Lecture Notes in Computer Science 3211

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

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
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
Aurélio Campilho  Mohamed Kamel (Eds.)

Image Analysis and Recognition

International Conference, ICIAR 2004
Porto, Portugal, September 29 - October 1, 2004
Proceedings, Part I
ICIAR 2004, the International Conference on Image Analysis and Recognition, was the first ICIAR conference, and was held in Porto, Portugal. ICIAR will be organized annually, and will alternate between Europe and North America. ICIAR 2005 will take place in Toronto, Ontario, Canada. The idea of offering these conferences came as a result of discussion between researchers in Portugal and Canada to encourage collaboration and exchange, mainly between these two countries, but also with the open participation of other countries, addressing recent advances in theory, methodology and applications.

The response to the call for papers for ICIAR 2004 was very positive. From 316 full papers submitted, 210 were accepted (97 oral presentations, and 113 posters). The review process was carried out by the Program Committee members and other reviewers; all are experts in various image analysis and recognition areas. Each paper was reviewed by at least two reviewing parties. The high quality of the papers in these proceedings is attributed first to the authors, and second to the quality of the reviews provided by the experts. We would like to thank the authors for responding to our call, and we wholeheartedly thank the reviewers for their excellent work in such a short amount of time. We are especially indebted to the Program Committee for their efforts that allowed us to set up this publication.

We were very pleased to be able to include in the conference, Prof. Murat Kunt from the Swiss Federal Institute of Technology, and Prof. Márcio Figueiredo, of the Instituto Superior Técnico, in Portugal. These two world-renowned experts were a great addition to the conference and we would like to express our sincere gratitude to each of them for accepting our invitations.

We would also like to thank Prof. Ana Maria Mendonça and Prof. Luís Cortereal for all their help in organizing this meeting; Khaled Hammouda, the webmaster of the conference, for maintaining the Web pages, interacting with authors and preparing the proceedings; and Gabriela Afonso, for her administrative assistance. We also appreciate the help of the editorial staff from Springer for supporting this publication in the LNCS series.

Finally, we were very pleased to welcome all the participants to this conference. For those who did not attend, we hope this publication provides a brief view into the research presented at the conference, and we look forward to meeting you at the next ICIAR conference, to be held in Toronto, 2005.

September 2004

Aurélio Campilho, Mohamed Kamel
ICIAR 2004 – International Conference on Image Analysis and Recognition

General Chair
Aurélio Campilho
University of Porto, Portugal
campilho@fe.up.pt

General Co-chair
Mohamed Kamel
University of Waterloo, Canada
mkamel@uwaterloo.ca

Local Chairs
Ana Maria Mendonça
University of Porto, Portugal
amendon@fe.up.pt

Luís Corte-Real
University of Porto, Portugal
lreal@inescporto.pt

Webmaster
Khaled Hammouda
University of Waterloo, Canada
hammouda@pami.uwaterloo.ca

Supported by
Department of Electrical and Computer Engineering, Faculty of Engineering, University of Porto, Portugal

INEB – Instituto de Engenharia Biomédica

Pattern Analysis and Machine Intelligence Group, University of Waterloo, Canada

**FCT Fundação para a Ciência e a Tecnologia**
MINISTÉRIO DA CIÊNCIA E DO ENSINO SUPERIOR
**Advisory and Program Committee**

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. Ahmadi</td>
<td>University of Windsor, Canada</td>
</tr>
<tr>
<td>M. Ahmed</td>
<td>Wilfrid Laurier University, Canada</td>
</tr>
<tr>
<td>A. Amin</td>
<td>University of New South Wales, Australia</td>
</tr>
<tr>
<td>O. Basir</td>
<td>University of Waterloo, Canada</td>
</tr>
<tr>
<td>J. Bioucas</td>
<td>Technical University of Lisbon, Portugal</td>
</tr>
<tr>
<td>M. Cheriet</td>
<td>University of Quebec, Canada</td>
</tr>
<tr>
<td>D. Clausi</td>
<td>University of Waterloo, Canada</td>
</tr>
<tr>
<td>L. Corte-Real</td>
<td>University of Porto, Portugal</td>
</tr>
<tr>
<td>M. El-Sakka</td>
<td>University of Western Ontario, Canada</td>
</tr>
<tr>
<td>P. Fieguth</td>
<td>University of Waterloo, Canada</td>
</tr>
<tr>
<td>M. Ferretti</td>
<td>University of Pavia, Italy</td>
</tr>
<tr>
<td>M. Figueiredo</td>
<td>Technical University of Lisbon, Portugal</td>
</tr>
<tr>
<td>A. Fred</td>
<td>Technical University of Lisbon, Portugal</td>
</tr>
<tr>
<td>L. Guan</td>
<td>Ryerson University, Canada</td>
</tr>
<tr>
<td>E. Hancock</td>
<td>University of York, UK</td>
</tr>
<tr>
<td>M. Kunt</td>
<td>Swiss Federal Institute of Technology, Switzerland</td>
</tr>
<tr>
<td>E. Jerningan</td>
<td>University of Waterloo, Canada</td>
</tr>
<tr>
<td>J. Marques</td>
<td>Technical University of Lisbon, Portugal</td>
</tr>
<tr>
<td>A. Mendonça</td>
<td>University of Porto, Portugal</td>
</tr>
<tr>
<td>A. Padilha</td>
<td>University of Porto, Portugal</td>
</tr>
<tr>
<td>F. Perales</td>
<td>University of the Balearic Islands, Spain</td>
</tr>
<tr>
<td>F. Pereira</td>
<td>Technical University of Lisbon, Portugal</td>
</tr>
<tr>
<td>A. Pinho</td>
<td>University of Aveiro, Portugal</td>
</tr>
<tr>
<td>N. Peres de la Blanca</td>
<td>University of Granada, Spain</td>
</tr>
<tr>
<td>P. Pina</td>
<td>Technical University of Lisbon, Portugal</td>
</tr>
<tr>
<td>F. Pla</td>
<td>University of Jaume I, Spain</td>
</tr>
<tr>
<td>K. Plataniotis</td>
<td>University of Toronto, Canada</td>
</tr>
<tr>
<td>T. Rabie</td>
<td>University of Toronto, Canada</td>
</tr>
<tr>
<td>P. Scheunders</td>
<td>University of Antwerp, Belgium</td>
</tr>
<tr>
<td>M. Sid-Ahmed</td>
<td>University of Windsor, Canada</td>
</tr>
<tr>
<td>W. Skarbek</td>
<td>Warsaw University of Technology, Poland</td>
</tr>
<tr>
<td>H. Tizhoosh</td>
<td>University of Waterloo, Canada</td>
</tr>
<tr>
<td>D. Vandermeulen</td>
<td>Catholic University of Leuven, Belgium</td>
</tr>
<tr>
<td>M. Vento</td>
<td>University of Salerno, Italy</td>
</tr>
<tr>
<td>R. Ward</td>
<td>University of British Columbia, Canada</td>
</tr>
<tr>
<td>D. Zhang</td>
<td>Hong Kong Polytechnic, Hong Kong</td>
</tr>
</tbody>
</table>
Reviewers

