

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

University of Dortmund, Germany

Madhu Sudan

Massachusetts Institute of Technology, MA, USA

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Gerhard Weikum

Max-Planck Institute of Computer Science, Saarbruecken, Germany

Antonios Gasteratos Markus Vincze
John K. Tsotsos (Eds.)

Computer Vision Systems

6th International Conference, ICVS 2008
Santorini, Greece, May 12-15, 2008
Proceedings

Volume Editors

Antonios Gasteratos
Democritus University of Thrace
Department of Production and Management Engineering
University Campus, Kimmeria, 671 00 Xanthi, Greece
E-mail: agaster@pme.duth.gr

Markus Vincze
Vienna University of Technology
Automation and Control Institute
Gusshausstraße 27/376, 1040 Vienna, Austria
E-mail: vincze@acin.tuwien.ac.at

John K. Tsotsos
York University
Department of Computer Science and Engineering
4700 Keele St., Toronto, ON M3J 1P3, Canada
E-mail: tsotsos@cse.yorku.ca

Library of Congress Control Number: 2008925840

CR Subject Classification (1998): I.4, I.2.0, I.2.6, I.5.4-5, I.3.1-2, D.2

LNCS Sublibrary: SL 1 – Theoretical Computer Science and General Issues

ISSN	0302-9743
ISBN-10	3-540-79546-4 Springer Berlin Heidelberg New York
ISBN-13	978-3-540-79546-9 Springer 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. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springer.com

© Springer-Verlag Berlin Heidelberg 2008
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 12264100 06/3180 5 4 3 2 1 0

Preface

In the past few years, with the advances in microelectronics and digital technology, cameras became a widespread media. This, along with the enduring increase in computing power boosted the development of computer vision systems. The International Conference on Computer Vision Systems (ICVS) covers the advances in this area. This is to say that ICVS is not and should not be yet another computer vision conference. The field of computer vision is fully covered by many well-established and famous conferences and ICVS differs from these by covering the systems point of view. ICVS 2008 was the 6th International Conference dedicated to advanced research on computer vision systems. The conference, continuing a series of successful events in Las Palmas, Vancouver, Graz, New York and Bielefeld, in 2008 was held on Santorini.

In all, 128 papers entered the review process and each was reviewed by three independent reviewers using the double-blind review method. Of these, 53 papers were accepted (23 as oral and 30 as poster presentation). There were also two invited talks by P. Anandan and by Heinrich H. Bühlhoff. The presented papers cover all aspects of computer vision systems, namely: cognitive vision, monitor and surveillance, computer vision architectures, calibration and registration, object recognition and tracking, learning, human—machine interaction and cross-modal systems.

The theme of the conference was ‘Vision for Cognitive Systems’, and thus in conjunction with ICVS 2008 two workshops were organized:

The 4th International Cognitive Vision Workshop—ICVW 2008, organized by Barbara Caputo and Markus Vincze, aimed at studying issues such as multi-cue integration, embodied categorization, and behavior / skill acquisition.

The 5th International Workshop on Attention in Cognitive Systems—WAPCV 2008, organized by Lucas Paletta and John Tsotsos, aimed at selective attention and its importance for the organization of behaviors for control and interfacing between sensory and cognitive information processing and for the understanding of individual and social cognition in humanoid artifacts.

We wish to thank the Workshop Chair, Antonis Argyros, for his assistance and his constructive comments during the workshop selection. We also owe a great thank you to Dimitris Chrysostomou and Stamatina Gika for their valuable efforts in organizing this event. Thanks also to EuCognition network and the Greek Ministry of Education for sponsoring this event.

May 2008

Antonios Gasteratos
Markus Vincze
John Tsotsos

Conference Committee

Conference General Chair

Antonios Gasteratos (Democritus University of Thrace, Greece)

Program Co-chairs

Markus Vincze (TU Vienna, Austria)

John Tsotsos (York University, Canada)

Workshop Chair

Antonis Argyros, (University of Crete and FORTH, Greece)

Program Committee

Balasundram P. Amavasai (Sheffield Hallam University, UK)

Nick Barnes (National ICT, Australia)

Christian Bauckhage (Deutsche Telekom AG, Berlin, Germany)

Carlos Beltran Gonzalez (University of Genoa, Italy)

Alexandre Bernardino (Instituto Superior Técnico, Portugal)

Horst Bischof (Technical University Graz, Austria)

Alain Boucher (IFI Hanoi, Vietnam)

François Bremond, (INRIA Sophia Antipolis, France)

