University (Jordan)

Mohamed El-Sayed Farag, Al-Azhar University (Egypt)

Li Jun, Chongqing University (China)

Murat Orhun Murat Orhun, İstanbul Bilgi University (Turkey)

Anrong Xue, Jiangsu University (China)

Cristina Ofelia Stanciu, Tibiscus University of Timișoara (Romania)

Chi-Cheng Cheng, National Sun Yat-Sen University (Taiwan)

Zahurin Samad, Universiti Sains Malaysia (Malaysia)

Ming Liang, University of Ottawa (Canada)

Weiliang Lin, Guangzhou University (China)

Mohamed Basel Al Mourad, Zayed University (United Arab Emirates)

Chiung Ching Ho, Multimedia University (Malaysia)

Qassim Nasir, Electrical and Computer Engineering (United Arab Emirates)

Huwida E. Said, Zayed University (United Arab Emirates)

Jinoh Kim, Texas A&M University (United States)

Introduction

The Seventh International Conference on Machine Vision (ICMV 2014) was held 19–21 November 2014, in Milan, Italy. The ICMV 2014 was organized and sponsored by Science and Engineering Institute (United States), and the aim of the conference was to present the latest research and results of scientists (Professors, students, PhD Students, engineers, and post-doc scientists) related to machine vision. The conference provided opportunities for the different area delegates to exchange new ideas and application experiences face to face, to establish business or research relations, and to find global partners for future collaboration.

The keynote lectures from leading experts in the field and scientific fellows as well as invited papers from all around the globe, presented state of art in all major fields of machine vision. The highly selective peer-review progress has guaranteed the quality of accepted papers that are published in these proceedings.

After the peer-review process, the submitted papers were selected on the basis of originality, significance, and clarity for the purpose of the conference. The selected papers and additional late-breaking contributions presented as lectures made for an exciting technical program.

This volume records the fully referred papers presented at the conference. The main conference theme and track is machine vision. We hope all participants and other interested readers benefit scientifically from these proceedings.

On behalf of the conference committees, we thank you for attending this outstanding event to share your latest research findings and/or R&D works with the research community by submitting a paper to this conference.

Antanas Verikas
Jianhong Zhou