M. Abasolo  University of the Balearic Islands, Spain
A. Adegorite  University of Waterloo, Canada
N. Alajlan  University of Waterloo, Canada
H. Araújo  University of Coimbra, Portugal
B. Ávila  Universidade Federal de Pernambuco, Brazil
Z. Azimifar  University of Waterloo, Canada
O. Badawy  University of Waterloo, Canada
J. Batista  University of Coimbra, Portugal
A. Buchowicz  Warsaw University of Technology, Poland
J. Caeiro  Beja Polytechnical Institute, Portugal
L. Chen  University of Waterloo, Canada
G. Corkidi  National University of Mexico, Mexico
M. Correia  University of Porto, Portugal
J. Costeira  Technical University of Lisbon, Portugal
R. Dara  University of Waterloo, Canada
A. Dawoud  University of South Alabama, USA
H. du Buf  University of the Algarve, Portugal
I. El Rube  University of Waterloo, Canada
L. Guan  Ryerson University, Canada
M. Hidalgo  University of the Balearic Islands, Spain
J. Jiang  University of Waterloo, Canada
J. Jorge  Technical University of Lisbon, Portugal
A. Kong  University of Waterloo, Canada
M. Koprnicky  University of Waterloo, Canada
R. Lins  Universidade Federal de Pernambuco, Brazil
W. Mageed  University of Maryland, USA
B. Miners  University of Waterloo, Canada
A. Monteiro  University of Porto, Portugal
J. Orchard  University of Waterloo, Canada
M. Piedade  Technical University of Lisbon, Portugal
J. Pinto  Technical University of Lisbon, Portugal
M. Portells  University of the Balearic Islands, Spain
A. Puga  University of Porto, Portugal
W. Rakowski  Bialystok Technical University, Poland
B. Santos  University of Aveiro, Portugal
J. Santos-Victor  Technical University of Lisbon, Portugal
G. Schaefer  Nottingham Trent University, UK
J. Sequeira  Laboratoire LSIS (UMR CNRS 6168), France
J. Silva  University of Porto, Portugal
J. Sousa  Technical University of Lisbon, Portugal
L. Sousa  Technical University of Lisbon, Portugal
X. Varona  University of the Balearic Islands, Spain
E. Vrscay  University of Waterloo, Canada
S. Wesolkowski  University of Waterloo, Canada
L. Winger  LSI Logic Canada Corporation, Canada
Table of Contents – Part I

Image Segmentation

Automatic Image Segmentation Using a Deformable Model Based on Charged Particles ........................................... 1
     Andrei C. Jalba, Michael H.F. Wilkinson, Jos B.T.M. Roerdink

Hierarchical Regions for Image Segmentation ......................... 9
     Slawo Wesolkowski, Paul Fieguth

Efficiently Segmenting Images with Dominant Sets ................... 17
     Massimiliano Pavan, Marcello Pelillo

Color Image Segmentation Using Energy Minimization on a Quadtree Representation ........................................... 25
     Adolfo Martínez-Usó, Filiberto Pla, Pedro García-Sevilla

Segmentation Using Saturation Thresholding and Its Application in Content-Based Retrieval of Images ......................... 33
     A. Vadivel, M. Mohan, Shamik Sural, A.K. Majumdar

A New Approach to Unsupervised Image Segmentation Based on Wavelet-Domain Hidden Markov Tree Models .................. 41
     Qiang Sun, Shuiping Gou, Licheng Jiao

Spatial Discriminant Function with Minimum Error Rate for Image Segmentation ........................................... 49
     EunSang Bak

Detecting Foreground Components in Grey Level Images for Shift Invariant and Topology Preserving Pyramids .................. 57
     Giuliana Ramella, Gabriella Sanniti di Baja

Pulling, Pushing, and Grouping for Image Segmentation ............. 65
     Guoping Qiu, Kin-Man Lam

Image Segmentation by a Robust Clustering Algorithm Using Gaussian Estimator ........................................... 74
     Lei Wang, Hongbing Ji, Xinbo Gao

A Multistage Image Segmentation and Denoising Method – Based on the Mumford and Shah Variational Approach ................ 82
     Song Gao, Tien D. Bui
A Multiresolution Threshold Selection Method Based on Training  
*J.R. Martinez-de Dios, A. Ollero*

Segmentation Based Environment Modeling  
Using a Single Image  
*Seung Taek Ryoo*

Unsupervised Color-Texture Segmentation  
*Yuzhong Wang, Jie Yang, Yue Zhou*

**Image Processing and Analysis**

Hierarchical MCMC Sampling  
*Paul Fieguth*

Registration and Fusion of Blurred Images  
*Filip Sroubek, Jan Flusser*

A New Numerical Scheme for Anisotropic Diffusion  
*Hongwen Yi, Peter H. Gregson*

