

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Friedemann Mattern

ETH Zurich, Switzerland

John C. Mitchell

Stanford University, CA, USA

Oscar Nierstrasz

University of Bern, Switzerland

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

University of Dortmund, Germany

Madhu Sudan

Massachusetts Institute of Technology, MA, USA

Demetri Terzopoulos

New York University, NY, USA

Doug Tygar

University of California, Berkeley, CA, USA

Moshe Y. Vardi

Rice University, Houston, TX, USA

Gerhard Weikum

Max-Planck Institute of Computer Science, Saarbruecken, Germany

Springer

Berlin

Heidelberg

New York

Hong Kong

London

Milan

Paris

Tokyo

Tomáš Pajdla Jiří Matas (Eds.)

Computer Vision – ECCV 2004

8th European Conference on Computer Vision
Prague, Czech Republic, May 11-14, 2004
Proceedings, Part I



Springer

Volume Editors

Tomáš Pajdla

Jiří Matas

Czech Technical University in Prague, Department of Cybernetics

Center for Machine Perception

121-35 Prague 2, Czech Republic

E-mail: {pajdla,matas}@cmp.felk.cvut.cz

Library of Congress Control Number: 2004104846

CR Subject Classification (1998): I.4, I.3.5, I.5, I.2.9-10

ISSN 0302-9743

ISBN 3-540-21984-6 Springer-Verlag Berlin Heidelberg New York

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-Verlag. Violations are liable to prosecution under the German Copyright Law.

Springer-Verlag is a part of Springer Science+Business Media

springeronline.com

© Springer-Verlag Berlin Heidelberg 2004

Printed in Germany

Typesetting: Camera-ready by author, data conversion by PTP-Berlin, Protago-TeX-Production GmbH
Printed on acid-free paper SPIN: 11007678 06/3142 5 4 3 2 1 0

Preface

Welcome to the proceedings of the 8th European Conference on Computer Vision!

Following a very successful ECCV 2002, the response to our call for papers was almost equally strong – 555 papers were submitted. We accepted 41 papers for oral and 149 papers for poster presentation.

Several innovations were introduced into the review process. First, the number of program committee members was increased to reduce their review load. We managed to assign to program committee members no more than 12 papers. Second, we adopted a paper ranking system. Program committee members were asked to rank all the papers assigned to them, even those that were reviewed by additional reviewers. Third, we allowed authors to respond to the reviews consolidated in a discussion involving the area chair and the reviewers. Fourth, the reports, the reviews, and the responses were made available to the authors as well as to the program committee members. Our aim was to provide the authors with maximal feedback and to let the program committee members know how authors reacted to their reviews and how their reviews were or were not reflected in the final decision. Finally, we reduced the length of reviewed papers from 15 to 12 pages.

The preparation of ECCV 2004 went smoothly thanks to the efforts of the organizing committee, the area chairs, the program committee, and the reviewers. We are indebted to Anders Heyden, Mads Nielsen, and Henrik J. Nielsen for passing on ECCV traditions and to Dominique Asselineau from ENST/TSI who kindly provided his GestRFIA conference software. We thank Jan-Olof Eklundh and Andrew Zisserman for encouraging us to organize ECCV 2004 in Prague. Andrew Zisserman also contributed many useful ideas concerning the organization of the review process. Olivier Faugeras represented the ECCV Board and helped us with the selection of conference topics. Kyros Kutulakos provided helpful information about the CVPR 2003 organization. David Vernon helped to secure ECVision support.

This conference would never have happened without the support of the Centre for Machine Perception of the Czech Technical University in Prague. We would like to thank Radim Šára for his help with the review process and the proceedings organization. We thank Daniel Večerka and Martin Matoušek who made numerous improvements to the conference software. Petr Pohl helped to put the proceedings together. Martina Budošová helped with administrative tasks. Hynek Bakstein, Ondřej Chum, Jana Kostková, Branislav Mičušík, Štěpán Obdržálek, Jan Šochman, and Vít Zýka helped with the organization.

Organization

Conference Chair

Václav Hlaváč

CTU Prague, Czech Republic

Program Chairs

Tomáš Pajdla

CTU Prague, Czech Republic

Jiří Matas

CTU Prague, Czech Republic

Organization Committee

Tomáš Pajdla

CTU Prague, Czech Republic

Radim Šára

Workshops, Tutorials

CTU Prague, Czech Republic

Vladimír Smutný

Budget, Exhibition

CTU Prague, Czech Republic

Eva Matysková

Local Arrangements

CTU Prague, Czech Republic

Jiří Matas

CTU Prague, Czech Republic

Václav Hlaváč

CTU Prague, Czech Republic

Conference Board

Hans Burkhardt

University of Freiburg, Germany

Bernard Buxton

University College London, UK

Roberto Cipolla

University of Cambridge, UK

Jan-Olof Eklundh

Royal Institute of Technology, Sweden

Olivier Faugeras

INRIA, Sophia Antipolis, France

Anders Heyden

Lund University, Sweden

Bernd Neumann

University of Hamburg, Germany

Mads Nielsen

IT University of Copenhagen, Denmark

Giulio Sandini

University of Genoa, Italy

David Vernon

Trinity College, Ireland

Area Chairs

Dmitry Chetverikov

MTA SZTAKI, Hungary

Kostas Daniilidis

University of Pennsylvania, USA

Rachid Deriche

INRIA Sophia Antipolis, France

Jan-Olof Eklundh

KTH Stockholm, Sweden

Luc Van Gool

KU Leuven, Belgium & ETH Zürich, Switzerland

Richard Hartley

Australian National University, Australia

Michal Irani	Weizmann Institute of Science, Israel
Sing Bing Kang	Microsoft Research, USA
Aleš Leonardis	University of Ljubljana, Slovenia
Stan Li	Microsoft Research China, Beijing, China
David Lowe	University of British Columbia, Canada
Mads Nielsen	IT University of Copenhagen, Denmark
Long Quan	HKUST, Hong Kong, China
Jose Santos-Victor	Instituto Superior Tecnico, Portugal
Cordelia Schmid	INRIA Rhône-Alpes, France
Steven Seitz	University of Washington, USA
Amnon Shashua	Hebrew University of Jerusalem, Israel
Stefano Soatto	UCLA, Los Angeles, USA
Joachim Weickert	Saarland University, Germany
Andrew Zisserman	University of Oxford, UK