Jorge Cabrera (University of Las Palmas de Gran Canaria, Spain)

Régis Clouard (GREYC Laboratory, France)

Patrick Courtney (Perkin Elmer Life Science, UK)

James Crowley (I.N.P. Grenoble, France)

Kostas Daniilidis (University of Pennsylvania, USA)

Larry Davis (University of Maryland, USA)

Alberto Del Bimbo (University of Florence, Italy)

Rachid Deriche (INRIA Sophia Antipolis, France)

Bruce Draper (Colorado State University, USA)

James Ferryman (University of Reading, UK)

Bob Fisher (School of Informatics, University of Edinburgh, UK)

Gian Luca Foresti (University of Udine, Italy)

Jannik Fritsch (Honda Research Institute Europe GmbH, Germany)

Vassilios Gatos (National Center for Scientific Research 'Demokritos,' Greece)

Riad Hammoud (Delphi Corporation, USA)

Jesse Hoey (University of Dundee, UK)

David Hogg (University of Leeds, UK)

Vaclav Hvalac (Czech Technical University in Prague, Czech Republic)
Rick Kjeldsen (IBM T.J. Watson Research Center, USA)
Edgar Koerner (Honda Research Institute Europe GmbH, Germany)
Yiannis Kompatsiaris (ITI CERTH, Greece)
Costas Kotropoulos (Aristotle University of Thessaloniki, Greece)
Ales Leonardis (University of Ljubljana, Slovenia)
Dimitrios Makris (Kingston University, UK)
Bärbel Mertsching (University of Paderborn, Germany)
Giorgio Metta (Istituto Italiano di Tecnologia, Italy)
Bernd Neumann (University of Hamburg, Germany)
Ramakant Nevatia (University of Southern California, USA)
Lucas Paletta (Joanneum Research, Austria)
Nikolaos Papamarkos (Democritus University of Thrace, Greece)
Chung Pau-Choo (National Cheng Kung University, Taiwan)
Justus Piater (University of Liege, Belgium)
Claudio Pinhanez (IBM T.J. Watson Research Center, USA)
Axel Pinz (Graz University of Technology, Austria)
Fiora Pirri (University of Rome 'La Sapienza,' Italy)
Ioannis Pratikakis (National Center for Scientific Research 'Demokritos,' Greece)
Paolo Remagnino (Kingston University, UK)
Gerhard Sagerer (University of Bielefeld, Germany)
Gerald Schaefer (Aston University, UK)
Bernt Schiele (TU Darmstadt, Germany)
Athanasios Skodras (Hellenic Open University, Greece)
Anastasios Tefas (Aristotle University of Thessaloniki, Greece)
Monique Thonnat (INRIA Sophia Antipolis, France)
Panagiotis Trahanias (University of Crete, Greece)
Sofia Tsekeridou (Athens Information Technology, Greece)
Sergio Velastin (Kingston University, UK)
Sven Wachsmuth (University of Bielefeld, Germany)
Christian Wöhler (DaimlerChrysler Group Research, Ulm, Germany)
Sebastian Wrede (University of Bielefeld, Germany)

Local Administration

Dimitris Chrysostomou (Democritus University of Thrace, Greece)

Additional Reviewers

Angelos Amanatiadis	Konstantinos Derpanis
Alexander Andreopoulos	James Elder
Neil Bruce	Pantelis Ellinas
Dimitris Chrysostomou	Ehsan Fazl-Ersi
Andrew Dankers	Michael Jenkin
Petros Daras	Anastasios Kesidis

Konstantinos Konstantinidis
 Leonidas Kotoulas
 Dimitrios Koulouriotis
 Rigas Kouskouridas
 Nikolaos Kyriakoulis
 Erich Leung
 James J. Little
 Manolis Lourakis
 Chris MacCarthy
 James W. MacLean
 David Meger
 Nathan Mekuz
 Spyridon G. Mouroutsos
 Hans-Hellmut Nagel
 Lazaros Nalpantidis

Lorenzo Natale
 Francesco Nori
 Karl Pauwels
 Stavros Perantonis
 Antonio Rodriguez-Sanchez
 Andrei Rothenstein
 Albert Rothenstein
 George Sergiadis
 Chunhua Shen
 Georgios Sirakoulis
 Minas Spetsakis
 Vasileios Vonikakis
 Liang Wang
 Richard Wildes

