Lecture Notes in Computer Science 7594

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison
Lancaster University, UK

Takeo Kanade
Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler
University of Surrey, Guildford, UK

Jon M. Kleinberg
Cornell University, Ithaca, NY, USA

Alfred Kobsa
University of California, Irvine, CA, USA

Friedemann Mattern
ETH Zurich, Switzerland

John C. Mitchell
Stanford University, CA, USA

Moni Naor
Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz
University of Bern, Switzerland

C. Pandu Rangan
Indian Institute of Technology, Madras, India

Bernhard Steffen
TU Dortmund University, Germany

Madhu Sudan
Microsoft Research, Cambridge, MA, USA

Demetri Terzopoulos
University of California, Los Angeles, CA, USA

Doug Tygar
University of California, Berkeley, CA, USA

Gerhard Weikum
Max Planck Institute for Informatics, Saarbruecken, Germany

Leonard Bolc
Ryszard Tadeusiewicz
Leszek J. Chmielewski
Konrad Wojciechowski (Eds.)

Computer Vision and Graphics

International Conference, ICCVG 2012
Warsaw, Poland, September 24-26, 2012
Proceedings

Springer

Volume Editors

Leonard Bolc
Polish-Japanese Institute of Information Technology, Warsaw, Poland

Ryszard Tadeusiewicz
AGH University of Science and Technology, Krakow, Poland
E-mail: rtad@agh.edu.pl

Leszek J. Chmielewski
Warsaw University of Life Sciences (SGGW), Warsaw, Poland
E-mail: leszek_chmielewski@sggw.pl

Konrad Wojciechowski
Silesian University of Technology, Gliwice, Poland
and
Polish-Japanese Institute of Information Technology, Warsaw, Poland
E-mail: konrad.wojciechowski@polsl.pl

ISSN 0302-9743 e-ISSN 1611-3349
ISBN 978-3-642-33563-1 e-ISBN 978-3-642-33564-8
DOI 10.1007/978-3-642-33564-8
Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: 2012947146

CR Subject Classification (1998): I.4.1-10, I.3.5, I.3.8, I.5.3-4, I.2.10

LNCS Sublibrary: SL 6 – Image Processing, Computer Vision, Pattern Recognition, and Graphics

© Springer-Verlag Berlin Heidelberg 2012
This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.
The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

The International Conference on Computer Vision and Graphics, organized since 2002, is the continuation of the International Conferences on Computer Graphics and Image Processing, GKPO, held in Poland every second year from 1990 to 2000. The founder and organizer of these conferences was Prof. Wojciech Mokrzycki. The main objective of ICCVG is to provide an environment for the exchange of ideas between researchers in the closely related domains of computer vision and computer graphics.

ICCVG 2012 brought together more than 100 authors. The proceedings contain 89 papers, each accepted on the grounds of at least two independent reviews. During the conference a special session on Visual Surveillance and a workshop on Medical Image Analysis with the Open Source Software CreaTools were organized.

The content of the book has been divided into three parts. The first two are devoted to the main topics of the conference, namely Computer Vision and Computer Graphics, respectively. The third part is related to the special session, mentioned above, containing four chapters.

ICCVG 2012 was organized by the Association for Image Processing, Poland (Towarzystwo Przetwarzania Obrazów – TPO), the Faculty of Applied Informatics and Mathematics, Warsaw University of Life Sciences (WZIM SGGW), and the Polish-Japanese Institute of Information Technology (PJWSTK).

The Association for Image Processing integrates the Polish community working on the theory and applications of computer vision and graphics. It was formed between 1989 and 1991.

The Faculty of Applied Informatics and Mathematics, established in 2008 at Warsaw University of Life Sciences, offers two programs of study: Informatics, and Informatics and Econometrics. Its main advantage is merging technical education with applied sciences, including the application of computer sciences to the management and analysis of the agricultural industry.

The Polish-Japanese Institute of Information Technology founded in 1994 by the Computer Techniques Development Foundation under the agreement of the Polish and Japanese governments is one of the leading, non-state (private) Polish universities. We are very grateful that the institute hosted and supported the conference.

We would like to thank all the members of the Scientific Committee, as well as the additional reviewers, for their help in ensuring the high quality of the papers. We would also like to thank Grażyna Domańska-Żurek for her excellent

work on technically editing the proceedings, and Dariusz Frejlichowski, Bernadeta Bonio, Paweł Wieman, Henryk Palus, Marcin Bator, and Artur Wiliński for their engagement in the conference organization and administration.