Program Committee

Jorgen Ahlberg	Joachim Buhmann	Alexei Efros
Narendra Ahuja	Hans Burkhardt	Irfan Essa
Yiannis Aloimonos	Aurelio Campilho	Michael Felsberg
Arnon Amir	Octavia Camps	Cornelia Fermueller
Elli Angelopoulou	Stefan Carlsson	Mario Figueiredo
Helder Araujo	Yaron Caspi	Bob Fisher
Tal Arbel	Tat-Jen Cham	Andrew Fitzgibbon
Karl Astrom	Mike Chantler	David Fleet
Shai Avidan	Francois Chaumette	Wolfgang Foerstner
Simon Baker	Santanu Choudhury	David Forsyth
Subhashis Banerjee	Laurent Cohen	Pascal Fua
Kobus Barnard	Michael Cohen	Dariu Gavrilă
Ronen Basri	Bob Collins	Jan-Mark Geusebroek
Serge Belongie	Dorin Comaniciu	Christopher Geyer
Marie-Odile Berger	Tim Cootes	Georgy Gimelfarb
Horst Bischof	Joao Costeira	Frederic Guichard
Michael J. Black	Daniel Cremers	Gregory Hager
Andrew Blake	Antonio Criminisi	Allan Hanbury
Laure Blanc-Feraud	James Crowley	Edwin Hancock
Aaron Bobick	Kristin Dana	Horst Haussecker
Rein van den Boomgaard	Trevor Darrell	Eric Hayman
Terrance Boulton	Larry Davis	Martial Hebert
Richard Bowden	Fernando De la Torre	Bernd Heisele
Edmond Boyer	Frank Dellaert	Anders Heyden
Mike Brooks	Joachim Denzler	Adrian Hilton
Michael Brown	Greg Dudek	David Hogg
Alfred Bruckstein	Chuck Dyer	Atsushi Imiya

Michael Isard	Nassir Navab	Jon Sporning
Yuri Ivanov	Shree Nayar	Charles Stewart
David Jacobs	Ko Nishino	Peter Sturm
Allan D. Jepson	David Nister	Changming Sun
Peter Johansen	Ole Fogh Olsen	Tomas Svoboda
Nebojsa Jojic	Theodore Papadopoulos	Rahul Swaminathan
Frederic Jurie	Nikos Paragios	Richard Szeliski
Fredrik Kahl	Shmuel Peleg	Tamas Sziranyi
Daniel Keren	Francisco Perales	Chi-keung Tang
Benjamin Kimia	Nicolas Perez	Hai Tao
Ron Kimmel	de la Blanca	Sibel Tari
Nahum Kiryati	Pietro Perona	Chris Taylor
Georges Koepfler	Matti Pietikainen	C.J. Taylor
Pierre Kornprobst	Filiberto Pla	Bart ter Haar Romeny
David Kriegman	Robert Pless	Phil Torr
Walter Kropatsch	Marc Pollefeys	Antonio Torralba
Rakesh Kumar	Jean Ponce	Panos Trahanias
David Liebowitz	Ravi Ramamoorthi	Bill Triggs
Tony Lindeberg	James Rehg	Emanuele Trucco
Jim Little	Ian Reid	Dimitris Tsakiris
Yanxi Liu	Tammy Riklin-Raviv	Yanghai Tsin
Yi Ma	Ehud Rivlin	Matthew Turk
Claus Madsen	Nicolas Rougon	Tinne Tuytelaars
Tom Malzbender	Yong Rui	Nuno Vasconcelos
Jorge Marques	Javier Sanchez	Baba C. Vemuri
David Marshall	Guillermo Sapiro	David Vernon
Bogdan Matei	Yoichi Sato	Alessandro Verri
Steve Maybank	Eric Saund	Rene Vidal
Gerard Medioni	Otmar Scherzer	Jordi Vitria
Etienne Memin	Bernt Schiele	Yair Weiss
Rudolf Mester	Mikhail Schlesinger	Tomas Werner
Krystian Mikolajczyk	Christoph Schnoerr	Carl-Fredrik Westin
J.M.M. Montiel	Stan Sclaroff	Ross Whitaker
Theo Moons	Mubarak Shah	Lior Wolf
Pavel Mrazek	Eitan Sharon	Ying Wu
Joe Mundy	Jianbo Shi	Ming Xie
Vittorio Murino	Kaleem Siddiqi	Ramin Zabih
David Murray	Cristian Sminchisescu	Assaf Zomet
Hans-Hellmut Nagel	Nir Sochen	Steven Zucker
Vic Nalwa	Gerald Sommer	
P.J. Narayanan	Gunnar Sparr	