An Effective Detail Preserving Filter for Impulse Noise Removal  
*Naif Alajlan, Ed Jernigan*

A Quantum-Inspired Genetic Algorithm  
for Multi-source Affine Image Registration  
*Hichem Talbi, Mohamed Batouche, Amer Draa*

Nonparametric Impulsive Noise Removal  
*Bogdan Smolka, Rastislav Lukac*

BayesShrink Ridgelets for Image Denoising  
*Nezamoddin Nezamoddini-Kachowie, Paul Fieguth, Edward Jernigan*

Image Salt-Pepper Noise Elimination by Detecting Edges  
and Isolated Noise Points  
*Gang Li, Binheng Song*

Image De-noising via Overlapping Wavelet Atoms  
*V. Bruni, D. Vitulano*

Gradient Pile Up Algorithm for Edge Enhancement and Detection  
*Leticia Guimarães, André Soares, Viviane Cordeiro, Altamiro Susin*

Co-histogram and Image Degradation Evaluation  
*Pengwei Hao, Chao Zhang, Anrong Dang*
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAP Signal Reconstruction with Non Regular Grids</td>
<td>204</td>
</tr>
<tr>
<td>João M. Sanches, Jorge S. Marques</td>
<td></td>
</tr>
<tr>
<td>Comparative Frameworks for Directional Primitive Extraction</td>
<td>212</td>
</tr>
<tr>
<td>M. Penas, M.J. Carreira, M.G. Penedo, M. Mirmehdi, B.T. Thomas</td>
<td></td>
</tr>
<tr>
<td>Dynamic Content Adaptive Super-Resolution</td>
<td>220</td>
</tr>
<tr>
<td>Mei Chen</td>
<td></td>
</tr>
<tr>
<td>Efficient Classification Method for Autonomous Driving Application</td>
<td>228</td>
</tr>
<tr>
<td>Pangyu Jeong, Sergiu Nedevschi</td>
<td></td>
</tr>
</tbody>
</table>

**Image Analysis and Synthesis**

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameterized Hierarchical Annealing for Scientific Models</td>
<td>236</td>
</tr>
<tr>
<td>Simon K. Alexander, Paul Fieguth, Edward R. Vrscay</td>
<td></td>
</tr>
<tr>
<td>Significance Test for Feature Subset Selection on Image Recognition</td>
<td>244</td>
</tr>
<tr>
<td>Qianren Xu, M. Kamel, M.M.A. Salama</td>
<td></td>
</tr>
<tr>
<td>Image Recognition Applied to Robot Control Using Fuzzy Modeling</td>
<td>253</td>
</tr>
<tr>
<td>Paulo J. Sequeira Gonçalves, L.F. Mendonça, J.M.C. Sousa, J.R. Caldas Pinto</td>
<td></td>
</tr>
<tr>
<td>Large Display Interaction Using Video Avatar and Hand Gesture Recognition</td>
<td>261</td>
</tr>
<tr>
<td>Sang Chul Ahn, Tae-Seong Lee, Ig-Jae Kim, Yong-Moo Kwon, Hyoung-Gon Kim</td>
<td></td>
</tr>
</tbody>
</table>

**Image and Video Coding**

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal Transform in Perceptually Uniform Color Space and Its Application in Image Coding</td>
<td>269</td>
</tr>
<tr>
<td>Ying Chen, Pengwei Hao, Anrong Dang</td>
<td></td>
</tr>
<tr>
<td>Lossless Compression of Color-Quantized Images Using Block-Based Palette Reordering</td>
<td>277</td>
</tr>
<tr>
<td>António J.R. Neves, Armando J. Pinho</td>
<td></td>
</tr>
<tr>
<td>Fovea Based Coding for Video Streaming</td>
<td>285</td>
</tr>
<tr>
<td>Çağatay Dikici, H. İsil Bozma, Reha Civanlar</td>
<td></td>
</tr>
<tr>
<td>Influence of Task and Scene Content on Subjective Video Quality</td>
<td>295</td>
</tr>
<tr>
<td>Ying Zhong, Iain Richardson, Arash Sahraie, Peter McGeorge</td>
<td></td>
</tr>
<tr>
<td>Evaluation of Some Reordering Techniques for Image VQ Index Compression</td>
<td>302</td>
</tr>
<tr>
<td>António R.C. Paiva, Armando J. Pinho</td>
<td></td>
</tr>
</tbody>
</table>
Adaptive Methods for Motion Characterization and Segmentation of MPEG Compressed Frame Sequences ............................................... 310
  C. Doulaverakis, S. Vagionitis, M. Zervakis, E. Petrakis

On the Automatic Creation of Customized Video Content ............... 318
  José San Pedro, Nicolas Denis, Sergio Dominguez

Shape and Matching

Graph Pattern Spaces from Laplacian Spectral Polynomials .............. 327
  Bin Luo, Richard C. Wilson, Edwin R. Hancock

A Hierarchical Framework for Shape Recognition Using Articulated Shape Mixtures ......................................................... 335
  Abdullah Al Shafer, Edwin R. Hancock

A New Affine Invariant Fitting Algorithm for Algebraic Curves .......... 344
  Sait Sener, Mustafa Unel

Graph Matching Using Manifold Embedding .................................. 352
  Bai Xiao, Hang Yu, Edwin Hancock

A Matching Algorithm Based on Local Topologic Structure .............. 360
  Xinjian Chen, Jie Tian, Xin Yang

2-D Shape Matching Using Asymmetric Wavelet-Based Dissimilarity Measure ................................................................. 368
  Ibrahim El Rube', Mohamed Kamel, Maher Ahmed

A Real-Time Image Stabilization System Based on Fourier-Mellin Transform ................................................................. 376
  J.R. Martinez-de Dios, A. Ollero

