

Image Processing: Machine Vision Applications

Kurt S. Niel
David Fofi
Editors

29–31 January 2008
San Jose, California, USA

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

Volume 6813

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:

Author(s), "Title of Paper," in *Image Processing: Machine Vision Applications*, edited by Kurt S. Niel, David Fofi, Proceedings of SPIE-IS&T Electronic Imaging, SPIE Vol. 6813, Article CID Number (2008).

ISSN 0277-786X

ISBN 9780819469854

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 © 2008, 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/08/\$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

vii *Conference Committee*

SESSION 1 MACHINE VISION AND ROBOTICS

- 6813 02 **Vision robot with rotational camera for searching ID tags** [6813-01]
N. Kimura, T. Moriya, Hitachi, Ltd. (Japan)
- 6813 03 **A unifying software architecture for model-based visual tracking** [6813-43]
G. Panin, C. Lenz, M. Wojtczyk, S. Nair, E. Roth, T. Friedlhuber, A. Knoll, Technical Univ. of Munich (Germany)
- 6813 04 **Video object tracking using improved chamfer matching and condensation particle filter** [6813-03]
T. Wu, X. Ding, S. Wang, Tsinghua Univ. (China); K. Wang, Nokia Research Ctr. (China)

SESSION 2 HW EQUIPMENT

- 6813 05 **Compact and thin multi-lens system for machine vision applications** [6813-04]
E. Y. Lam, Univ. of Hong Kong (Hong Kong China)
- 6813 06 **Feasibility study for a catadioptric bi-spectral imaging system** [6813-05]
C. Gée, L. Berret, C. Chardon, J. Bossu, ENESAD/DSI/LGAP (France); J. P. Guillemain, ENESAD/DAE (France); G. Jones, ENESAD/DSI/LGAP (France); F. Truchetet, Le2i (France)
- 6813 07 **Video-rate or high-precision: a flexible range imaging camera** [6813-06]
A. A. Dorrington, M. J. Cree, Univ. of Waikato (New Zealand); D. A. Carnegie, Victoria Univ. of Wellington (New Zealand); A. D. Payne, R. M. Conroy, J. P. Godbaz, Univ. of Waikato (New Zealand); A. P. P. Jongenelen, Victoria Univ. of Wellington (New Zealand)
- 6813 08 **Polarization imaging for industrial inspection** [6813-07]
F. Meriaudeau, M. Ferraton, C. Stolz, O. Morel, Le2i (France); L. Bigué, MIPS, ENSISA Lumière (France)

SESSION 3 3D APPLICATIONS AND CT/MR

- 6813 09 **Machine vision approach for improving accuracy of focus-based depth measurements** [6813-09]
R. Bryll, Micro Encoder Inc. (USA)
- 6813 0A **New solutions and applications of 3D computer tomography image processing** [6813-10]
I. Effenberger, J. Kroll, A. Verl, Fraunhofer Institut für Produktionstechnik und Automatisierung (Germany)

6813 0B **3D geometric modelling of hand-woven textile** [6813-42]
H. Shidanshidi, F. Naghdy, G. Naghdy, D. W. Conroy, Univ. of Wollongong (Australia)

SESSION 4 MULTIREOLUTION AND MATHEMATICAL FITTING I

6813 0C **A modular non-negative matrix factorization for parts-based object recognition using subspace representation** [6813-12]
I. Bajla, D. Soukup, ARC Seibersdorf Research GmbH (Austria)

6813 0E **A novel circle detection method using Radon transform** [6813-14]
H. Peng, R. Rao, Rochester Institute of Technology (USA)

6813 0F **An algorithm for automated registration of maps and images based on feature detection and mutual information** [6813-15]
X. Fan, H. Rhody, E. Saber, Rochester Institute of Technology (USA)

6813 0G **Automatic cell segmentation and classification using morphological features and Bayesian networks** [6813-16]
M.-R. Jung, J.-H. Shim, B. Ko, J.-Y. Nam, Keimyung Univ. (South Korea)

6813 0H **Multi-model geometrical fitting for wide baseline image matching** [6813-40]
L. Fan, T. Pylvänäinen, Nokia Research Ctr. (Finland)

SESSION 5 MULTIREOLUTION AND MATHEMATICAL FITTING II

6813 0I **Constraint optimization method for line fitting** [6813-17]
B. C. Li, Lockheed Martin (USA)

SESSION 6 COMPUTER VISION ALGORITHMS FOR INDUSTRIAL AND MEDICAL APPLICATIONS

6813 0K **Edge noise removal in multimodal background modeling techniques** [6813-19]
J. W. Choi, S. Apewokin, B. E. Valentine, D. S. Wills, L. M. Wills, Georgia Institute of Technology (USA)

6813 0L **Robust edge-detection algorithm for runway edge detection** [6813-20]
S. Tandra, Z. Rahman, Old Dominion Univ. (USA)

6813 0M **The effect of JPEG compression on automated detection of microaneurysms in retinal images** [6813-21]
M. J. Cree, Univ. of Waikato (New Zealand); H. F. Jelinek, Charles Sturt Univ. (Australia)

6813 0N **Tracking with a new distribution metric in a particle filtering framework** [6813-22]
R. Sandhu, Georgia Institute of Technology (USA); T. Georgiou, Univ. of Minnesota (USA);
A. Tannenbaum, Georgia Institute of Technology (USA)

6813 0O **Methods of statistical uncertainty analysis applied to evaluation algorithms of a video-extensometer system** [6813-23]
E. Fauster, Hot Vision Research GmbH (Austria); P. O'Leary, Univ. of Leoben (Austria)