Additional Reviewers

Lourdes Agapito	Claudio Fanti	Jocelyn Marchadier
Manoj Aggarwal	Michela Farenzena	Scott McCloskey
Parvez Ahammad	Doron Feldman	Leonard McMillan
Fernando Alegre	Darya Frolova	Marci Meingast
Jonathan Alon	Andrea Fusiello	Anurag Mittal
Hans Jorgen Andersen	Chunyu Gao	Thomas B. Moeslund
Marco Andreetto	Kshitiz Garg	Jose Montiel
Anelia Angelova	Yoram Gat	Philippos Mordohai
Himanshu Arora	Dan Gelb	Pierre Moreels
Thangali Ashwin	Ya'ara Goldschmidt	Hesam Najafi
Vassilis Athitsos	Michael E. Goss	P.J. Narayanan
Henry Baird	Leo Grady	Ara Nefian
Harlyn Baker	Sertan Grigin	Oscar Nestares
Evgeniy Bart	Michael Grossberg	Michael Nielsen
Moshe Ben-Ezra	J.J. Guerrero	Peter Nillius
Manuele Bicego	Guodong Guo	Fredrik Nyberg
Marten Björkman	Yanlin Guo	Tom O'Donnell
Paul Blaer	Robert Hanek	Eyal Ofek
Ilya Blayvas	Matthew Harrison	Takahiro Okabe
Eran Borenstein	Tal Hassner	Kazunori Okada
Lars Bretzner	Horst Haussecker	D. Ortin
Alexia Briassouli	Yakov Hel-Or	Patrick Perez
Michael Bronstein	Anton van den Hengel	Christian Perwass
Rupert Brooks	Tat Jen Cham	Carlos Phillips
Gabriel Brostow	Peng Chang	Srikumar Ramalingam
Thomas Brox	John Isidoro	Alex Rav-Acha
Stephanie Brubaker	Vishal Jain	Stefan Roth
Andres Bruhn	Marie-Pierre Jolly	Ueli Rutishauser
Darius Burschka	Michael Kaess	C. Sagues
Umberto Castellani	Zia Khan	Garbis Salgian
J.A. Castellanos	Kristian Kirk	Ramin Samadani
James Clark	Dan Kong	Bernard Sarel
Andrea Colombari	B. Kröse	Frederik Schaffalitzky
Marco Cristani	Vivek Kwatra	Adam Seeger
Xiangtian Dai	Michael Langer	Cheng Dong Seon
David Demirdjian	Catherine Laporte	Ying Shan
Maxime Descoteaux	Scott Larsen	Eli Shechtman
Nick Diakopoulos	Barbara Levienaise-	Grant Schindler
Anthony Dicks	Obadia	Nils T. Siebel
Carlotta Domeniconi	Frederic Leymarie	Leonid Sigal
Roman Dvrgard	Fei-Fei Li	Greg Slabaugh
R. Dugad	Rui Li	Ben Southall
Ramani Duraiswami	Kok-Lim Low	Eric Spellman
Kerrien Erwan	Le Lu	Narasimhan Srinivasa

Drew Steedly	Zhizhou Wang	Ruigang Yang
Moritz Stoerring	Joost van de Weijer	Yll Haxhimusa
David Suter	Wolfgang Wein	Tianli Yu
Yi Tan	Martin Welk	Lihi Zelnik-Manor
Donald Tanguay	Michael Werman	Tao Zhao
Matthew Toews	Horst Wildenauer	Wenyi Zhao
V. Javier Traver	Christopher R. Wren	Sean Zhou
Yaron Ukrainitz	Ning Xu	Yue Zhou
F.E. Wang	Hulya Yalcin	Ying Zhu
Hongcheng Wang	Jingyu Yan	

Sponsors

BIG - Business Information Group a.s.
Camea spol. s r.o.
Casablanca INT s.r.o.
ECVision – European Research Network for Cognitive Computer Vision Systems
Microsoft Research
Miracle Network s.r.o.
Neovision s.r.o.
Toyota

Table of Contents – Part I

Tracking I

A Unified Algebraic Approach to 2-D and 3-D Motion Segmentation	1
<i>René Vidal, Yi Ma</i>	
Enhancing Particle Filters Using Local Likelihood Sampling	16
<i>Péter Torma, Csaba Szepesvári</i>	
A Boosted Particle Filter: Multitarget Detection and Tracking	28
<i>Kenji Okuma, Ali Taleghani, Nando de Freitas, James J. Little, David G. Lowe</i>	

Feature-Based Object Detection and Recognition I

Simultaneous Object Recognition and Segmentation by Image Exploration	40
<i>Vittorio Ferrari, Tinne Tuytelaars, Luc Van Gool</i>	
Recognition by Probabilistic Hypothesis Construction	55
<i>Pierre Moreels, Michael Maire, Pietro Perona</i>	
Human Detection Based on a Probabilistic Assembly of Robust Part Detectors	69
<i>Krystian Mikołajczyk, Cordelia Schmid, Andrew Zisserman</i>	

Posters I

Model Selection for Range Segmentation of Curved Objects	83
<i>Alireza Bab-Hadiashar, Niloofar Gheissari</i>	
High-Contrast Color-Stripe Pattern for Rapid Structured-Light Range Imaging	95
<i>Changsoo Je, Sang Wook Lee, Rae-Hong Park</i>	
Using Inter-feature-Line Consistencies for Sequence-Based Object Recognition	108
<i>Jiun-Hung Chen, Chu-Song Chen</i>	
Discriminant Analysis on Embedded Manifold	121
<i>Shuicheng Yan, Hongjiang Zhang, Yuxiao Hu, Benyu Zhang, Qiansheng Cheng</i>	