A Novel Shape Descriptor Based on Interrelation Quadruplet .......... 384
  Dongil Han, Bum-Jae You, Sang-Rok Oh

An Efficient Representation of Hand Sketch Graphic Messages Using Recursive Bezier Curve Approximation ............................. 392
  Jaehwa Park, Young-Bin Kwon

Contour Description Through Set Operations on Dynamic Reference Shapes ................................................................. 400
  Miroslav Koprnicky, Maher Ahmed, Mohamed Kamel

An Algorithm for Efficient and Exhaustive Template Matching ........ 408
  Luigi Di Stefano, Stefano Matteoccia, Federico Tombari

Modelling of Overlapping Circular Objects Based on Level Set Approach ................................................................. 416
  Eva Dejnozkova, Petr Dokladal
### A Method for Dominant Points Detection and Matching 2D Object Identification

A. Carmona-Poyato, N.L. Fernández-García, R. Medina-Carnicer, F.J. Madrid-Cuevas

**Character Recognition Using Canonical Invariants**  
Sema Doguscu, Mustafa Unel

**Finding Significant Points for a Handwritten Classification Task**  
Juan Ramón Rico-Juan, Luisa Micó

**The System for Handwritten Symbol and Signature Recognition Using FPGA Computing**  
Rauf K. Sadykhov, Leonid P. Podenok, Vladimir A. Samokhval, Andrey A. Uvarov

**Reconstruction of Order Parameters Based on Immunity Clonal Strategy for Image Classification**  
Xiuli Ma, Licheng Jiao

**Visual Object Recognition Through One-Class Learning**  
QingHua Wang, Luís Seabra Lopes, David M.J. Tax

**Semantic Image Analysis Based on the Representation of the Spatial Relations Between Objects in Images**  
Hyunjang Kong, Miyoung Cho, Kwanho Jung, Sunkyoung Baek, Pankoo Kim

**Ridgelets Frame**  
Tan Shan, Licheng Jiao, Xiangchu Feng

**Adaptive Curved Feature Detection Based on Ridgelet**  
Kang Liu, Licheng Jiao

**Globally Stabilized 3L Curve Fitting**  
Turker Sahin, Mustafa Unel

**Learning an Information Theoretic Transform for Object Detection**  
Jianzhong Fang, Guoping Qiu

**Image Object Localization by AdaBoost Classifier**  
Władysław Skarbek, Krzysztof Kucharski

**Cost and Information-Driven Algorithm Selection for Vision Systems**  
Mauricio Marengoni, Allen Hanson, Shlomo Zilberstein, Edward Riseman
Gesture Recognition for Human-Robot Interaction
Through a Knowledge Based Software Platform......................... 530
   M. Hasanuzzaman, Tao Zhang, V. Ampornaramveth, M.A. Bhuiyan,
   Yoshiaki Shirai, H. Ueno

Appearance-Based Object Detection in Space-Variant Images:
A Multi-model Approach ........................................... 538
   V. Javier Traver, Alexandre Bernardino, Plinio Moreno,
   José Santos-Victor

3D Object Recognition from Appearance:
PCA Versus ICA Approaches ....................................... 547
   M. Asunción Vicente, Cesar Fernández, Oscar Reinoso, Luis Payá

A Stochastic Search Algorithm to Optimize an N-tuple Classifier
by Selecting Its Inputs ............................................. 556
   Hannan Bin Azhar, Keith Dimond

**Video Processing and Analysis**

A Multi-expert Approach for Shot Classification in News Videos .... 564
   M. De Santo, G. Percannella, C. Sansone, M. Vento

Motion-Compensated Wavelet Video Denoising ........................ 572
   Fu Jin, Paul Fieguth, Lowell Winger

Alpha-Stable Noise Reduction in Video Sequences .................... 580
   Mohammed El Hassouni, Hocine Cherifi

Automatic Text Extraction in Digital Video
Based on Motion Analysis ............................................. 588
   Duarte Palma, João Ascenso, Fernando Pereira

Fast Video Registration Method for Video Quality Assessment ...... 597
   Jihwan Choe, Chulhee Lee

Hidden Markov Model Based Events Detection in Soccer Video ....... 605
   Guoying Jin, Linmi Tao, Guangyou Xu

**3D Imaging**

Improving Height Recovery from a Single Image of a Face
Using Local Shape Indicators ....................................... 613
   Mario Castelán, Edwin R. Hancock

Recovery of Surface Height from Diffuse Polarisation ............... 621
   Gary Atkinson, Edwin Hancock
Vectorization-Free Reconstruction of 3D CAD Models from Paper Drawings .............................................. 629
  Frank Ditrich, Herbert Suesse, Klaus Voss

Plane Segmentation from Two Views in Reciprocal-Polar Image Space ......................................................... 638
  Zezhi Chen, Nick E. Pears, Bojian Liang, John McDermid

Tracking of Points in a Calibrated and Noisy Image Sequence ......... 647
  Domingo Mery, Felipe Ochoa, René Vidal

Multiresolution Approach to “Visual Pattern” Partitioning of 3D Images .......................................................... 655
  Raquel Dosil, Xosé R. Fdez-Vidal, Xosé M. Pardo

Visual Cortex Frontend: Integrating Lines, Edges, Keypoints, and Disparity ..................................................... 664
  João Rodrigues, J.M. Hans du Buf

Estimation of Directional and Ambient Illumination Parameters by Means of a Calibration Object ......................... 672
  Alberto Ortiz, Gabriel Oliver

Environment Authentication Through 3D Structural Analysis .......... 680
  Toby P. Breckon, Robert B. Fisher

Camera Calibration Using Two Concentric Circles .......................... 688
  Francisco Abad, Emilio Camahort, Roberto Vivó