Table of Contents

I Cognitive Vision

Visual Search in Static and Dynamic Scenes Using Fine-Grain Top-Down Visual Attention	3
<i>Muhammad Zaheer Aziz and Bärbel Mertsching</i>	
Integration of Visual and Shape Attributes for Object Action Complexes	13
<i>Kai Huebner, Mårten Björkman, Babak Rasolzadeh, Martina Schmidt, and Danica Kragic</i>	
3D Action Recognition and Long-Term Prediction of Human Motion ...	23
<i>Markus Hahn, Lars Krüger, and Christian Wöhler</i>	
Tracking of Human Hands and Faces through Probabilistic Fusion of Multiple Visual Cues	33
<i>Haris Baltzakis, Antonis Argyros, Manolis Lourakis, and Panos Trahanias</i>	
Enhancing Robustness of a Saliency-Based Attention System for Driver Assistance	43
<i>Thomas Michalke, Jannik Fritsch, and Christian Goerick</i>	
Covert Attention with a Spiking Neural Network	56
<i>Sylvain Chevallier and Philippe Tarroux</i>	
Salient Region Detection and Segmentation	66
<i>Radhakrishna Achanta, Francisco Estrada, Patricia Wils, and Sabine Süsstrunk</i>	

II Monitor and Surveillance

The SAFEE On-Board Threat Detection System	79
<i>Nicholas L. Carter and James M. Ferryman</i>	
Region of Interest Generation in Dynamic Environments Using Local Entropy Fields	89
<i>Luciano Spinello and Roland Siegwart</i>	
Real-Time Face Tracking for Attention Aware Adaptive Games	99
<i>Matthieu Perreira Da Silva, Vincent Courboulay, Armelle Prigent, and Pascal Estraillier</i>	

Rek-Means: A k-Means Based Clustering Algorithm	109
<i>Domenico Daniele Bloisi and Luca Iocchi</i>	
Smoke Detection in Video Surveillance: A MoG Model in the Wavelet Domain	119
<i>Simone Calderara, Paolo Piccinini, and Rita Cucchiara</i>	

III Computer Vision Architectures

Feature Extraction and Classification by Genetic Programming	131
<i>Olly Oechsle and Adrian F. Clark</i>	
GPU-Based Multigrid: Real-Time Performance in High Resolution Nonlinear Image Processing	141
<i>Harald Grossauer and Peter Thoman</i>	
Attention Modulation Using Short- and Long-Term Knowledge	151
<i>Sven Rebhan, Florian Röhrbein, Julian Eggert, and Edgar Körner</i>	
PCA Based 3D Shape Reconstruction of Human Foot Using Multiple Viewpoint Cameras	161
<i>Edmée Amstutz, Tomoaki Teshima, Makoto Kimura, Masaaki Mochimaru, and Hideo Saito</i>	
An On-Line Interactive Self-adaptive Image Classification Framework	171
<i>Davy Sannen, Marnix Nuttin, Jim Smith, Muhammad Atif Tahir, Praminda Caleb-Solly, Edwin Lughofer, and Christian Eitzinger</i>	
Communication-Aware Face Detection Using Noc Architecture	181
<i>Hung-Chih Lai, Radu Marculescu, Marios Savvides, and Tsuhan Chen</i>	

IV Calibration and Registration

A System for Geometrically Constrained Single View Reconstruction	193
<i>Manolis I.A. Lourakis</i>	
Monocular Omnidirectional Visual Odometry for Outdoor Ground Vehicles	206
<i>Davide Scaramuzza and Roland Siegwart</i>	
Eyes and Cameras Calibration for 3D World Gaze Detection	216
<i>Stefano Marra and Fiora Pirri</i>	
Evaluating Multiview Reconstruction	228
<i>Keir Mierle and W. James Maclean</i>	