Multiscale Inverse Compositional Alignment for Subdivision	
Surface Maps	133
<i>Igor Guskov</i>	
A Fourier Theory for Cast Shadows	146
<i>Ravi Ramamoorthi, Melissa Koudelka, Peter Belhumeur</i>	
Surface Reconstruction by Propagating 3D Stereo Data in	
Multiple 2D Images	163
<i>Gang Zeng, Sylvain Paris, Long Quan, Maxime Lhuillier</i>	
Visibility Analysis and Sensor Planning in Dynamic Environments	175
<i>Anurag Mittal, Larry S. Davis</i>	
Camera Calibration from the Quasi-affine Invariance of	
Two Parallel Circles	190
<i>Yihong Wu, Haijiang Zhu, Zhanyi Hu, Fuchao Wu</i>	
Texton Correlation for Recognition	203
<i>Thomas Leung</i>	
Multiple View Feature Descriptors from Image Sequences via Kernel	
Principal Component Analysis	215
<i>Jason Meltzer, Ming-Hsuan Yang, Rakesh Gupta, Stefano Soatto</i>	
An Affine Invariant Salient Region Detector	228
<i>Timor Kadir, Andrew Zisserman, Michael Brady</i>	
A Visual Category Filter for Google Images	242
<i>Robert Fergus, Pietro Perona, Andrew Zisserman</i>	
Scene and Motion Reconstruction from Defocused and Motion-Blurred	
Images via Anisotropic Diffusion	257
<i>Paolo Favaro, Martin Burger, Stefano Soatto</i>	
Semantics Discovery for Image Indexing	270
<i>Joo-Hwee Lim, Jesse S. Jin</i>	
Hand Gesture Recognition within a Linguistics-Based Framework	282
<i>Konstantinos G. Derpanis, Richard P. Wildes, John K. Tsotsos</i>	
Line Geometry for 3D Shape Understanding and Reconstruction	297
<i>Helmut Pottmann, Michael Hofer, Boris Odehnal, Johannes Wallner</i>	
Extending Interrupted Feature Point Tracking for	
3-D Affine Reconstruction	310
<i>Yasuyuki Sugaya, Kenichi Kanatani</i>	

Many-to-Many Feature Matching Using Spherical Coding of Directed Graphs	322
<i>M. Fatih Demirci, Ali Shokoufandeh, Sven Dickinson, Yakov Keselman, Lars Bretzner</i>	
Coupled-Contour Tracking through Non-orthogonal Projections and Fusion for Echocardiography	336
<i>Xiang Sean Zhou, Dorin Comaniciu, Sriram Krishnan</i>	
A Statistical Model for General Contextual Object Recognition	350
<i>Peter Carbonetto, Nando de Freitas, Kobus Barnard</i>	
Reconstruction from Projections Using Grassmann Tensors	363
<i>Richard I. Hartley, Fred Schaffalitzky</i>	
Co-operative Multi-target Tracking and Classification	376
<i>Pankaj Kumar, Surendra Ranganath, Kuntal Sengupta, Huang Weimin</i>	
A Linguistic Feature Vector for the Visual Interpretation of Sign Language	390
<i>Richard Bowden, David Windridge, Timor Kadir, Andrew Zisserman, Michael Brady</i>	
Fast Object Detection with Occlusions	402
<i>Yen-Yu Lin, Tyng-Luh Liu, Chiou-Shann Fuh</i>	
Pose Estimation of Free-Form Objects	414
<i>Bodo Rosenhahn, Gerald Sommer</i>	
Interactive Image Segmentation Using an Adaptive GMMRF Model	428
<i>Andrew Blake, Carsten Rother, M. Brown, Patrick Perez, Philip Torr</i>	
Can We Consider Central Catadioptric Cameras and Fisheye Cameras within a Unified Imaging Model	442
<i>Xianghua Ying, Zhanyi Hu</i>	
Image Clustering with Metric, Local Linear Structure, and Affine Symmetry	456
<i>Jongwoo Lim, Jeffrey Ho, Ming-Hsuan Yang, Kuang-chih Lee, David Kriegman</i>	
Face Recognition with Local Binary Patterns	469
<i>Timo Ahonen, Abdenour Hadid, Matti Pietikäinen</i>	
Steering in Scale Space to Optimally Detect Image Structures	482
<i>Jeffrey Ng, Anil A. Bharath</i>	
Hand Motion from 3D Point Trajectories and a Smooth Surface Model	495
<i>Guillaume Dewaele, Frédéric Devernay, Radu Horaud</i>	

A Robust Probabilistic Estimation Framework for Parametric Image Models	508
<i>Maneesh Singh, Himanshu Arora, Narendra Ahuja</i>	
Keyframe Selection for Camera Motion and Structure Estimation from Multiple Views	523
<i>Thorsten Thormählen, Hellward Broszio, Axel Weissenfeld</i>	
Omnidirectional Vision: Unified Model Using Conformal Geometry	536
<i>Eduardo Bayro-Corrochano, Carlos López-Franco</i>	
A Robust Algorithm for Characterizing Anisotropic Local Structures	549
<i>Kazunori Okada, Dorin Comaniciu, Navneet Dalal, Arun Krishnan</i>	
Dimensionality Reduction by Canonical Contextual Correlation Projections	562
<i>Marco Loog, Bram van Ginneken, Robert P.W. Duin</i>	
Illumination, Reflectance, and Reflection	
Accuracy of Spherical Harmonic Approximations for Images of Lambertian Objects under Far and Near Lighting	574
<i>Darya Frolova, Denis Simakov, Ronen Basri</i>	
Characterization of Human Faces under Illumination Variations Using Rank, Integrability, and Symmetry Constraints	588
<i>S. Kevin Zhou, Rama Chellappa, David W. Jacobs</i>	
User Assisted Separation of Reflections from a Single Image Using a Sparsity Prior	602
<i>Anat Levin, Yair Weiss</i>	
The Quality of Catadioptric Imaging – Application to Omnidirectional Stereo	614
<i>Wolfgang Stürzl, Hansjürgen Dahmen, Hanspeter A. Mallot</i>	
Author Index	629