September 2012

Leonard Bolc
Ryszard Tadeusiewicz
Leszek J Chmielewski
Konrad Wojciechowski

Organization

- Association for Image Processing (TPO)
- Polish-Japanese Institute of Information Technology (PJWSTK)
- Faculty of Applied Informatics and Mathematics, Warsaw University of Life Sciences (WZIM SGGW)

Conference General Chairs

J.L. Kulikowski (Poland)
L.J. Chmielewski (Poland)
K. Wojciechowski (Poland)

Scientific Committee

Ivan Bajla (Slovakia)
Ewert Bengtsson (Sweden)
Maria Berndt-Schreiber (Poland)
Prabir Bhattacharya (USA)
Gunilla Borgefors (Sweden)
Adam Borkowski (Poland)
Leszek Chmielewski (Poland)
László Czúni (Hungary)
Silvana Dellepiane (Italy)
Marek Domański (Poland)
Paweł Forczmański (Poland)
Dariusz Frejlichowski (Poland)
Maria Frucci (Italy)
André Gagalowicz (France)
Duncan Gillies (UK)
Marcin Iwanowski (Poland)
Adam Jóźwik (Poland)
Heikki Kälviäinen (Finland)
Andrzej Kasiński (Poland)
Włodzimierz Kasprzak (Poland)
Bertrand Kerautret (France)
Nahum Kiryati (Israel)
Reinhard Klette (New Zealand)
Józef Korbicz (Poland)
Witold Kosiński (Poland)
Witold Malina (Poland)
Krzysztof Marasek (Poland)
Andrzej Materka (Poland)
Nikolaos Mavridis (United Arab Emirates)
Paweł Mikołajczak (Poland)
Wojciech Mokrzycki (Poland)
Heinrich Niemann (Germany)
Mariusz Nieniewski (Poland)
Sławomir Nikiel (Poland)
Lyle Noakes (Australia)
Antoni Nowakowski (Poland)
Maciej Orkisz (France)
Krzysztof Okarma (France)
Arkadiusz Orłowski (Poland)
Henryk Palus (Poland)
Wiesław Pamula (Poland)
Jan Piecha (Poland)
Maria Pietruszka (Poland)
Piotr Porwik (Poland)
Artur Przelaskowski (Poland)
Przemysław Rokita (Poland)
Khalid Saeed (Poland)
Gerald Schaefer (UK)
Andrzej Śluzek (United Arab Emirates)
Maciej Smiatacz (Poland)

Ryszard Kozera (Australia)
Hans-Jörg Kreowski (Germany)
Adam Krzyżak (Canada)
Juliusz L. Kulikowski (Poland)
Marek Kurzyński (Poland)
Bogdan Kwolek (Poland)
Y.B. Kwon (South Korea)
Bart Lamiroy (France)
Wojciech Maleika (Poland)
Bogdan Smołka (Poland)
Ryszard Tadeusiewicz (Poland)
Joao Manuel R.S. Tavares (Portugal)
Ventzeslav Valev (Bulgaria & USA)
Artur Wiliński (Poland)
Konrad Wojciechowski (Poland)
Michał Woźniak (Poland)
Jan Zabrodzki (Poland)

Table of Contents

Computer Graphics

Video Summarization: Techniques and Classification 1
Muhammad Ajmal, Muhammad Husnain Ashraf, Muhammad Shakir, Yasir Abbas, and Faiz Ali Shah

Discrete Geometric Modeling of Thick Pelvic Organs with a Medial Axis 14
Thierry Bay, Romain Raffin, and Marc Daniel

An Evolutionary-Neural Algorithm for Solving Inverse IFS Problem for Images in Two-Dimensional Space 22
Marzena Bielecka and Andrzej Bielecki

Euler's Approximations to Image Reconstruction 30
Dariusz Borkowski

Application of Backward Stochastic Differential Equations to Reconstruction of Vector-Valued Images 38
Dariusz Borkowski and Katarzyna Jańczak-Borkowska

Batch Neural Gas with Deterministic Initialization for Color Quantization 48
M. Emre Celebi, Quan Wen, Gerald Schaefer, and Huiyu Zhou

CreaTools: A Framework to Develop Medical Image Processing Software: Application to Simulate Pipeline Stent Deployment in Intracranial Vessels with Aneurysms 55
Eduardo E. Dávila Serrano, Laurent Guigues, Jean-Pierre Roux, Frédéric Cervenansky, Sorina Camarasu-Pop, Juan G. Riveros Reyes, Leonardo Flórez-Valencia, Marcela Hernández Hoyos, and Maciej Orkisz