SESSION 7 MULTISPECTRAL IMAGING

- 6813 0Q **2D virtual texture on 3D real object with coded structured light** [6813-25]
T. Molinier, D. Fofi, Lab. Le2i, Univ. of Burgundy (France); J. Salvi, Univ. of Girona (Spain);
P. Gorria, Lab. Le2i, Univ. of Burgundy (France)
- 6813 0R **Real-time line scan extraction from infrared images using the wedge method in industrial environments** [6813-26]
R. Usamentiaga, D. F. García, J. Molleda, Univ. of Oviedo (Spain)

SESSION 8 INDUSTRIAL APPLICATIONS

- 6813 0S **Automatic fire detection system using CCD camera and Bayesian network** [6813-27]
K.-H. Cheong, B.-C. Ko, J.-Y. Nam, Keimyung Univ. (South Korea)
- 6813 0T **Optical measurement system for characterizing plastic surfaces** [6813-28]
R. Gahleitner, K. S. Niel, Upper Austria Univ. of Applied Sciences (Austria); S. Frank, Borealis Polyolefine GmbH (Austria)
- 6813 0U **Directional filter banks for detecting un-patterned TFT-LCD defect** [6813-29]
N. K. Park, H. W. Kim, S. I. Yoo, Seoul National Univ. (South Korea)
- 6813 0V **Non referential method for defects inspection of TFT-LCD pad** [6813-30]
H. W. Kim, S. I. Yoo, Seoul National Univ. (South Korea)
- 6813 0W **Statistical methods for texture analysis applied to agronomical images** [6813-31]
F. Cointault, ENESAD-UP (France); L. Journaux, Faculté Universitaire des Sciences Agronomiques de Gembloux (Belgium); P. Gouton, Le2i, Univ. of Burgundy (France)
- 6813 0Y **Geometric in-line inspection of profiled strips and welding seams** [6813-41]
J. Reisinger, vatron gmbh (Austria); K. S. Niel, Fachhochschule Oberösterreich Studienbetriebs GmbH (Austria); M. Tratnig, vatron gmbh (Austria)

INTERACTIVE PAPER AND SYMPOSIUM DEMONSTRATION SESSION

- 6813 0Z **Human body segmentation based on adaptive feature selection in complex situations** [6813-33]
S. Bi, Dalian Maritime Univ. (China); B. Shao, Huazhong Univ. of Science and Technology (China); D. Liang, X. Shen, Dalian Maritime Univ. (China)
- 6813 11 **Unusual behavior detection in the entry gate scenes of subway station using Bayesian networks and inference** [6813-36]
S. Kwak, G. Bae, Yonsei Univ. (South Korea); M. Kim, Kangwon National Univ. (South Korea);
H. Byun, Yonsei Univ. (South Korea)
- 6813 12 **Human face detection using motion and color information** [6813-37]
Y.-G. Kim, M.-W. Bang, S.-Y. Park, K.-H. Choi, Mokpo National Univ. (South Korea);
J.-H. Hwang, Eyenix Co. (South Korea)

- 6813 13 **Research of online automatism identification algorithm based on image character sequence look-up table** [6813-38]
Y. Han, Y. Han, North China Univ. of Science and Technology (China); R. Li, North Univ. of China (China)
- 6813 14 **Camera calibration and near-view vehicle speed estimation** [6813-35]
F. Peng, C. Liu, X. Ding, Tsinghua Univ. (China)

Author Index

Conference Committee

Symposium Chair

Nitin Sampat, Rochester Institute of Technology (USA)

Conference Chairs

Kurt S. Niel, Fachhochschule Wels (Austria)

David Fofi, Université de Bourgogne (France)

Program Committee

Pierrick T. Bourgeat, Commonwealth Scientific and Industrial Research Organisation (Australia)

Michael J. Cree, University of Waikato (New Zealand)

Luciano F. da Fontoura Costa, Universidade de São Paulo (Brazil)

Marc M. Ellenrieder, Carl Zeiss AG (Germany)

Steven P. Floeder, 3M Company (USA)

Ralph M. Ford, The Pennsylvania State University (USA)

Edmund Y. Lam, The University of Hong Kong (Hong Kong China)

Fabrice Meriaudeau, Institut Universitaire de Technologie, Université de Bourgogne (France)

Dinesh Nair, National Instruments Corporation (USA)

Paul L. O'Leary, Montanuniversität Leoben (Austria)

A. Ravishankar Rao, IBM Thomas J. Watson Research Center (USA)

Jeffery R. Price, Oak Ridge National Laboratory (USA)

Joaquim Salvi, Universitat de Girona (Spain)

Hamed Sari-Sarraf, Texas Tech University (USA)

Ralph Seulin, Université de Bourgogne (France)

Kenneth W. Tobin, Jr., Oak Ridge National Laboratory (USA)

Yvon Voisin, Université de Bourgogne (France)

Session Chairs

Front Matter

- 1 Machine Vision and Robotics
Kurt S. Niel, Fachhochschule Wels (Austria)
- 2 HW Equipment
David Fofi, Université de Bourgogne (France)
- 3 3D Applications and CT/MR
Kenneth W. Tobin, Jr., Oak Ridge National Laboratory (USA)

- 4 Multiresolution and Mathematical Fitting I
 Edmund Y. Lam, The University of Hong Kong (Hong Kong China)
- 5 Multiresolution and Mathematical Fitting II
 Edmund Y. Lam, The University of Hong Kong (Hong Kong China)
- 6 Computer Vision Algorithms for Industrial and Medical Applications
 Michael J. Cree, University of Waikato (New Zealand)
- 7 Multispectral Imaging
 David Fofi, Université de Bourgogne (France)
- 8 Industrial Applications
 Kurt S. Niel, Fachhochschule Wels (Austria)