Table of Contents – Part II

Geometry

A Generic Concept for Camera Calibration	1
<i>Peter Sturm, Srikumar Ramalingam</i>	
General Linear Cameras	14
<i>Jingyi Yu, Leonard McMillan</i>	
A Framework for Pencil-of-Points Structure-from-Motion	28
<i>Adrien Bartoli, Mathieu Coquerelle, Peter Sturm</i>	
What Do Four Points in Two Calibrated Images Tell Us about the Epipoles?	41
<i>David Nistér, Frederik Schaffalitzky</i>	

Feature-Based Object Detection and Recognition II

Dynamic Visual Search Using Inner-Scene Similarity: Algorithms and Inherent Limitations	58
<i>Tamar Avraham, Michael Lindenbaum</i>	
Weak Hypotheses and Boosting for Generic Object Detection and Recognition	71
<i>A. Opelt, M. Fussenegger, A. Pinz, P. Auer</i>	
Object Level Grouping for Video Shots	85
<i>Josef Sivic, Frederik Schaffalitzky, Andrew Zisserman</i>	

Posters II

Statistical Symmetric Shape from Shading for 3D Structure Recovery of Faces	99
<i>Roman Dougard, Ronen Basri</i>	
Region-Based Segmentation on Evolving Surfaces with Application to 3D Reconstruction of Shape and Piecewise Constant Radiance	114
<i>Hailin Jin, Anthony J. Yezzi, Stefano Soatto</i>	
Human Upper Body Pose Estimation in Static Images	126
<i>Mun Wai Lee, Isaac Cohen</i>	
Automated Optic Disc Localization and Contour Detection Using Ellipse Fitting and Wavelet Transform	139
<i>P.M.D.S. Pallawala, Wynne Hsu, Mong Li Lee, Kah-Guan Au Eong</i>	

View-Invariant Recognition Using Corresponding Object Fragments	152
<i>Evgeniy Bart, Evgeny Byvatov, Shimon Ullman</i>	
Variational Pairing of Image Segmentation and Blind Restoration	166
<i>Leah Bar, Nir Sochen, Nahum Kiryati</i>	
Towards Intelligent Mission Profiles of Micro Air Vehicles:	
Multiscale Viterbi Classification	178
<i>Sinisa Todorovic, Michael C. Nechyba</i>	
Stitching and Reconstruction of Linear-Pushbroom Panoramic Images for Planar Scenes	190
<i>Chu-Song Chen, Yu-Ting Chen, Fay Huang</i>	
Audio-Video Integration for Background Modelling	202
<i>Marco Cristani, Manuele Bicego, Vittorio Murino</i>	
A Combined PDE and Texture Synthesis Approach to Inpainting	214
<i>Harald Grossauer</i>	
Face Recognition from Facial Surface Metric	225
<i>Alexander M. Bronstein, Michael M. Bronstein, Alon Spira, Ron Kimmel</i>	
Image and Video Segmentation by Anisotropic Kernel Mean Shift	238
<i>Jue Wang, Bo Thiesson, Yingqing Xu, Michael Cohen</i>	
Colour Texture Segmentation by Region-Boundary Cooperation	250
<i>Jordi Freixenet, Xavier Muñoz, Joan Martí, Xavier Lladó</i>	
Spectral Solution of Large-Scale Extrinsic Camera Calibration as a Graph Embedding Problem	262
<i>Matthew Brand, Matthew Antone, Seth Teller</i>	
Estimating Intrinsic Images from Image Sequences with Biased Illumination	274
<i>Yasuyuki Matsushita, Stephen Lin, Sing Bing Kang, Heung-Yeung Shum</i>	
Structure and Motion from Images of Smooth Textureless Objects	287
<i>Yasutaka Furukawa, Amit Sethi, Jean Ponce, David Kriegman</i>	
Automatic Non-rigid 3D Modeling from Video	299
<i>Lorenzo Torresani, Aaron Hertzmann</i>	
From a 2D Shape to a String Structure Using the Symmetry Set	313
<i>Arjan Kuijper, Ole Fogh Olsen, Peter Giblin, Philip Bille, Mads Nielsen</i>	

Extrinsic Camera Parameter Recovery from Multiple Image Sequences Captured by an Omni-directional Multi-camera System	326
<i>Tomokazu Sato, Sei Ikeda, Naokazu Yokoya</i>	
Evaluation of Robust Fitting Based Detection	341
<i>Sio-Song Ieng, Jean-Philippe Tarel, Pierre Charbonnier</i>	
Local Orientation Smoothness Prior for Vascular Segmentation of Angiography	353
<i>Wilbur C.K. Wong, Albert C.S. Chung, Simon C.H. Yu</i>	
Weighted Minimal Hypersurfaces and Their Applications in Computer Vision	366
<i>Bastian Goldlücke, Marcus Magnor</i>	
Interpolating Novel Views from Image Sequences by Probabilistic Depth Carving	379
<i>Annie Yao, Andrew Calway</i>	
Sparse Finite Elements for Geodesic Contours with Level-Sets	391
<i>Martin Weber, Andrew Blake, Roberto Cipolla</i>	
Hierarchical Implicit Surface Joint Limits to Constrain Video-Based Motion Capture	405
<i>Lorna Herda, Raquel Urtasun, Pascal Fua</i>	
Separating Specular, Diffuse, and Subsurface Scattering Reflectances from Photometric Images	419
<i>Tai-Pang Wu, Chi-Keung Tang</i>	
Temporal Factorization vs. Spatial Factorization	434
<i>Lihi Zelnik-Manor, Michal Irani</i>	
Tracking Aspects of the Foreground against the Background	446
<i>Hieu T. Nguyen, Arnold Smeulders</i>	
Example-Based Stereo with General BRDFs	457
<i>Adrien Treuille, Aaron Hertzmann, Steven M. Seitz</i>	
Adaptive Probabilistic Visual Tracking with Incremental Subspace Update	470
<i>David Ross, Jongwoo Lim, Ming-Hsuan Yang</i>	
On Refractive Optical Flow	483
<i>Sameer Agarwal, Satya P. Mallick, David Kriegman, Serge Belongie</i>	
Matching Tensors for Automatic Correspondence and Registration	495
<i>Ajmal S. Mian, Mohammed Bennamoun, Robyn Owens</i>	

