Proceedings Fourth Indian Conference on Computer Vision, Graphics & Image Processing

ICVGIP 2004

December 16-18, 2004

Editors

B. Chanda S. Chandran L. Davis

Indian Statistical Institute & Indian Unit for Pattern Recognition and Artificial Intelligence

Kolkata



Allied Publishers Private Limited New Delhi • Mumbai • Kolkata • Chennai • Nagpur Ahmedabad • Bangalore • Hyderabad • Lucknow

Preface

It is a great pleasure to welcome you all --- in the fourth year of this century -- to the Fourth Indian Conference on Computer Vision, Graphics, and Imaging Processing (ICVGIP2004) to be held on 16-18 December. The objective of the conference is to act as a forum to exchange ideas and to bring together researchers in the academic institutions and R&D laboratories working in the related fields. It is being organized every two years since 1995 by premier academic institutions and research and development laboratories in India. The first ICVGIP was in the nations capital in New Delhi, the second in the south in Bangalore, the third towards the west in Ahmedabad, and now we are in one of the most spectacular cities in the east, Kolkata.

ICVGIP has grown over the years with about 304 submissions this year. We had submissions from 23 countries. This would not have been possible without your enthusiasm and support. We could accept only 120 papers based on the single-track format of ICVGIP. Some good papers, no doubt, could not be accommodated. The decision to go with the 24 oral papers was based on a number of factors, not just quality. Each paper was assigned to about 4 reviewers out of a total of 100 reviewers. The average number of reviews per paper (based on actual received reviews) was about 2.95. (In some unusual cases, there were only singleton reviews; although the program co-chairs looked at these carefully we agree that a reviewing process cannot satisfy all.) We sincerely thank all the reviewers.

In addition to the contributed papers, ICVGIP2004 will -- carrying on the tradition -- have excellent plenary talks from famed international researchers. We are glad that Henry Baird of Lehigh University, Peter J. Burt of Sarnoff Corporation, Brian Curless of University of Washington, Parth P. Das of Interra Systems and Ken Nakayama of Harvard University have kindly agreed to deliver plenary talks this year. We are grateful to P. Anandan for arranging this set of excellent plenary sessions. A tutorial session has also been organized. Thanks to the untiring efforts of Sankar K. Pal and we are indebted to him.

There are many people to be thanked in making ICVGIP2004 happen. Beyond the contributing authors, we thank the program committee members for their excellent support. Malay K. Kundu (the organizing committee chair) and his team have been fantastic in their efforts. The steering committee members and the General Cochairs have provided the necessary vision and guidance and we thank them profusely. We take this opportunity to record our appreciation to the many student volunteers of the Department of Computer Science & Engineering, IIT Bombay and ISI Calcutta. Sponsorship support of the various organizations is also duly acknowledged. It would have been impossible to complete the editorial task of this proceedings without active help from Dilip Kumar Gayen and Partha Pratim Mohanta.

We hope that ICVGIP04 will be an exciting technical meeting.

Bhabatosh Chanda Sharat Chandran Larry S. Davis (Programme Co-Chairs)

Committee

General Co-Chairs

D Dutta Majumder Indian Statistical Institute, Kolkata, India O Faugeras INRIA, Sophia Antipolis, France

Programme Co-Chairs

B Chanda Indian Statistical Institute, Kolkata, India S Chandran Indian Institute of Technology, Bombay, India L S Davis Univ. of Maryland, Maryland, USA

Advisory Chair

K B Sinha Indian Statistical Institute, Kolkata, India

Organizing Chair M K Kundu Indian Statistical Institute, Kolkata, India

Tutorial Chair

S K Pal Indian Statistical Institute, Kolkata, India

Fellowship Co-chairs

B B Bhattacharya Indian Statistical Institute, Kolkata, India P K Nandy Bengal Engineering College, Sibpore, India

Plenary Chair P Anandan *Microsoft Research, USA*

Industry Forum and Liaison Co-Chairs A Bagchi

Indian Statistical Institute, Kolkata, India B K Roy Indian Statistical Institute, Kolkata, India