Three-Dimensional Object Recognition Using a Modified Exoskeleton and Extended Hausdorff Distance Matching Algorithm .................. 697
  Rajalida Lipikorn, Akinobu Shimizu, Hidefumi Kobatake

Recognition of 3D Object from One Image Based on Projective and Permutative Invariants .................................... 705

Wide Baseline Stereo Matching by Corner-Edge-Regions ............. 713
  Jun Xie, Hung Tat Tsui

Gradient Based Dense Stereo Matching ........................................ 721
  Tomasz Twardowski, Bogusław Cyganek, Jan Borgosz

Image Retrieval and Indexing

Accelerating Multimedia Search by Visual Features .................. 729
  Grzegorz Galinski, Karol Wnukowicz, Władysław Skarbek

Semantic Browsing and Retrieval in Image Libraries .................. 737
  Andrea Kutics, Akihiko Nakagawa
Robust Shape Retrieval Using Maximum Likelihood Theory .......... 745
   Naif Alajlan, Paul Fieguth, Mohamed Kamel

A Novel Shape Feature for Image Classification and Retrieval .......... 753
   Rami Rautkorpi, Jukka Iivarinen

A Local Structure Matching Approach for Large Image Database Retrieval .......... 761
   Yanling Chi, Maylor K.H. Leung

People Action Recognition in Image Sequences Using a 3D Articulated Object .......... 769
   Jean-Charles Atine

CVPIC Compressed Domain Image Retrieval by Colour and Shape ...... 778
   Gerald Schaefer, Simon Lieutaud

Automating GIS Image Retrieval Based on MCM ................. 787
   Adel Hafiane, Bertrand Zavidovique

Significant Perceptual Regions by Active-Nets .................. 795
   David García-Pérez, Antonio Mosquera, Marcos Ortega,
   Manuel G. Penedo

Improving the Boosted Correlogram ......................... 803
   Nicholas R. Howe, Amanda Ricketson

Distance Map Retrieval .................................. 811
   László Czúni, Dezső Csordás, Gergely Császár

Grass Field Segmentation, the First Step Toward Player Tracking,
Deep Compression, and Content Based Football Image Retrieval ...... 818
   Kaveh Kangarloo, Ehsanollah Kabir

Spatio-temporal Primitive Extraction Using Hermite
and Laguerre Filters for Early Vision Video Indexing ............... 825
   Carlos Joel Rivero- Moreno, Stéphane Bres

Non-parametric Performance Comparison in Pictorial Query
by Content Systems ........................................ 833
   Sergio Domínguez

Morphology

Hierarchical Watersheds with Inter-pixel Boundaries ............... 840
   Luc Brun, Philippe Vautrot, Fernand Meyer

From Min Tree to Watershed Lake Tree: Theory and Implementation .... 848
   Xiaqiang Huang, Mark Fisher, Yanong Zhu
From Min Tree to Watershed Lake Tree: Evaluation 858
   Xiaoqiang Huang, Mark Fisher

Optimizing Texture Primitives Description
Based on Variography and Mathematical Morphology 866
   Assia Kourgli, Aichouche Belhadj-aissa, Lynda Bouchemakh

Author Index 875
Table of Contents – Part II

Biomedical Applications

An Automated Multichannel Procedure for cDNA Microarray Image Processing ........................................... 1
   Rastislav Lukac, Konstantinos N. Plataniotis, Bogdan Smolka, Anastasios N. Venetsanopoulos

A Modified Nearest Neighbor Method for Image Reconstruction in Fluorescence Microscopy ......................... 9
   Koji Yano, Itsuo Kumazawa

An Improved Clustering-Based Approach for DNA Microarray Image Segmentation ...................................... 17
   Luis Rueda, Li Qin

A Spatially Adaptive Filter Reducing Arc Stripe Noise for Sector Scan Medical Ultrasound Imaging .................. 25
   Qianren Xu, M. Kamel, M.M.A. Salama

Fuzzy-Snake Segmentation of Anatomical Structures Applied to CT Images .................................................. 33
   Gloria Bueno, Antonio Martínez-Albalá, Antonio Adán

Topological Active Volumes for Segmentation and Shape Reconstruction of Medical Images ......................... 43
   N. Barreira, M.G. Penedo

Region of Interest Based Prostate Tissue Characterization Using Least Square Support Vector Machine LS-SVM .......... 51
   S.S. Mohamed, M.M.A. Salama, M. Kamel, K. Rizkalla

Ribcage Boundary Delineation in Chest X-ray Images .................................................................................. 59
   Carlos Vinhais, Aurélio Campilho

A Level-Set Based Volumetric CT Segmentation Technique: A Case Study with Pulmonary Air Bubbles ............ 68
   José Silvestre Silva, Beatriz Sousa Santos, Augusto Silva, Joaquim Madeira

