2009 Digital Image Computing: Techniques and Applications

(DICTA 2009)

Melbourne, Australia
1-3 December 2009

Editors:
Hao Shi
Yanchun Zhang
Murk J. Bottema

Brian C. Lovell
Anthony J. Maeder

IEEE Catalog Number: CFP09397-PRT
2009 Digital Image Computing: Techniques and Applications

DICTA 2009

Table of Contents

Preface
Message from the General Chair
Conference Committee
Review Panel
Session 1 Keynote
Session 2A Keynote
Session 2B Keynote
Session 3 Keynote

Session 1A - Image Coding and Processing
A Low Complexity Algorithm for Global Motion Parameter Estimation Targeting Hardware Implementation .................................................................1
M. N. Haque, M. Biswas, M. R. Pickering, and M. R. Frater
Affine-Invariant Image Watermarking Using the Hyperbolic Chirp .......................................................... 6
Peter Fletcher, Kieran Larkin, and Stephen Hardy
Improved 3D Thinning Algorithms for Skeleton Extraction .......................................................... 14
F. H. She, R. H. Chen, W. M. Gao, P. H. Hodgson, L. X. Kong, and H. Y. Hong

Session 1B - Biomedical and e-Health Applications
Optimizing Sharpness Measure for Bright Lesion Detection in Retinal Image Analysis ......................................................... 19
Benson S. Y. Lam, Yongsheng Gao, and Alan Wee-Chung Liew
Blotch Detection in Pigmented Skin Lesions Using Fuzzy Co-clustering and Texture Segmentation ................................................... 25
Vamsi K. Madasu and Brian C. Lovell
Microscopic Cell Segmentation and Dead Cell Detection Based on CFSE and PI Images by Using Distance and Watershed Transforms ......................................................... 32
Eric Dahai Cheng, Subhash Challa, and Rajib Chakravorty
**Session 1C - Shape and Texture Analysis**

Patch Contour Matching by Correlating Fourier Descriptors ................................................................. 40
   Fredrik Larsson, Michael Felsberg, and Per-Erik Forssén

Texture Description in Local Scale Using Texton Histograms with Universal Dictionary ................................................................. 47
   José Rouco, Manuel G. Penedo, Marcos Ortega, and Antonio Mosquera

Dense Correspondence Extraction in Difficult Uncalibrated Scenarios ................................................................. 53
   Ruan Lakemond, Clinton Fookes, and Sridha Sridharan

**Session 1D - Software and Hardware**

Novel Hardware Algorithms for Row-Parallel Integral Image Calculation ................................................................. 61
   Shoaib Ehsan, Adrian F. Clark, and Klaus D. McDonald-Maier

Exploiting Bayesian Belief Network for Adaptive IP-Reuse Decision ................................................................. 66
   A. W. Azman, A. Bigdeli, M. Biglari-Abhari, Y. M. Mustafah, and B. C. Lovell

Portable Multi-megapixel Camera with Real-Time Recording and Playback ................................................................. 74
   Peter Carr and Richard Hartley

**Session 1E - Surveillance, Defence and Industrial Applications**

Crowd Counting Using Multiple Local Features ................................................................. 81
   David Ryan, Simon Denman, Clinton Fookes, and Sridha Sridharan

Measuring Latency for Video Surveillance Systems ................................................................. 89
   Rhys Hill, Christopher Madden, Anton van den Hengel, Henry Detmold, and Anthony Dick

Evaluation of a Particle Filter to Track People for Visual Surveillance ................................................................. 96
   Jamie Sherrah, Branko Ristic, and Nicholas J. Redding

Improved Single Image Dehazing Using Geometry ................................................................. 103
   Peter Carr and Richard Hartley

**Session 1F - Statistical and Structural Pattern Recognition**

Incremental Object Matching with Bayesian Methods and Particle Filters ................................................................. 111
   Mikko Toivanen and Jouko Lampinen

Multi-projective Parameter Estimation for Sets of Homogeneous Matrices ................................................................. 119
   Wojciech Chojnacki, Rhys Hill, Anton van den Hengel, and Michael J. Brooks

Learning the Optimal Transformation of Salient Features for Image Classification ................................................................. 125
   Jun Zhou, Zhouyu Fu, and Antonio Robles-Kelly

Feature and Classifier Selection for Automatic Classification of Lesions in Dynamic Contrast-Enhanced MRI of the Breast ................................................................. 132
   Yaniv Gal, Andrew Mehnert, Andrew Bradley, Dominic Kennedy, and Stuart Crozier
Session 2A - Surveillance, Defence and Industrial Applications