Advisory Committee

M G K Menon (ISI) R A Mashelkar (CSIR) V S Ramamurthy (DST, GoI) M Nair (DOS, GoI) Om Vikas (MIT, GoI) A K. Chakravarti (MIT, GoI) R Narayana Murthy (INFOSYS) N Sitaram (CAIR) V K Aatre (DRDO) R Kasturi (Univ. South Florida) R M Haralick (CUNY) B L Deekshatulu (Univ. of Hyderabad) B Yegnanarayana (IIT Madras) B N Chatterjee (IIT Kharagpur) K K Biswas (IIT Delhi) Y V Venkatesh (IISc Bangalore) L M Patnaik (IISc Bangalore) B B Chaudhuri (ISI Kolkata)

Program Committee

Subhashis Banerjee (IIT Delhi) Santanu Chaudhury (IIT Delhi) Prem K Kalra (IIT Delhi) Subhasis Choudhury (IIT Bombay) Ajay K Ray (IIT Kharagpur) A N Rajagopalan (IIT Madras) Phalguni Gupta (IIT Kanpur) C V Jawahar (IIIT Hyderabad) P J Narayanan (IIIT Hyderabad) K R Ramakrishnan (IISc Bangalore) B Kartikeyan (SAC Ahmedabad) Arun Pujari (Univ. of Hyderabad) C A Murthy (ISI Kolkata) M K Kundu (ISI Kolkata) B B Bhattacharya (ISI Kolkata) D P Mukherjee (ISI Kolkata) Umapada Pal (ISI Kolkata) S Bandopadhyay (Univ. Calcutta)

J K Aggarwal (Univ. Texas) P Anandan (Microsoft Research) Amitabh Varshney (Univ. of Maryland) Subodh Kumar (John Hopkins Inst) Steve Seitz (Univ of Washington) Visvanathan Ramesh (Siemens Research) R Chellappa (Univ. of Maryland) J Udupa (Univ. of Pennsylavania) Amarnath Gupta (USC) R Nevatia (USC) N Ahuja (UIUC/IIIT Hyderabad) H Niemann (Univ. of Erlangen) Andrew Zisserman (Oxford Univ.) Gabriella Sannti de Baja (Inst.di Cib.) Murat Kunt (SFIT, Lausanne) Scott Acton (Univ. of Virginia) Vito de Gesu (Univ. of Palermo, Italy) Witold Pedrycz (Univ. of Alberta)

Organizing Committee

D P Mukherjee (ISI), Convener P Pal (ISI Kolkata) D P Mandal (ISI Kolkata) A Ghosh (ISI Kolkata) M Mitra (ISI Kolkata) A Pal (ISI Kolkata) U Pal (ISI Kolkata) S Mitra (ISI Kolkata) B Uma Shankar (ISI Kolkata) R K De (ISI Kolkata) S Choudhury (ISI Kolkata) B C Dhara (Jadavpur Univ.) P K Das (Jadavpur Univ.) S K Saha (Jadavpur Univ.) S Bandopadhyay (WBUT) A Dutta (Univ. Calcutta) D Sarkar (BARC Kolkata) A Das (B E College) S P Maity (B E College)

Industry Forum and Liaison Committee

A V Rao (DST, GoI) J S Sehra (MIT, GoI) M Saxena (Siemens) N Gupta (Adobe India) A Mukherjee (TCS) B Bhattacharya (HP India) D Moitra (INFOSYS) P Ghosh (GE India)

Additional Reviewers

Abhiram Ranade Amitabha Mukherjee Anil K Jain Arun Kumar Ashis Ghosh Bidyut B Chaudhuri B N Chatterji B K Mohan **Bimal Roy** Debashis Ghosh David Doerbam Jayanta Mukherjee Kasturi Rangchar Margrit Betke Nikhil Pal Pinakpani Pal Preeti Rao R Balasubramannian R S Jadon Rajat De

Rajeev Kumar Ramani Duraiswami **Richard Hartley** S N Merchant Sanghamitra Bandopadhyay Sharat Pankanti Shree Navar Shyamali Mukherjee Suchi Bhandarkar Sudeep Sarkar Sumantra Dutta Roy Sukhendu Das Sushmita Mitra Sven Dickinson Uday Desai Venkatesh Kamat Venu Govindan Vikram Gadre B Yegnanarayana

Sponsors

Adobe Systems India Pvt. Ltd. Association of Computing Machinery British Council, Kolkata CMC Limited Council of Industrial and Scientific Research (CSIR), GoI Defence Research and Development Organization (DRDO), GoI Dept. of Information and Technology (DIT), GoI Hewlett-Packard (HP) India Pvt. Ltd. Microsoft Research Siemens Information Systems Ltd. Sun Microsystems Tata Consultancy Services Ltd. The International Association for Pattern Recognition