Robust Fitting of a Point Distribution Model of the Prostate Using Genetic Algorithms ............................... 76
   Fernando Arámbula Cosío
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Quantification Tool to Analyse Stained Cell Cultures</td>
<td>84</td>
</tr>
<tr>
<td>E. Glory, A. Faure, V. Meas-Yedid, F. Cloppet, Ch. Pinset, G. Stamon, J-Ch. Olivo-Marin</td>
<td></td>
</tr>
<tr>
<td>Dynamic Pedobarography Transitional Objects by Lagrange’s Equation with FEM, Modal Matching, and Optimization Techniques</td>
<td>92</td>
</tr>
<tr>
<td>Raquel Ramos Pinho, João Manuel, R.S. Tavares</td>
<td></td>
</tr>
<tr>
<td>3D Meshes Registration: Application to Statistical Skull Model</td>
<td>100</td>
</tr>
<tr>
<td>M. Berar, M. Desvignes, G. Bailly, Y. Payan</td>
<td></td>
</tr>
<tr>
<td>Detection of Rib Borders on X-ray Chest Radiographs</td>
<td>108</td>
</tr>
<tr>
<td>Rui Moreira, Ana Maria Mendonça, Aurélio Campilho</td>
<td></td>
</tr>
<tr>
<td>Isosurface-Based Level Set Framework for MRA Segmentation</td>
<td>116</td>
</tr>
<tr>
<td>Yongqiang Zhao, Minglu Li</td>
<td></td>
</tr>
<tr>
<td>Segmentation of the Comet Assay Images</td>
<td>124</td>
</tr>
<tr>
<td>Bogdan Smolka, Rastislav Lukac</td>
<td></td>
</tr>
<tr>
<td>Automatic Extraction of the Retina AV Index</td>
<td>132</td>
</tr>
<tr>
<td>I.G. Caderno, M.G. Penedo, C. Mariño, M.J. Carreira, F. Gomez-Ulla, F. González</td>
<td></td>
</tr>
<tr>
<td>Image Registration in Electron Microscopy. A Stochastic Optimization Approach</td>
<td>141</td>
</tr>
<tr>
<td>J.L. Redondo, P.M. Ortigosa, I. García, J.J. Fernández</td>
<td></td>
</tr>
<tr>
<td>Evolutionary Active Contours for Muscle Recognition</td>
<td>150</td>
</tr>
<tr>
<td>A. Caro, P.G. Rodríguez, M.L. Durán, J.A. Ávila, T. Antequera, R. Palacios</td>
<td></td>
</tr>
<tr>
<td>Automatic Lane and Band Detection in Images of Thin Layer Chromatography</td>
<td>158</td>
</tr>
<tr>
<td>António V. Sousa, Rui Agutar, Ana Maria Mendonça, Aurélio Campilho</td>
<td></td>
</tr>
<tr>
<td>Automatic Tracking of Arabidopsis thaliana Root Meristem in Confocal Microscopy</td>
<td>166</td>
</tr>
<tr>
<td>Bernardo Garcia, Ana Campilho, Ben Scheres, Aurélio Campilho</td>
<td></td>
</tr>
<tr>
<td>Document Processing</td>
<td></td>
</tr>
<tr>
<td>A New File Format for Decorative Tiles</td>
<td>175</td>
</tr>
<tr>
<td>Rafael Dueire Lins</td>
<td></td>
</tr>
<tr>
<td>Projection Profile Based Algorithm for Slant Removal</td>
<td>183</td>
</tr>
<tr>
<td>Moisés Pastor, Alejandro Toselli, Enrique Vidal</td>
<td></td>
</tr>
<tr>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Novel Adaptive Filtering for Salt-and-Pepper Noise Removal from Binary Document Images</td>
<td>191</td>
</tr>
<tr>
<td>Amr R. Abdel-Dayem, Ali K. Hamou, Mahmoud R. El-Sakka</td>
<td></td>
</tr>
<tr>
<td>Automated Seeded Region Growing Method for Document Image Binarization Based on Topographic Features</td>
<td>200</td>
</tr>
<tr>
<td>Yufei Sun, Yan Chen, Yuzhi Zhang, Yanxia Li</td>
<td></td>
</tr>
<tr>
<td>Image Segmentation of Historical Documents: Using a Quality Index</td>
<td>209</td>
</tr>
<tr>
<td>Carlos A.B. de Mello</td>
<td></td>
</tr>
<tr>
<td>A Complete System for Detection and Identification of Tabular Structures from Document Images</td>
<td>217</td>
</tr>
<tr>
<td>S. Mandal, S.P. Chowdhury, A.K. Das, Bhabatosh Chanda</td>
<td></td>
</tr>
<tr>
<td>Underline Removal on Old Documents</td>
<td>226</td>
</tr>
<tr>
<td>João R. Caldas Pinto, Pedro Pina, Lourenço Bandeira, Luís Pimentel, Mário Ramalho</td>
<td></td>
</tr>
<tr>
<td>A New Algorithm for Skew Detection in Images of Documents</td>
<td>234</td>
</tr>
<tr>
<td>Rafael Dueire Lins, Bruno Tenório Ávila</td>
<td></td>
</tr>
<tr>
<td>Blind Source Separation Techniques for Detecting Hidden Texts and Textures in Document Images</td>
<td>241</td>
</tr>
<tr>
<td>Anna Tonazzini, Emanuele Salerno, Matteo Mochi, Luigi Bedini</td>
<td></td>
</tr>
<tr>
<td>Efficient Removal of Noisy Borders from Monochromatic Documents</td>
<td>249</td>
</tr>
<tr>
<td>Bruno Tenório Ávila, Rafael Dueire Lins</td>
<td></td>
</tr>
<tr>
<td>Colour Analysis</td>
<td></td>
</tr>
<tr>
<td>Robust Dichromatic Colour Constancy</td>
<td>257</td>
</tr>
<tr>
<td>Gerald Schaefer</td>
<td></td>
</tr>
<tr>
<td>Soccer Field Detection in Video Images Using Color and Spatial Coherence</td>
<td>265</td>
</tr>
<tr>
<td>Arnaud Le Troter, Sebastien Mavromatis, Jean Sequeira</td>
<td></td>
</tr>
<tr>
<td>New Methods to Produce High Quality Color Anaglyphs for 3-D Visualization</td>
<td>273</td>
</tr>
<tr>
<td>Ianir Ideses, Leonid Yaroslavsky</td>
<td></td>
</tr>
<tr>
<td>A New Color Filter Array Interpolation Approach for Single-Sensor Imaging</td>
<td>281</td>
</tr>
<tr>
<td>Rastislav Lukac, Konstantinos N. Plataniotis, Bogdan Smolka</td>
<td></td>
</tr>
<tr>
<td>A Combinatorial Color Edge Detector</td>
<td>289</td>
</tr>
<tr>
<td>Soufiane Rital, Hocine Cherifi</td>
<td></td>
</tr>
</tbody>
</table>
## Texture Analysis

A Fast Probabilistic Bidirectional Texture Function Model .......................... 298  
*Michal Haindl, Jiří Filip*