Visualization of Multidimensional Data in Explorative Forecast 63
Diana Domańska, Marek Wojtylak, and Wiesław Kotarski

Automatic Shape Generation Based on Quadratic Four-Dimensional Fractals 71
Adam Goiński, Tomasz Zawadzki, and Sławomir Nikiel

Architecture of Algorithmically Optimized MPEG-4 AVC/H.264 Video Encoder 79
Tomasz Grajek, Damian Karwowski, Adam Łuczak, Sławomir Maćkowiak, and Marek Domański

A Prototype of Unmanned Aerial Vehicle for Image Acquisition 87
Paweł Iwaneczko, Karol Jędrasiak, Krzysztof Daniec, and Aleksander Nawrat

Application of a Hybrid Algorithm for Non–humanoid Skeleton Model Estimation from Motion Capture Data 95
Łukasz Janik, Karol Jędrasiak, Konrad Wojciechowski, and Andrzej Polański

A New Method to Segment X-Ray Microtomography Images of Lamellar Titanium Alloy Based on Directional Filter Banks and Gray Level Gradient 105
Łukasz Jopek, Laurent Babout, and Marcin Janaszewski

Intelligent 3D Graph Exploration with Time-Travel Features 113
Peter Kapec, Michal Paprčka, and Adam Pažitnaj

Improved Adaptive Arithmetic Coding for HEVC Video Compression Technology 121
Damian Karwowski

Extrinsic Camera Calibration Method and Its Performance Evaluation 129
Jacek Komorowski and Przemysław Rokita

Length Estimation for the Adjusted Exponential Parameterization 139
Ryszard Kozera, Lyle Noakes, and Mariusz Rasiński

Sharpness in Trajectory Estimation by Piecewise-quadratics(-cubics) and Cumulative Chords 148
Ryszard Kozera and Mateusz Śmietanka

Estimation of Electrooculography and Blinking Signals Based on Filter Banks 156
Robert Krupiński and Przemysław Mazurek

A Large Barrel Distortion in an Acquisition System for Multifocal Images Extraction 164
Adam Łuczak, Sławomir Maćkowiak, Damian Karwowski, and Tomasz Grajek

Diamond Scanning Order of Image Blocks for Massively Parallel HEVC Compression 172
Adam Łuczak, Damian Karwowski, Sławomir Maćkowiak, and Tomasz Grajek

Edge Preserving Smoothing by Self-quotient Referring ε-filter for Images under Varying Lighting Conditions 180
Mitsuharu Matsumoto

SPReAD: On Spherical Part Recognition by Axial Discretization in 4D Hough Space 188
Radhika Mittal and Partha Bhowmick

Multimedia Objects Conversion for a Digital Repository – A Case Study 196
Julian Myrcha and Przemysław Rokita

Towards User-Guided Quantitative Evaluation of Wrist Fractures in CT Images 204
Johan Nysjö, Albert Christersson, Filip Malmberg, Ida-Maria Sintorn, and Ingela Nyström

Hybrid Feature Similarity Approach to Full-Reference Image Quality Assessment 212
Krzysztof Okarma

Haptic Visualization of Material on TIN-Based Surfaces 220
Václav Purchart, Tomáš Pašek, Ivana Kolingerová, and Petr Vaněček

Some Ways of Distribution Viewing Points for Generating Viewing Representation 228
Andrzej Salamonczyk and Wojciech Mokrzycki

Interactive Browsing of Image Repositories (Invited Paper) 236
Gerald Schaefer

User Study in Non-static HDR Scenes Acquisition 245
Anna Tomaszewska

A Curvature Tensor Distance for Mesh Visual Quality Assessment 253
Fakhri Torkhani, Kai Wang, and Jean-Marc Chassery

Computer Vision

A Framework for Combined Recognition of Actions and Objects 264
Ilktan Ar and Yusuf Sinan Akgul

A Fast and Robust Feature Set for Cross Individual Facial Expression Recognition 272
Rodrigo Araujo, Yun-Qian Miao, Mohamed S. Kamel, and Mohamed Cheriet

Image and Video Saliency Models Improvement by Blur Identification 280
Yoann Baveye, Fabrice Urban, and Christel Chamaret