The Dynamic Decision Switch for Multiple Pixel Connected Component Labeling Algorithm .................................................................140
Wen-Shan Wang, Ya-Fei Hung, Jen-Kuei Yang, and Shau-Yin Tseng

A Context-Based Approach for Detecting Suspicious Behaviours .................................................................146
Arnold Wiliem, Vamsi Madasu, Wageeh Boles, and Prasad Yarlagadda

Object Modelling in Videos via Multidimensional Features of Colours and Textures .................................................................154
Zhuhan Jiang

A Two-Layer Night-Time Vehicle Detector .................................................................162
Weihong Wang, Chunhua Shen, Jian Zhang, and Sakrapee Paisitkriangkrai

Investigations into the Robustness of Audio-Visual Gender Classification to Background Noise and Illumination Effects .................................................................168
Darryl Stewart, Hongbin Wang, Jiall Shen, and Paul Miller

Improved Simultaneous Computation of Motion Detection and Optical Flow for Object Tracking .................................................................175
Simon Denman, Clinton Fookes, and Sridha Sridharan

Content-Based Video Retrieval (CBVR) System for CCTV Surveillance Videos .................................................................183
Yan Yang, Brian C. Lovell, and Farhad Dadgostar

Deterministic Initialization of Hidden Markov Models for Human Action Recognition .................................................................188
Zia Moghaddam and Massimo Piccardi

Soft-Biometrics: Unconstrained Authentication in a Surveillance Environment .................................................................196
Simon Denman, Clinton Fookes, Alina Bialkowski, and Sridha Sridharan

Video Surveillance: Legally Blind? .................................................................204
Peter Kovesi

Session 2B - Biomedical and e-Health Applications

3D Reconstruction of Patient Specific Bone Models from 2D Radiographs for Image Guided Orthopedic Surgery .................................................................212
P. Gamage, S. Q. Xie, P. Delmas, and P. Xu

Estimation of Muscle Fatigue during Cyclic Contractions Using Source Separation Techniques .................................................................217
Ganesh R. Naik, Dinesh K. Kumar, Katherine Wheeler, and Sridhar P. Arjunan

Luminescent Microspheres Resolved from Strong Background on an Automated Time-Gated Luminescence Microscopy Workstation .................................................................223
Leonard G. C. Hamey, Russell E. Connally, Simon Wong Too Yen, Thomas S. Lawson, James A. Piper, and Jon Iredell

Self-Organizing Map Methodology and Google Maps Services for Geographical Epidemiology Mapping .................................................................229
Jingyuan Zhang, Hao Shi, and Yanchun Zhang
Session 2B - Biotechnology Applications of Pattern Recognition

Automatic Mass Segmentation Based on Adaptive Pyramid and Sublevel Set Analysis ...........................................................................................................236
   Fei Ma, Mariusz Bajger, and Murk J. Bottema

Session 2B - Content-Based Image Retrieval and Image Databases

Semantic Image Retrieval Using Region Based Inverted File .................................................................242
   Dengsheng Zhang, Md Monirul Islam, Guojun Lu, and Jin Hou

Session 2B - Computer Vision

A Direct Method to Self-Calibrate a Surveillance Camera by Observing a Walking Pedestrian ........................................................................................................250
   Worapan Kusakunniran, Hongdong Li, and Jian Zhang
Perspective Invariant Angle Ordering ........................................................................................................256
   David Shaw and Nick Barnes
A Quadratic Deformation Model for Facial Expression Recognition .................................................264
   M. Obaid, R. Mukundan, R. Goecke, M. Billinghurst, and H. Seichter

Session 2C - Remote Sensing and Spectral Imaging

Extraction of Road Lanes from High-Resolution Stereo Aerial Imagery Based on Maximum Likelihood Segmentation and Texture Enhancement .................................................................271
   Hang Jin, Yanming Feng, and Zhengrong Li
A Clustering Based Automated Glacier Segmentation Scheme Using Digital Elevation Model ...........................................................................................................277
   Syed Zulqarnain Gilani and Naveed Iqbal Rao
Combined Time Domain and Spectral Domain Data Compression for Fast Multispectral Imagery Updating ...........................................................................................................285
   Al Mamun, Xiuping Jia, and Michael Ryan
   Chandrama Dey, Xiuping Jia, D. Fraser, and L. Wang