A Biologically Motivated and Computationally Tractable Model of Low and Mid-Level Vision Tasks	506
<i>Iasonas Kokkinos, Rachid Deriche, Petros Maragos, Olivier Faugeras</i>	
Appearance Based Qualitative Image Description for Object Class Recognition	518
<i>Johan Thureson, Stefan Carlsson</i>	
Consistency Conditions on the Medial Axis	530
<i>Anthony Pollitt, Peter Giblin, Benjamin Kimia</i>	
Normalized Cross-Correlation for Spherical Images	542
<i>Lorenzo Sorigi, Kostas Daniilidis</i>	
Bias in the Localization of Curved Edges	554
<i>Paulo R.S. Mendonça, Dirk Padfield, James Miller, Matt Turek</i>	
Texture	
Texture Boundary Detection for Real-Time Tracking	566
<i>Ali Shahrokni, Tom Drummond, Pascal Fua</i>	
A TV Flow Based Local Scale Measure for Texture Discrimination	578
<i>Thomas Brox, Joachim Weickert</i>	
Spatially Homogeneous Dynamic Textures	591
<i>Gianfranco Doretto, Eagle Jones, Stefano Soatto</i>	
Synthesizing Dynamic Texture with Closed-Loop Linear Dynamic System	603
<i>Lu Yuan, Fang Wen, Ce Liu, Heung-Yeung Shum</i>	
Author Index	617

Table of Contents – Part III

Learning and Recognition

A Constrained Semi-supervised Learning Approach to Data Association	1
<i>Hendrik Kück, Peter Carbonetto, Nando de Freitas</i>	
Learning Mixtures of Weighted Tree-Unions by Minimizing Description Length	13
<i>Andrea Torsello, Edwin R. Hancock</i>	
Decision Theoretic Modeling of Human Facial Displays	26
<i>Jesse Hoey, James J. Little</i>	
Kernel Feature Selection with Side Data Using a Spectral Approach	39
<i>Amnon Shashua, Lior Wolf</i>	

Tracking II

Tracking Articulated Motion Using a Mixture of Autoregressive Models	54
<i>Ankur Agarwal, Bill Triggs</i>	
Novel Skeletal Representation for Articulated Creatures	66
<i>Gabriel J. Brostow, Irfan Essa, Drew Steedly, Vivek Kwatra</i>	
An Accuracy Certified Augmented Reality System for Therapy Guidance	79
<i>Stéphane Nicolau, Xavier Pennec, Luc Soler, Nichlas Ayache</i>	

Posters III

3D Human Body Tracking Using Deterministic Temporal Motion Models	92
<i>Raquel Urtasun, Pascal Fua</i>	
Robust Fitting by Adaptive-Scale Residual Consensus	107
<i>Hanzi Wang, David Suter</i>	
Causal Camera Motion Estimation by Condensation and Robust Statistics Distance Measures	119
<i>Tal Nir, Alfred M. Bruckstein</i>	

An Adaptive Window Approach for Image Smoothing and Structures Preserving	132
<i>Charles Kervrann</i>	
Extraction of Semantic Dynamic Content from Videos with Probabilistic Motion Models	145
<i>Gwenaëlle Piriou, Patrick Bouthemy, Jian-Feng Yao</i>	
Are Iterations and Curvature Useful for Tensor Voting?	158
<i>Sylvain Fischer, Pierre Bayerl, Heiko Neumann, Gabriel Cristóbal, Rafael Redondo</i>	
A Feature-Based Approach for Determining Dense Long Range Correspondences	170
<i>Josh Wills, Serge Belongie</i>	
Combining Geometric- and View-Based Approaches for Articulated Pose Estimation	183
<i>David Demirdjian</i>	
Shape Matching and Recognition – Using Generative Models and Informative Features	195
<i>Zhuowen Tu, Alan L. Yuille</i>	
Generalized Histogram: Empirical Optimization of Low Dimensional Features for Image Matching	210
<i>Shin'ichi Satoh</i>	
Recognizing Objects in Range Data Using Regional Point Descriptors . . .	224
<i>Andrea Frome, Daniel Huber, Ravi Kolluri, Thomas Bülow, Jitendra Malik</i>	
Shape Reconstruction from 3D and 2D Data Using PDE-Based Deformable Surfaces	238
<i>Ye Duan, Liu Yang, Hong Qin, Dimitris Samaras</i>	
Structure and Motion Problems for Multiple Rigidly Moving Cameras . . .	252
<i>Henrik Stewenius, Kalle Åström</i>	
Detection and Tracking Scheme for Line Scratch Removal in an Image Sequence	264
<i>Bernard Besserer, Cedric Thiré</i>	
Color Constancy Using Local Color Shifts	276
<i>Marc Ebner</i>	
Image Anisotropic Diffusion Based on Gradient Vector Flow Fields	288
<i>Hongchuan Yu, Chin-Seng Chua</i>	