Contents

Preface Committee Reviewers	iii v vi
Plenary	
Perception and Recognition of Faces - Human Capacities of Possible Relevance for Artificial Systems <i>Ken Nakayama</i> , Harvard University, USA	3
Document Image Understanding and Digital Libraries Henry S. Baird, Lehigh University, USA	4
Real Time, Real World, Distributed Vision Peter J. Burt, Sarnoff Corporation, USA	5
The Space of Human Shapes Brian Curless, University of Washington, USA	6
Oral Session: Computer Vision	
Geometric Structure Computation from Conics Pawan Kumar Mudigonda, C. V. Jawahar and P. J. Narayanan	9
A Framework for Activity Recognition and Detection of Unusual Activities Dhruv Mahajan, Nipun Kwatra, Sumit Jain, Prem Kalra and Subhashis Banerjee	15
Activity Representation Using 3D Shape Models Amit K. Roy-Chowdhury, Rama Chellappa and Umut Akdemir	22
High-Resolution Multiscale Panoramic Mosaics from Pan-Tilt-Zoom Cameras Sudipta N. Sinha, Marc Pollefeys and Seon Joo Kim	28
Poster Session: Computer Vision - I	
Spatio-Temporal Grouping Models and Prominence Models in Perceptual Organization for Semantic Interpretation of Video Shot <i>Gaurav Harit and Santanu Chaudhury</i>	34
Active 3-D Object Recognition Using Appearance-Based Aspect Graphs Sumantra Dutta Roy and Nirupama Kulkarni	40

A Robust and Computationally Efficient Motion Detection Algorithm Based on $\Sigma-\Delta$ Background Estimation <i>A. Manzanera and J. C. Richefeu</i>	46
Handling Occlusions in Monocular Surveillance Systems Prithwijit Guha, Nisarg Vyas, Amitabha Mukerjee and K. S. Venkatesh	52
Estimating 3D Hand Position and Orientation Using Stereo Afshin Sepehri, Yaser Yacoob and Larry S. Davis	58
Modeling Signs Using Functional Data Analysis Sunita Nayak, Sudeep Sarkar and Kuntal Sengupta	64
IRIS Recognition Method Using Random Texture Analysis Ali Ajdari Rad, Reza Safabakhsh and Navid Qaragozlou	70
Mathematical Morphology Based Corner Detection Scheme: A Non-Parametric approach R. Dinesh and D. S. Guru	76

Poster Session: Computer Graphics - I

A proposed Glass-Painting Filter Priti Sehgal and P. S. Grover	82
Encoding Quadrilateral Meshes in 2.40 bits per Vertex Pawel Kosicki and Asish Mukhopadhyay	89
Stylistic Reuse of View-Dependent Animations Parag Chaudhuri, Ashwani Jindal, Prem Kalra and Subhashis Banerjee	95
MoCap Based New Walk and Climb Synthesis Shrinath Shanbhag and Sharat Chandran	101
Animation of Lip Motions and Facial Expressions using 3D Homeomorphic Models Erdem Akagunduz and Ugur Halici	107
Depth+Texture Representation for Image Based Rendering P. J. Narayanan, Sashi Kumar P and Sireesh Reddy K	113
The Fast Multipole Method for Global Illumination Alap Karapurkar, Nitin Goel and Sharat Chandran	119
Markerless Motion Capture from Monocular Videos Vishal Mamania, Appu Shaji and Sharat Chandran	126