Session 2C - Statistical and Structural Pattern Recognition

Wavelet Transform and Fusion of Linear and Non Linear Method for Face Recognition .................................................................296
   Masoud Mazloom, Shohreh Kasaei, and Nourohoda Alemi Neissi
Greedy Approximation of Kernel PCA by Minimizing the Mapping Error ........................................303
   Peng Cheng, Wanqing Li, and Philip Ogunbona
Wavelets/Multiwavelets in Stereo Correspondence Estimation: A Comparative Study ................................................................. 309
   Asim Bhatti and Saeid Nahavandi
SIFTing the Relevant from the Irrelevant: Automatically Detecting Objects in Training Images ........................................................................ 317
   Edmond Zhang and Michael Mayo

**Session 2C - Artificial Intelligence**

A Biological Inspired Visual Landmark Recognition Architecture .......................................................... 325
   Quoc Do and Lakhmi Jain

**Session 2C - Real World Applications and Emerging Technologies**

Biometric Authentication Based on Infrared Thermal Hand Vein Patterns .................................................. 331
   Amiyo Kumar, M. Hanmandlu, Vamsi K. Madasu, and Brian C. Lovell

**Session 2D - Image Coding and Processing**

Smooth Approximation of L_\infty-Norm for Multi-view Geometry ................................................................. 339
   Yuchao Dai, Hongdong Li, Mingyi He, and Chunhua Shen
An Efficient and Accurate Iris Segmentation Technique ............................................................................. 347
   Nitin K. Mahadeo and Nandita Bhattacharjee
A Combined Just Noticeable Distortion Model Guided Image Watermarking ........................................... 353
   Yaqing Niu, Jianbo Liu, Sridhar Krishnan, and Qin Zhang
A Fast Number Theoretic Finite Radon Transform ..................................................................................... 361
   Shekhar Chandra and Imants Svalbe
Image Compression Based on Side-Match VQ and SOC ........................................................................ 369
   Shih-Chieh Shie and Long-Tai Chen
A Super Resolution Algorithm for Atmospherically Degraded Images Using Lucky Regions and MAP-uHMT .................................................................................. 374
   Zhiying Wen, Feng Li, Donald Fraser, Andrew Lambert, and Xiuping Jia

**Session 2D - Shape and Texture Analysis**

Shape Signature for Retinal Biometrics ........................................................................................................ 381
   M. Z. Che Azemin, Dinesh K. Kumar, and Hong Ren Wu
Applying Sum and Max Product Algorithms of Belief Propagation to 3D Shape Matching and Registration .................................................................................. 387
   Pengdong Xiao, Nick Barnes, Paulette Lieby, and Tiberio Caetano
Feature Extraction from Contours Shape for Tumor Analyzing in Mammographic Images .................. 395
   Atef Boujelben, Ali Cherif Chaabani, Hedi Tmar, and Mohamed Abid
Session 3E - Computer Vision

Real Time Target Tracking with Pan Tilt Zoom Camera ................................................................. 492
    Pankaj Kumar, Anthony Dick, and Tan Soo Sheng
Cartoon Motion Capturing and Retargeting by Rigid Shape Manipulation ...................................... 498
    Mohammad Rastegari, Mohammad Rouhani, Niloofar Gheissari,
    and Mir Mohsen Pedram
Straight-Edge Extraction in Distorted Images Using Gradient Correction ........................................... 505
    Muhammad Sirajul Islam and Leslie John Kitchen
Refining Local 3D Feature Matching through Geometric Consistency for Robust Biometric Recognition .............................................................................................................. 513
    Syed M. S. Islam and Rowan Davies

Session 3F - Statistical and Structural Pattern Recognition

A Fast Corner Detector Based on the Chord-to-Point Distance Accumulation Technique .......................................................... 519
    Mohammad Awrangjeb, Guojun Lu, Clive S. Fraser, and Mehdi Ravanbakhsh
Multivariate Skew t Mixture Models: Applications to Fluorescence-Activated Cell Sorting Data .......................................................................................................................... 526
    Kui Wang, Shu-Kay Ng, and Geoffrey J. McLachlan
Solving Multilabel Graph Cut Problems with Multilabel Swap .................................................................. 532
    Peter Carr and Richard Hartley
Regularized Multinomial Regression Method for Hyperspectral Data Classification via Pathwise Coordinate Optimization .................................................................................. 540
    Jiming Li and Yuntao Qian

Author Index