Optimal Importance Sampling for Tracking in Image Sequences: Application to Point Tracking	302
<i>Elise Arnaud, Etienne Mémín</i>	
Learning to Segment	315
<i>Eran Borenstein, Shimon Ullman</i>	
MCMC-Based Multiview Reconstruction of Piecewise Smooth Subdivision Curves with a Variable Number of Control Points	329
<i>Michael Kaess, Rafal Zboinski, Frank Dellaert</i>	
Bayesian Correction of Image Intensity with Spatial Consideration	342
<i>Jiaya Jia, Jian Sun, Chi-Keung Tang, Heung-Yeung Shum</i>	
Stretching Bayesian Learning in the Relevance Feedback of Image Retrieval	355
<i>Ruofei Zhang, Zhongfei (Mark) Zhang</i>	
Real-Time Tracking of Multiple Skin-Colored Objects with a Possibly Moving Camera	368
<i>Antonis A. Argyros, Manolis I.A. Lourakis</i>	
Evaluation of Image Fusion Performance with Visible Differences	380
<i>Vladimir Petrović, Costas Xydeas</i>	
An Information-Based Measure for Grouping Quality	392
<i>Erik A. Engbers, Michael Lindenbaum, Arnold W.M. Smeulders</i>	
Bias in Shape Estimation	405
<i>Hui Ji, Cornelia Fermüller</i>	
Contrast Marginalised Gradient Template Matching	417
<i>Saleh Basalamah, Anil Bharath, Donald McRobbie</i>	
The Kullback-Leibler Kernel as a Framework for Discriminant and Localized Representations for Visual Recognition	430
<i>Nuno Vasconcelos, Purdy Ho, Pedro Moreno</i>	
Partial Object Matching with Shapeme Histograms	442
<i>Y. Shan, H.S. Sawhney, B. Matei, R. Kumar</i>	
Modeling and Synthesis of Facial Motion Driven by Speech	456
<i>Payam Saisan, Alessandro Bissacco, Alessandro Chiuso, Stefano Soatto</i>	
Recovering Local Shape of a Mirror Surface from Reflection of a Regular Grid	468
<i>Silvio Savarese, Min Chen, Pietro Perona</i>	

Structure of Applicable Surfaces from Single Views	482
<i>Nail Gumerov, Ali Zandifar, Ramani Duraiswami, Larry S. Davis</i>	
Joint Bayes Filter: A Hybrid Tracker for Non-rigid Hand Motion Recognition	497
<i>Huang Fei, Ian Reid</i>	
Iso-disparity Surfaces for General Stereo Configurations	509
<i>Marc Pollefeys, Sudipta Sinha</i>	
Camera Calibration with Two Arbitrary Coplanar Circles	521
<i>Qian Chen, Haiyuan Wu, Toshikazu Wada</i>	
Reconstruction of 3-D Symmetric Curves from Perspective Images without Discrete Features	533
<i>Wei Hong, Yi Ma, Yizhou Yu</i>	
A Topology Preserving Non-rigid Registration Method Using a Symmetric Similarity Function-Application to 3-D Brain Images	546
<i>Vincent Noblet, Christian Heinrich, Fabrice Heitz, Jean-Paul Armspach</i>	
A Correlation-Based Approach to Robust Point Set Registration	558
<i>Yanghai Tsin, Takeo Kanade</i>	
Hierarchical Organization of Shapes for Efficient Retrieval	570
<i>Shantanu Joshi, Anuj Srivastava, Washington Mio, Xiuwen Liu</i>	
Information-Based Image Processing	
Intrinsic Images by Entropy Minimization	582
<i>Graham D. Finlayson, Mark S. Drew, Cheng Lu</i>	
Image Similarity Using Mutual Information of Regions	596
<i>Daniel B. Russakoff, Carlo Tomasi, Torsten Rohlfing, Calvin R. Maurer, Jr.</i>	
Author Index	609

Table of Contents – Part IV

Scale Space, Flow, Restoration

A l^1 -Unified Variational Framework for Image Restoration	1
<i>Julien Bect, Laure Blanc-Féraud, Gilles Aubert, Antonin Chambolle</i>	
Support Blob Machines. The Sparsification of Linear Scale Space	14
<i>Marco Loog</i>	
High Accuracy Optical Flow Estimation Based on a Theory for Warping	25
<i>Thomas Brox, Andrés Bruhn, Nils Papenberg, Joachim Weickert</i>	
Model-Based Approach to Tomographic Reconstruction Including Projection Deblurring. Sensitivity of Parameter Model to Noise on Data	37
<i>Jean Michel Lagrange, Isabelle Abraham</i>	

2D Shape Detection and Recognition

Unlevel-Sets: Geometry and Prior-Based Segmentation.....	50
<i>Tammy Riklin-Raviv, Nahum Kiryati, Nir Sochen</i>	
Learning and Bayesian Shape Extraction for Object Recognition	62
<i>Washington Mio, Anuj Srivastava, Xiuwen Liu</i>	
Multiphase Dynamic Labeling for Variational Recognition-Driven Image Segmentation	74
<i>Daniel Cremers, Nir Sochen, Christoph Schnörr</i>	

Posters IV

Integral Invariant Signatures	87
<i>Siddharth Manay, Byung-Woo Hong, Anthony J. Yezzi, Stefano Soatto</i>	
Detecting Keypoints with Stable Position, Orientation, and Scale under Illumination Changes	100
<i>Bill Triggs</i>	
Spectral Simplification of Graphs	114
<i>Huaijun Qiu, Edwin R. Hancock</i>	
Inferring White Matter Geometry from Diffusion Tensor MRI: Application to Connectivity Mapping.....	127
<i>Christophe Lenglet, Rachid Deriche, Olivier Faugeras</i>	