Oral Session: Image Processing

Use of Linear Diffusion in Depth Estimation Based on Defocus Cue Vinay P. Namboodiri and Subhasis Chaudhuri	133
PCA Based Generalized Interpolation for Image Super-Resolution C. V. Jiji and Subhasis Chaudhuri	139
Design of A Robust Spread Spectrum Image Watermarking Scheme Santi P. Maity, Malay K. Kundu and Tirtha S. Das	145
Multi Example Based Image Retrieval: An ICA Based Approach Jayanta Basak, Koustav Bhattacharya and Santanu Chaudhury	151
Learning Layered Pictorial Structures from Video M. Pawan Kumar, P. H. S. Torr and A. Zisserman	158
Robust Segmentation of Unconstrained Online Handwritten Documents Anoop M. Namboodiri and Anil K. Jain	165
Poster Session: Computer Vision - II	
Fitting Coupled Geometric Objects for Metric Vision Paul O'Leary, Matthew Harker and Paul Zsombor-Murray	171
Efficient Identification Based on Human Iris Patterns A. Chitra and R. Bremananth	177
Multiple Model Based Point Targets Tracking Using Particle Filtering in InfraRed Image Sequence Mukesh A. Zaveri, S. N. Merchant and Uday B. Desai	184
Study on Ultrasound Kidney Images Using Principal Component Analysis: A Preliminary Result <i>C. Karthikeyini, K. Bommanna Raja and M. Madheswaran</i>	190
Bidimensional Motion Charge Map for Stereovision Disparity Analysis Jos'e M. L'opez-Valles and Miguel A. Fern'andez	196
Estimation of Depth Information from a Single View in an Image <i>S. Murali and N. Avinash</i>	202
Object Identification and Colour Recognition for Human Blind R. Nagarajan, G. Sainarayanan, Sazali Yaacob and Rosalyn R. Porle	210
Partial Shape Retrieval by M-tree and a Bayesian Approach Said Mahmoudi and Mohamed Daoudi	216

Statistical Object Recognition for Multi-Object Scenes with Heterogeneous Background	222
Marcin Grzegorzek, Kailash N. Pasumarthy, Michael Reinhold and Heinrich Niemann	
Moving Object Segmentation in Video Using Stationary Wavelet Transform Debashis Sen, Ajit Singh Sandhu and Harun Prasad Paramasivam	228
Object Discrimination Using Stereo Vision for Blind through Stereo Sonification G. Balakrishnan, G. Sainarayanan, R. Nagarajan and Sazali Yaacob	234
Probabilistic Measures for Motion Segmentation Venu Madhav Govindu	240
Recognition of Partially Occluded Objects Using B-tree Index Structure: An Efficient and Robust Approach <i>R. Dinesh and D.S. Guru</i>	246
Hough Transform for Region Extraction in Color Images Sarif Kumar Naik and C. A. Murthy	252
3D Reconstruction of Retinal Blood Vessels from Two Views Martinez-Perez M. E. and Espinosa-Romero A.	258
A New Morphological 3D Shape Decomposition: Grayscale Interframe Interpolation Method D. N. Vizireanu and R. M. Udrea	264
EMoTracker: Eyes and Mouth Tracker Based on Energy Minimization Criterion Shahrel A Suandi, Shuichi Enokida and Toshiaki Ejima	269
On Learning Shapes from Shades Subhajit Sanyal, Mayank Bansal, Subhashis Banerjee and Prem Kalra	275
Oral Session: Computer Graphics	
View Synthesis of Scenes with Man-Made Objects Using Uncalibrated Cameras Geetika Sharma, Santanu Chaudhury and J. B. Srivastava	283
Multi-Dimensional Transfer Function Design for Scientific Visualization Sangmin Park and Chandrajit Bajaj	290
Design of A Geometry Streaming System Soumyajit Deb and P. J. Narayanan	296
Efficient Light Field Based Camera Walk Aviral Pandey, Biswarup Choudhury and Sharat Chandran	302

Poster Session: Image Processing - I

Content Based Image Retrieval in Presence of Foreground Disturbances Rajashekhar and Subhasis Chaudhuri	308
Skew Estimation in Digitised Documents: A novel Approach D. S. Guru, P. Punitha and S. Mahesh	314
False Color Suppression in Demosaiced Color Images Jayanta Mukherje, Manfred K. Lan and S.K.Mitra	320
Algorithms and Hardware Implementation of Real Time Automatic Gain Control Feature for Thermal Imager <i>Himanshu Singh, Ajay Kumar and S. S. Negi</i>	326
Content Based Retrieval of Emotions in Face Images J. Nileema, Priti Chandra, C. Bhagvati, Arun K. Pujari and B. L. Deekshatulu	332
Multillevel Approach for Color Image Segmentation Kanchan Deshmukh, Abhijeet Nandedkar, Yeshwant Joshi and Ganesh Shinde	338
Diagnostic Analysis Using Textural Features of the Lachrymal Fluid Crystals Images N.Yu. Ilyasova, A.V. Kupriyanov, A.M. Malapheev and A.G. Khramov	343
Contrast Enhancement of Electron Magnetic Resonance Images Using Linear and Non Linear Unsharp Masking Techniques <i>P. Alli, Murali C. Krishna and R. Murugesan</i>	348
Evaluation of Algebraic Iterative Algorithms for Reconstruction of Electron Magnetic Resonance Images S. Sivakumar, Murali C. Krishna and R. Murugesan	353
A New Algorithm for Image Reconstruction for Positron Emission Tomography Partha P. Mondal and K. Rajan	359
Wavelet Packet Based Digital Image Watermarking A. Adhipathi Reddy and B. N. Chatterji	364
Unsupervised Segmentation of Texture Images Using A Combination of Gabor and Wavelet Features Shivani G. Rao, Manika Puri and Sukhendu Das	370
Watermarking Scheme for Blind Quality Assessment in Multimedia Mobile Communication Services Santi P. Maity, Malay K. Kundu and Prasanta K. Nandi	376