Model-Based Texture Segmentation ......................................................... 306  
*Michal Haindl, Stanislav Mikeš*

A New Gabor Filter Based Kernel for Texture Classification with SVM .......... 314  
*Mahdi Sabri, Paul Fieguth*

Grading Textured Surfaces with Automated Soft Clustering in a Supervised SOM .............................................. 323  
*J. Martín-Herrero, M. Ferreiro-Armán, J.L. Alba-Castro*

Textures and Wavelet-Domain Joint Statistics ........................................ 331  
*Zohreh Azimifar, Paul Fieguth, Ed Jernigan*

Video Segmentation Through Multiscale Texture Analysis ......................... 339  
*Miguel Alemán-Flores, Luis Álvarez-León*

## Motion Analysis

Estimation of Common Groundplane Based on Co-motion Statistics ............. 347  
*Zoltan Szlavik, Laszlo Havasi, Tamas Sziranyi*

An Adaptive Estimation Method for Rigid Motion Parameters of 2D Curves ................................................................. 355  
*Turker Sahin, Mustafa Unel*

Classifiers Combination for Improved Motion Segmentation .................... 363  
*Ahmad Al-Mazeed, Mark Nixon, Steve Gunn*

A Pipelined Real-Time Optical Flow Algorithm .................................... 372  
*Miguel V. Correia, Aurélio Campilho*

De-interlacing Algorithm Based on Motion Objects ................................ 381  
*Junxia Gu, Xinbo Gao, Jie Li*

Automatic Selection of Training Samples for Multitemporal Image Classification .................................................. 389  
*T.B. Cazes, R.Q. Feitosa, G.L.A. Mota*

Parallel Computation of Optical Flow .................................................. 397  
*Antonio G. Dopico, Miguel V. Correia, Jorge A. Santos, Luis M. Nunes*

Lipreading Using Recurrent Neural Prediction Model ............................. 405  
*Takuya Tsunekawa, Kazuhiro Hotta, Haruhisa Takahashi*
## Table of Contents – Part II

### XXV

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-model Adaptive Estimation for Nonuniformity Correction of Infrared Image Sequences</td>
<td>413</td>
</tr>
<tr>
<td><em>Jorge E. Pezoa, Sergio N. Torres</em></td>
<td></td>
</tr>
<tr>
<td><strong>Surveillance and Remote Sensing</strong></td>
<td></td>
</tr>
<tr>
<td>A MRF Based Segmentation Approach to Classification Using Dempster Shafer Fusion for Multisensor Imagery</td>
<td>421</td>
</tr>
<tr>
<td><em>A. Sarkar, N. Banerjee, P. Nair, A. Banerjee, S. Brahma, B. Kartikeyan, K.L. Majumder</em></td>
<td></td>
</tr>
<tr>
<td>Regularized RBF Networks for Hyperspectral Data Classification</td>
<td>429</td>
</tr>
<tr>
<td>A Change-Detection Algorithm Enabling Intelligent Background Maintenance</td>
<td>437</td>
</tr>
<tr>
<td><em>Luigi Di Stefano, Stefano Mattoccia, Martino Mola</em></td>
<td></td>
</tr>
<tr>
<td>Dimension Reduction and Pre-emphasis for Compression of Hyperspectral Images</td>
<td>446</td>
</tr>
<tr>
<td><em>C. Lee, E. Choi, J. Choe, T. Jeong</em></td>
<td></td>
</tr>
<tr>
<td>Viewpoint Independent Detection of Vehicle Trajectories and Lane Geometry from Uncalibrated Traffic Surveillance Cameras</td>
<td>454</td>
</tr>
<tr>
<td><em>José Melo, Andrew Naftel, Alexandre Bernardino, José Santos-Victor</em></td>
<td></td>
</tr>
<tr>
<td>Robust Tracking and Object Classification Towards Automated Video Surveillance</td>
<td>463</td>
</tr>
<tr>
<td><em>Jose-Luis Landabaso, Li-Qun Xu, Montse Pardas</em></td>
<td></td>
</tr>
<tr>
<td>Detection of Vehicles in a Motorway Environment by Means of Telemetric and Visual Data</td>
<td>471</td>
</tr>
<tr>
<td><em>Sonia Izri, Eric Brassart, Laurent Delahoche, Bruno Marhic, Arnaud Clérentin</em></td>
<td></td>
</tr>
<tr>
<td>High Quality-Speed Dilemma: A Comparison Between Segmentation Methods for Traffic Monitoring Applications</td>
<td>481</td>
</tr>
<tr>
<td><em>Alessandro Bevilacqua, Luigi Di Stefano, Alessandro Lanza</em></td>
<td></td>
</tr>
<tr>
<td>Automatic Recognition of Impact Craters on the Surface of Mars</td>
<td>489</td>
</tr>
<tr>
<td><em>Teresa Barata, E. Ivo Alves, José Saraiva, Pedro Pina</em></td>
<td></td>
</tr>
<tr>
<td>Classification of Dune Vegetation from Remotely Sensed Hyperspectral Images</td>
<td>497</td>
</tr>
<tr>
<td><em>Steve De Backer, Pieter Kempeneers, Walter Debruyne, Paul Scheunders</em></td>
<td></td>
</tr>
</tbody>
</table>
XXVI  Table of Contents – Part II

SAR Image Classification Based on Immune Clonal Feature Selection  .  504
Xiangrong Zhang, Tan Shan, Licheng Jiao

Depth Extraction System Using Stereo Pairs  .  512
Rizwan Ghaffar, Noman Jafri, Shoab Ahmed Khan

Fast Moving Region Detection Scheme in Ad Hoc Sensor Network  .  520
Yazhou Liu, Wen Gao, Hongxun Yao, Shaohui Liu, Lijun Wang

Tracking

LOD Canny Edge Based Boundary Edge Selection for Human Body Tracking  .  528
Jihun Park, Tae-Yong Kim, Sunghun Park