Unifying Approaches and Removing Unrealistic Assumptions in Shape from Shading: Mathematics Can Help	141
<i>Emmanuel Prados, Olivier Faugeras</i>	
Morphological Operations on Matrix-Valued Images	155
<i>Bernhard Burgeth, Martin Welk, Christian Feddern, Joachim Weickert</i>	
Constraints on Coplanar Moving Points	168
<i>Sujit Kuthirummal, C.V. Jawahar, P.J. Narayanan</i>	
A PDE Solution of Brownian Warping	180
<i>Mads Nielsen, P. Johansen</i>	
Stereovision-Based Head Tracking Using Color and Ellipse Fitting in a Particle Filter	192
<i>Bogdan Kwolek</i>	
Parallel Variational Motion Estimation by Domain Decomposition and Cluster Computing	205
<i>Timo Kohlberger, Christoph Schnörr, Andrés Bruhn, Joachim Weickert</i>	
Whitening for Photometric Comparison of Smooth Surfaces under Varying Illumination	217
<i>Margarita Osadchy, Michael Lindenbaum, David Jacobs</i>	
Structure from Motion of Parallel Lines	229
<i>Patrick Baker, Yiannis Aloimonos</i>	
A Bayesian Framework for Multi-cue 3D Object Tracking	241
<i>Jan Giebel, Darin M. Gavrilu, Christoph Schnörr</i>	
On the Significance of Real-World Conditions for Material Classification	253
<i>Eric Hayman, Barbara Caputo, Mario Fritz, Jan-Olof Eklundh</i>	
Toward Accurate Segmentation of the LV Myocardium and Chamber for Volumes Estimation in Gated SPECT Sequences	267
<i>Diane Lingrand, Arnaud Charnoz, Pierre Malick Koulibaly, Jacques Darcourt, Johan Montagnat</i>	
An MCMC-Based Particle Filter for Tracking Multiple Interacting Targets	279
<i>Zia Khan, Tucker Balch, Frank Dellaert</i>	
Human Pose Estimation Using Learnt Probabilistic Region Similarities and Partial Configurations	291
<i>Timothy J. Roberts, Stephen J. McKenna, Ian W. Ricketts</i>	

Tensor Field Segmentation Using Region Based Active Contour Model	304
<i>Zhizhou Wang, Baba C. Vemuri</i>	
Groupwise Diffeomorphic Non-rigid Registration for Automatic Model Building	316
<i>T.F. Cootes, S. Marsland, C.J. Twining, K. Smith, C.J. Taylor</i>	
Separating Transparent Layers through Layer Information Exchange	328
<i>Bernard Sarel, Michal Irani</i>	
Multiple Classifier System Approach to Model Pruning in Object Recognition.....	342
<i>Josef Kittler, Ali R. Ahmadyfard</i>	
Coaxial Omnidirectional Stereopsis	354
<i>Libor Spacek</i>	
Classifying Materials from Their Reflectance Properties	366
<i>Peter Nillius, Jan-Olof Eklundh</i>	
Seamless Image Stitching in the Gradient Domain	377
<i>Anat Levin, Assaf Zomet, Shmuel Peleg, Yair Weiss</i>	
Spectral Clustering for Robust Motion Segmentation	390
<i>JinHyeong Park, Hongyuan Zha, Rangachar Kasturi</i>	
Learning Outdoor Color Classification from Just One Training Image	402
<i>Roberto Manduchi</i>	
A Polynomial-Time Metric for Attributed Trees	414
<i>Andrea Torsello, Džena Hidović, Marcello Pelillo</i>	
Probabilistic Multi-view Correspondence in a Distributed Setting with No Central Server	428
<i>Shai Avidan, Yael Moses, Yoram Moses</i>	
Monocular 3D Reconstruction of Human Motion in Long Action Sequences	442
<i>Gareth Loy, Martin Eriksson, Josephine Sullivan, Stefan Carlsson</i>	
Fusion of Infrared and Visible Images for Face Recognition	456
<i>Aglika Gyaourova, George Bebis, Ioannis Pavlidis</i>	
Reliable Fiducial Detection in Natural Scenes	469
<i>David Claus, Andrew W. Fitzgibbon</i>	
Light Field Appearance Manifolds	481
<i>Chris Mario Christoudias, Louis-Philippe Morency, Trevor Darrell</i>	

Galilean Differential Geometry of Moving Images	494
<i>Daniel Fagerström</i>	
Tracking People with a Sparse Network of Bearing Sensors	507
<i>A. Rahimi, B. Dunagan, T. Darrell</i>	
Transformation-Invariant Embedding for Image Analysis	519
<i>Ali Ghodsi, Jiayuan Huang, Dale Schuurmans</i>	
The Least-Squares Error for Structure from Infinitesimal Motion	531
<i>John Oliensis</i>	
Stereo Based 3D Tracking and Scene Learning, Employing Particle Filtering within EM	546
<i>Trausti Kristjansson, Hagai Attias, John Hershey</i>	
3D Shape Representation and Reconstruction	
The Isophotic Metric and Its Application to Feature Sensitive Morphology on Surfaces	560
<i>Helmut Pottmann, Tibor Steiner, Michael Hofer, Christoph Haider, Allan Hanbury</i>	
A Closed-Form Solution to Non-rigid Shape and Motion Recovery	573
<i>Jing Xiao, Jin-xiang Chai, Takeo Kanade</i>	
Stereo Using Monocular Cues within the Tensor Voting Framework	588
<i>Philippos Mordohai, Gérard Medioni</i>	
Shape and View Independent Reflectance Map from Multiple Views	602
<i>Tianli Yu, Ning Xu, Narendra Ahuja</i>	
Author Index	617