Facial Model Improvement Using 3D Texture Mapping Feedback Yongjie Liu, Anup Basu and Jong-Seong Kim	382
Region of Interest Based Coding of 2-D and 3-D Magnetic Resonance Images <i>R. Srikanth and A. G. Ramakrishnan</i>	388
Fractal Based Image Segmentation Tushar Londhe, Asim Banerjee and Suman K. Mitra	394
Content Based Image Retrieval with Multiresolution Salient Points Minakshi Banerjee and Malay. K. Kundu	399
Image Retrieval Using Relevance Feedback Based on Mann-Whitney Test Sanjoy K. Saha, Amit K. Das and Bhabatosh Chanda	405
Poster Session: Image Processing - II	
A Very Efficient Table Detection System from Document Images S. Mandal, S. P. Chowdhury, A. K. Das and Bhabatosh Chanda	411
Similarity Retrieval of Symbolic Images with Multiple Instances of Iconic Objects: A Novel Approach <i>P. Punitha and D. S. Guru</i>	417
Recognition of Unconstrained Malayalam Handwritten Numeral U. Pal, S. Kundu, Y. Ali, H. Islam and N. Tripathy	423
Video Summarization: A Machine Learning Based Approach Koustav Bhattacharya, Santanu Chaudhury and Jayanta Basak	429
A Color-texture Histogram from the HSV Color Space for Video Shot Detection. A. Vadivel, M. Mohan, Shamik Sural and A. K. Majumdar	435
Some New Similarity Measures for Histograms Dietrich Van der Weken, Mike Nachtegael and Etienne Kerre	441
Improved Cut-Based Foreground Identification Sharat Chandran, Satwik Hebbar, Vishal Mamania and Abhineet Sawa	447
A Perceptual No-Reference Blockiness Metric for JPEG Images R. Venkatesh Babu, Ajit S. Bopardikar and Andrew Perkis	455
Face Recognition Using Legendre Moments S. Annadurai and A. Saradha	461
Recognition of Non-symmetric Faces Using Princlipal Component Analysis N. Krishnan, G. Raja Jothi and G. Lakhs Aaron	467

G-Images: Towards Multilevel Unsupervised Image Segmentation Harbir Singh and Reyer Zwiggelaar	473
Cursive Word Recognition Using a Novel Feature Extraction Method and a Neural Network	479
José Ruiz-Pinales and René Jaime-Rivas	
Lung Disease Detection Using Frequency Spectrum Analysis Ching Ming Jimmy Wang, Mamatha Rudrapatna and Arcot Sowmya	485
A Comparative Study on Discrete Orthonormal Chebyshev Moments and Legendre Moments for Representation of Printed Characters Sarat Saharia, Prabin K. Bora and Dilip K. Saikia	491
Emotion Recognition from Facial Expressions: A Target Oriented Approach Using Neural Network	497
Sreevatsan A N, Sathish Kumar K G, Rakeshsharma S and Mohd. Mansoor Roomi	
Local Correlation-based Fingerprint Matching Karthik Nandakumar and Anil K. Jain	503
CODE: An Adaptive Algorithm for Detecting Corners and Directions of Incident Edges	509
Partha Bhowmick and Bhargab B. Bhattacharya	
Transcoding of Document Images for Mobile Devices Tabassum Yasmin, Santanu Chaudhury and Richa Jain	516
Oral Session: Image Segmentation	
Information Content Driven Unsupervised Top-Down Image Segmentation Emanuel Diamant	522
An Unsupervised Boosting Learning Algorithm for Finite Mixture Model-based Image Segmentation	528
Yu lin-Sen and Zhang Tian-Wen	
A Novel Merging Method in Watershed Segmentation Maria Frucci	532
Quantitative Comparison of Automatic ICV Segmentation Methods Using 3T MR Images	538
Suja S. and Rakesh Mullick	