Hand Tracking Using Optical-Flow Embedded Particle Filter in Sign Language Scenes 288
Selma Belgacem, Clément Chatelain, Achraf Ben-Hamadou, and Thierry Paquet

Objects Detection and Tracking in Highly Congested Traffic Using Compressed Video Sequences 296
Marcin Bernaś

Syntactic Algorithm of Two-Dimensional Scene Analysis for Unmanned Flying Vehicles 304
Andrzej Bielecki, Tomasz Buratowski, and Piotr Śmigielski

Hough Transform for Opaque Circles Measured from Outside and Fuzzy Voting For and Against 313
Leszek J. Chmielewski and Marcin Bator

Adaptive Structuring Elements Based on Salience Information 321
Vladimir Ćurić and Cris L. Luengo Hendriks

Directional Votes of Optical Flow Projections for Independent Motion Detection 329
László Czúni and Mónika Gál

Recognition of Hand-Written Archive Text Documents 337
László Czúni, Tamás Szöke, and Mónika Gál

Comparison of Tensor Unfolding Variants for 2DPCA-Based Color Facial Portraits Recognition 345
Paweł Forczmański

Comparative Analysis of Benchmark Datasets for Face Recognition Algorithms Verification 354
Paweł Forczmański and Magdalena Furman

An Experimental Evaluation of the Polar-Fourier Greyscale Descriptor in the Recognition of Objects with Similar Silhouettes 363
Dariusz Frejlichowski

Application of 2D Fourier Descriptors and Similarity Measures to the General Shape Analysis Problem 371
Dariusz Frejlichowski and Katarzyna Gościewska

Supervised Texture Classification Using a Novel Compression-Based Similarity Measure 379
Mehrdad J. Gangeh, Ali Ghodsi, and Mohamed S. Kamel

A Real-Time Drivable Road Detection Algorithm in Urban Traffic Environment 387
Yuan Gao, Yixu Song, and Zehong Yang

Learning-Based Object Segmentation Using Regional Spatial Templates and Visual Features 397
Iker Gondra and Fahim Irfan Alam

Gesture Based Robot Control 407
Tomasz Grzejszczak, Michał Mikulski, Tadeusz Szkodny, and Karol Jędrasiak

Analysis of White Blood Cell Differential Counts Using Dual-Tree Complex Wavelet Transform and Support Vector Machine Classifier 414
Mehdi Habibzadeh, Adam Krzyżak, and Thomas Fevens

A Prototype Device for Concealed Weapon Detection Using IR and CMOS Cameras Fast Image Fusion 423
Karol Jędrasiak, Aleksander Nawrat, Krzysztof Daniec, Roman Koteras, Michał Mikulski, and Tomasz Grzejszczak

Application of Image Processing Algorithms in Proteomics: Automatic Analysis of 2-D Gel Electrophoresis Images from Western Blot Assay 433
Katarzyna Jonak, Karol Jędrasiak, Andrzej Polański, and Krzysztof Puszyński

3D Semantic Map Computation Based on Depth Map and Video Image 441
Włodzimierz Kasprzak and Maciej Stefańczyk

Skin Detection Using Color and Distance Transform 449
Michal Kawulok

Human Fall Detection by Mean Shift Combined with Depth Connected Components 457
Michal Kepski and Bogdan Kwolek

Stability of Dimensionality Reduction Methods Applied on Artificial Hyperspectral Images 465
Jihan Khoder, Rafic Younes, and Fethi Ben Ouezdou

Revisiting Component Tree Based Segmentation Using Meaningful Photometric Informations 475
Michał Kazimierz Kowalczyk, Bertrand Kerautret, Benoît Naegel, and Jonathan Weber

Oversampling Methods for Classification of Imbalanced Breast Cancer Malignancy Data 483
Bartosz Krawczyk, Łukasz Jeleń, Adam Krzyżak, and Thomas Fevens

View Independent Human Gait Recognition Using Markerless 3D Human Motion Capture 491
Tomasz Krzeszowski, Bogdan Kwolek, Agnieszka Michalczuk, Adam Świtoński, and Henryk Josiński

Gender Classification from Pose-Based GEIs 501
Raúl Martín-Félez, Ramón A. Mollineda, and J. Salvador Sánchez

Comparison of Key Point Detectors in SIFT Implementation for Mobile Devices 509
Karol Matusiak and Piotr Skulimowski

Estimation of Position and Radius of Light Probe Images 517
Przemysław Mazurek

Gait Identification Based on MPCA Reduction of a Video Recordings Data 525
Agnieszka Michalczuk, Adam Świtoński, Henryk Josiński, Andrzej Polański, and Konrad Wojciechowski