V Object Recognition and Tracking

Detecting and Recognizing Abandoned Objects in Crowded Environments	241
<i>Roland Mieziako and Dragoljub Pokrajac</i>	
Diagnostic System for Intestinal Motility Disfunctions Using Video Capsule Endoscopy	251
<i>Santi Seguí, Laura Igual, Fernando Vilariño, Petia Radeva, Carolina Malagelada, Fernando Azpiroz, and Jordi Vitrià</i>	
An Approach for Tracking the 3D Object Pose Using Two Object Points	261
<i>Sai Krishna Vuppala and Axel Gräser</i>	
Adaptive Motion-Based Gesture Recognition Interface for Mobile Phones	271
<i>Jari Hannuksela, Mark Barnard, Pekka Sangi, and Janne Heikkilä</i>	
Weighted Dissociated Dipoles: An Extended Visual Feature Set	281
<i>Xavier Baró and Jordi Vitrià</i>	
Scene Classification Based on Multi-resolution Orientation Histogram of Gabor Features	291
<i>Kazuhiro Hotta</i>	
Automatic Object Detection on Aerial Images Using Local Descriptors and Image Synthesis	302
<i>Xavier Perrotton, Marc Sturzel, and Michel Roux</i>	
CEDD: Color and Edge Directivity Descriptor: A Compact Descriptor for Image Indexing and Retrieval	312
<i>Savvas A. Chatzichristofis and Yiannis S. Boutalis</i>	
Ranking Corner Points by the Angular Difference between Dominant Edges	323
<i>Rafael Lemuz-López and Miguel Arias Estrada</i>	
Skeletonization Based on Metrical Neighborhood Sequences	333
<i>Attila Fazekas, Kálmán Palágyi, György Kovács, and Gábor Németh</i>	
Bottom-Up and Top-Down Object Matching Using Asynchronous Agents and a Contrario Principles	343
<i>Nicolas Burrus, Thierry M. Bernard, and Jean-Michel Jolion</i>	
A Tale of Two Object Recognition Methods for Mobile Robots	353
<i>Arnau Ramisa, Shrihari Vasudevan, Davide Scaramuzza, Ramón López de Mántaras, and Roland Siegwart</i>	

A Segmentation Approach in Novel Real Time 3D Plant Recognition System	363
<i>Dejan Šeatović</i>	
Face Recognition Using a Color PCA Framework	373
<i>Mani Thomas, Senthil Kumar, and Chandra Kambhamettu</i>	
Online Learning for Bootstrapping of Object Recognition and Localization in a Biologically Motivated Architecture	383
<i>Heiko Wersing, Stephan Kirstein, Bernd Schneiders, Ute Bauer-Wersing, and Edgar Körner</i>	
Vein Segmentation in Infrared Images Using Compound Enhancing and Crisp Clustering	393
<i>Marios Vlachos and Evangelos Dermatas</i>	
Multiscale Laplacian Operators for Feature Extraction on Irregularly Distributed 3-D Range Data.....	403
<i>Shanmugalingam Suganthan, Sonya Coleman, and Bryan Scotney</i>	

VI Learning

A System That Learns to Tag Videos by Watching Youtube	415
<i>Adrian Ulges, Christian Schulze, Daniel Keysers, and Thomas M. Breuel</i>	
Geo-located Image Grouping Using Latent Descriptions	425
<i>Marco Cristani, Alessandro Perina, and Vittorio Murino</i>	
Functional Object Class Detection Based on Learned Affordance Cues	435
<i>Michael Stark, Philipp Lies, Michael Zillich, Jeremy Wyatt, and Bernt Schiele</i>	
Increasing Classification Robustness with Adaptive Features.....	445
<i>Christian Eitzinger, Manfred Gmainer, Wolfgang Heidl, and Edwin Lughofer</i>	
Learning Visual Quality Inspection from Multiple Humans Using Ensembles of Classifiers	454
<i>Davy Sannen, Hendrik Van Brussel, and Marnix Nuttin</i>	
Learning Contextual Variations for Video Segmentation.....	464
<i>Vincent Martin and Monique Thonnat</i>	
Learning to Detect Aircraft at Low Resolutions	474
<i>Stavros Petridis, Christopher Geyer, and Sanjiv Singh</i>	

A Novel Feature Selection Based Semi-supervised Method for Image Classification	484
<i>Muhammad Atif Tahir, James E. Smith, and Praminda Caleb-Solly</i>	
Sub-class Error-Correcting Output Codes	494
<i>Sergio Escalera, Oriol Pujol, and Petia Radeva</i>	

VII Human Machine Interaction

Spatio-temporal 3D Pose Estimation of Objects in Stereo Images	507
<i>Björn Barrois and Christian Wöhler</i>	
Automatic Initialization for Facial Analysis in Interactive Robotics	517
<i>Ahmad Rabie, Christian Lang, Marc Hanheide, Modesto Castrillón-Santana, and Gerhard Sagerer</i>	
Face Recognition Across Pose Using View Based Active Appearance Models (VBAAMs) on CMU Multi-PIE Dataset	527
<i>Jingu Heo and Marios Savvides</i>	

VIII Cross Modal Systems

Object Category Detection Using Audio-Visual Cues	539
<i>Jie Luo, Barbara Caputo, Alon Zweig, Jörg-Hendrik Bach, and Jörn Anemüller</i>	
Multimodal Interaction Abilities for a Robot Companion	549
<i>Brice Burger, Isabelle Ferrané, and Frédéric Lerasle</i>	
Author Index	559