Object Boundary Edge Selection for Accurate Contour Tracking Using Multi-level Canny Edges  .  536
Tae-Yong Kim, Jihun Park, Seong-Whan Lee

Reliable Dual-Band Based Contour Detection: A Double Dynamic Programming Approach  .  544
Mohammad Dawood, Xiaoyi Jiang, Klaus P. Schäfers

Tracking Pedestrians Under Occlusion Using Multiple Cameras  .  552
Jorge P. Batista

Application of Radon Transform to Lane Boundaries Tracking  .  563
R. Nourine, M. Elarbi Boudihir, S.F. Khelifi

A Speaker Tracking Algorithm Based on Audio and Visual Information Fusion Using Particle Filter  .  572
Xin Li, Luo Sun, Linmi Tao, Guangyou Xu, Ying Jia

Kernel-Bandwidth Adaptation for Tracking Object Changing in Size  .  581
Ning-Song Peng, Jie Yang, Jia-Xin Chen

Tracking Algorithms Evaluation in Feature Points Image Sequences  .  589
Vanessa Robles, Enrique Alegre, Jose M. Sebastian

Short-Term Memory-Based Object Tracking  .  597
Hang-Bong Kang, Sang-Hyun Cho

Real Time Multiple Object Tracking Based on Active Contours  .  606
Sébastien Lefèvre, Nicole Vincent

An Object Tracking Algorithm Combining Different Cost Functions  .  614
D. Conte, P. Foggia, C. Guidobaldi, A. Limongiello, M. Vento
Vehicle Tracking at Traffic Scene with Modified RLS .......................... 623
   Hadi Sadoghi Yazdi, Mahmood Fathy, A. Mojtaba Lotfizad

**Face Detection and Recognition**

Understanding In-Plane Face Rotations Using Integral Projections ....... 633
   Henry Nicponski

Feature Fusion Based Face Recognition Using EFM ............................ 643
   Dake Zhou, Xin Yang

Real-Time Facial Feature Extraction
by Cascaded Parameter Prediction and Image Optimization .............. 651
   Fei Zuo, Peter H.N. de With

Frontal Face Authentication Through Creaseness-Driven Gabor Jets ...... 660
   Daniel González-Jiménez, José Luis Alba-Castro

A Coarse-to-Fine Classification Scheme
for Facial Expression Recognition .............................................. 668
   Xiaoyi Feng, Abdenour Hadid, Matti Pietikäinen

Fast Face Detection Using QuadTree Based Color Analysis
and Support Vector Verification................................................. 676
   Shu-Fai Wong, Kwan-Yee Kenneth Wong

Three-Dimensional Face Recognition: A Fishersurface Approach ...... 684
   Thomas Heseltine, Nick Pears, Jim Austin

Face Recognition Using Improved-LDA ........................................ 692
   Dake Zhou, Xin Yang

Analysis and Recognition of Facial Expression Based
on Point-Wise Motion Energy ..................................................... 700
   Hanhoon Park, Jong-Il Park

Face Class Modeling Using Mixture of SVMs ................................. 709
   Julien Meynet, Vlad Popovici, Jean-Philippe Thiran

Comparing Robustness of Two-Dimensional PCA and Eigenfaces
for Face Recognition ................................................................. 717
   Muriel Visani, Christophe Garcia, Christophe Laurent

Useful Computer Vision Techniques for Human-Robot Interaction ...... 725
   O. Deniz, A. Falcon, J. Mendez, M. Castrillon

Face Recognition with Generalized Entropy Measurements .............. 733
   Yang Li, Edwin R. Hancock
Facial Feature Extraction and Principal Component Analysis for Face Detection in Color Images ........................................ 741
Saman Cooray, Noel O’Connor

Security Systems

Fingerprint Enhancement Using Circular Gabor Filter ..................... 750
En Zhu, Jianping Yin, Guomin Zhang

A Secure and Localizing Watermarking Technique for Image Authentication ................................................................. 759
Abdelkader H. Ouda, Mahmoud R. El-Sakka

A Hardware Implementation of Fingerprint Verification for Secure Biometric Authentication Systems .............................. 770
Yongwha Chung, Daesung Moon, Sung Bum Pan, Min Kim, Kichul Kim

Inter-frame Differential Energy Video Watermarking Algorithm Based on Compressed Domain .............................................. 778
Lijun Wang, Hongxun Yao, Shaohui Liu, Wen Gao, Yazhou Liu

Improving DTW for Online Handwritten Signature Verification ........ 786
M. Wirotius, J.Y. Ramel, N. Vincent

Distribution of Watermark According to Image Complexity for Higher Stability ............................................................ 794
Mansour Jamzad, Farzin Yaghmaee

Visual Inspection

Comparison of Intelligent Classification Techniques Applied to Marble Classification ................................................................. 802
João M.C. Sousa, João R. Caldas Pinto

Inspecting Colour Tonality on Textured Surfaces ................................ 810
Xianghua Xie, Majid Mirmehdi, Barry Thomas

Automated Visual Inspection of Glass Bottles Using Adapted Median Filtering ............................................................... 818
Domingo Mery, Olaya Medina

Neuro-Fuzzy Method for Automated Defect Detection in Aluminium Castings ................................................................. 826
Sergio Hernández, Doris Sáez, Domingo Mery

Online Sauter Diameter Measurement of Air Bubbles and Oil Drops in Stirred Bioreactors by Using Hough Transform ............. 834
L. Vega-Alvarado, M.S. Cordova, B. Taboada, E. Galindo, G. Corkidi
Defect Detection in Textile Images Using Gabor Filters ................. 841
Céu L. Beirão, Mário A.T. Figueiredo

Geometric Surface Inspection of Raw Milled Steel Blocks.............. 849
Ingo Reindl, Paul O’Leary

Author Index .............................................................. 857