Canny Edge Detection Algorithm Modification 533
Wojciech Mokrzycki and Marek Samko

Determination of Road Traffic Parameters Based on 3D Wavelet Representation of an Image Sequence 541
Wieslaw Pamula

Detection of Voids of Dental Root Canal Obturation Using Micro-CT ... 549
Rafał Petryniak, Zbisław Tabor, Anna Kierklo, and Małgorzata Jaworska

Stafflines Pattern Detection Using the Swarm Intelligence Algorithm ... 557
Weronika Piątkowska, Leszek Nowak, Marcin Pawłowski, and Maciej Ogorzałek

Disparity Map Based Procedure for Collision-Free Guidance through Unknown Environments 565
Maciej Polańczyk and Przemysław Barański

Real-Time Hand Pose Estimation Using Classifiers 573
Mateusz Półrola and Adam Wojciechowski

Facial Expression Recognition Using Game Theory and Particle Swarm Optimization 581
Kaushik Roy and Mohamed S. Kamel

Multibiometric System Using Distance Regularized Level Set Method and Particle Swarm Optimization 590
Kaushik Roy and Mohamed S. Kamel

A Supremum Norm Based Near Neighbor Search in High Dimensional Spaces 600
Nikolai Sergeev

Using ASM in CT Data Segmentaion for Prostate Radiotherapy 610
Andrzej Skalski, Artur Kos, and Tomasz Zieliński

A System for Analysis of Tremor in Patients with Parkinson's Disease Based on Motion Capture Technique 618
Magdalena Stawarz, Andrzej Polański, Stanisław Kwiek, Magdalena Boczarska-Jedynak, Łukasz Janik, Andrzej Przybyszewski, and Konrad Wojciechowski

Multimodal Segmentation of Dense Depth Maps and Associated Color Information 626
Maciej Stefańczyk and Włodzimierz Kasprzak

Segmentation-Free Detection of Comic Panels 633
Martin Stommel, Lena I. Merhej, and Marion G. Müller

Quantification of the Myocardial Viability Based on Texture Parameters of Contrast Ultrasound Images 641
Michał Strzelecki, Sławomir Skonieczka, Błażej Michalski, Piotr Lipiec, and Jarosław D. Kasprzak

Analysis of the Abdominal Blood Oxygenation Signal of Premature Born Babies 649
Adam Szczepański, Marek Szczepański, Krzysztof Misztal, and Ewa Kulikowska

The Smooth Quaternion Lifting Scheme Transform for Multi-resolution Motion Analysis 657
Agnieszka Szczęsna, Janusz Słupik, and Mateusz Janiak

Eye Blink Based Detection of Liveness in Biometric Authentication Systems Using Conditional Random Fields 669
Mariusz Szwoch and Paweł Pieniądek

On Directionality in Morphological Feature Extraction 677
Michał Świercz and Marcin Iwanowski

Level-Set Based Infrared Image Segmentation for Automatic Veterinary Health Monitoring 685
Tom Wirthgen, Georg Lempe, Stephan Zipser, and Ulrich Grünhaupt

Improving Density Based Clustering with Multi-scale Analysis 694
Erdal Yenialp, Habil Kalkan, and Mutlu Mete

Comparing Image Objects Using Tree-Based Approach 702
Bartłomiej Zieliński and Marcin Iwanowski

A Fast Lesion Registration to Assist Coronary Heart Disease Diagnosis in CTA Images 710
Maria A. Zuluaga, Marcela Hernández Hoyos, Julio C. Dávila, Luis F. Uriza, and Maciej Orkisz

Visual Surveillance

Aesthetic-Driven Simulation of GUI Elements Deployment 718
Paweł Dąbrowski, Sławomir Nikiel, Daniel Skiera, Mark Hoenig, and Juergen Hoetzel

SmartMonitor: An Approach to Simple, Intelligent and Affordable Visual Surveillance System 726
Dariusz Frejlichowski, Paweł Forczmański, Adam Nowosielski, Katarzyna Gościewska, and Radosław Hofman

Biometrics Image Denoising Algorithm Based on Contourlet Transform 735
Monika Godzwon and Khalid Saeed

Multi-person Tracking-by-Detection Based on Calibrated Multi-camera Systems 743
Xiaoyan Jiang, Erik Rodner, and Joachim Denzler

Author Index 753