Poster Session: Image Processing - III

Sports Video Characterization Using Scene Dynamics	545
R. S. Jadon, Santanu Chaudhury and K. K. Biswas	

Line Segmentation and Analysis with Special Interest to the Duct of a Line Carola Schonlieb and Kung Chieh Wang	550
CONFERM: Connectivity Features with Randomized Masks and Their Applications to Image Indexing <i>Arindam Biswas, Partha Bhowmick and Bhargab B.Bhattacharya</i>	556
A Modified BTC Using Quincunx Subsampling and Pattern Fitting for Very Low bpp Bibhas Chandra Dhara and Bhabatosh Chanda	563
Multi Biometric System for Verification with Minimum Training Data Mayank Vatsa, Richa Singh and P. Gupta	569
Bitplane Based Area Morphology for CBIR K. Kiran Kumar, Chakravarthy Bhagvati, A. K. Pujari and B. L. Deekshatulu	575
A System for Joining and Recognition of Broken Bangla Numerals for Indian Postal Automation <i>K. Roy, U. Pal and B. B. Chaudhuri</i>	581
Recognition of Modification-based Scripts Using Direction Tensors Lalith Premaratne, Yaregal Assabie and Josef Bigun	587
Correcting Colours for Aided Recomposition of Fragments G. Carlomagno, F. Renna, N. Ancona, N. Mosca, G. Attolico and A. Distante	593
A Robust Nonparametric Estimation Framework for Implicit Image Models Himanshu Arora, Maneesh Singh and Narendra Ahuja	599
Robust Fingerprint Classification Using An Eigen Block Directional Approach P Madhusoodhanan and Sumantra Dutta Roy	605
Minutiae Verification in Fingerprint Images Using Steerable Wedge Filters Sharat Chikkerur, Venu Govindaraju, Sharath Pankanti and Ruud Bolle	611
Recognition of Binary Image Represented by A String of Numbers Kallol Bhattacharya, Krishnendu Goswami and Dipankar Biswas	617
Searching in Document Images C. V. Jawahar, Million Meshesha and A. Balasubramanian	622
A Study on the Application of Color Transfer Technique for Video Compression K. Madhu Sudhana Rao and Suman K. Mitra	628
Hidden Markov Model Based Structuring of Cricket Video Sequences Using Motion and Color Features <i>M. H. Kolekar and S. Sengupta</i>	632

Key Video Object Plane Selection by MPEG-7 Visual Shape Descriptor for Summarization and Recognition of Hand Gestures <i>M. K. Bhuyan, D. Ghosh and P. K. Bora</i>	638
An Architecture for Real Time Face Recognition Using WMPCA A. Pavan Kumar, V. Kamakoti and Sukhendu Das	644
Oral Session: Biometric and Related Application	
Fingerprint Classification Using Orientation Field Flow Curves Sarat C. Dass and Anil K. Jain	650
Multi-Cue Exemplar-Based Nonparametric Model for Gesture Recognition Vinay D. Shet, V. Shiv Naga Prasad, Ahmed Elgammal, Yaser Yacoob and Larry S. Davis	656
Towards A Robust and Real-time Face Detection and Tracking Framework <i>Peihua Li and Kai Xie</i>	663
Robust Face Recognition by Fusion K. Srinivasa Rao, Lilesh S. Ghadi, Y. Anoop Kumar and A. N. Rajagopalan	669
Dynamic Hand Gesture Recognition Using Predictive Eigen Tracker Kaustubh S. Patwardhan and Sumantra Dutta Roy	675
Fast and Robust Projective Matching for Fingerprints Using Geometric Hashing <i>Rintu Boro and Sumantra Dutta Roy</i>	681
Tutorial	
Detection and Tracking for Surveillance Larry S. Davis, University of Maryland, USA	689
Trainable Visual Models for Object Class Recognition Andrew Zisserman, University of Oxford, UK	690
Image Registration with Applications to Medical Imaging Baba C. Vemuri, University of Maryland, USA	691
Author Index	693