

BMVC'95

Proceedings of the 6th British Machine Vision
Conference, 11-14 September 1995, The
University of Birmingham, Birmingham

Edited by

David Pycock

BMVA

David Pycock
The School of Electronic & Electrical Engineering
The University of Birmingham
Edgbaston
Birmingham B15 2TT
United Kingdom

ISBN 0 9521898 2 8

Apart from any fair dealing for the purposes of research or private study, or criticism or review, as permitted under the Copyright, Designs and Patents Act 1988, this publication may only be reproduced, stored or transmitted, in any form or by any means, with the prior permission in writing of the publishers, or in the case of reprographic reproduction in accordance with the terms of licenses issued by the Copyright Licensing Agency. Enquires concerning reproduction outside those terms should be sent to the publishers.

© BMVA 1995

The use of registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant laws and regulations and therefore free for general use.

The publisher makes no representation, express or implied, with regard to the accuracy of the information in this book and cannot accept any legal responsibility for any error or omissions that may be made.

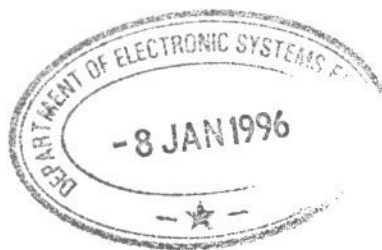
FORWARD

It is of course a honour and a delight to host the Sixth British Machine Vision Conference at The University of Birmingham; Being conference Chair provides a new perspective on the conference. This year the conference follows close to at least one international conference and another major national conference. Although the total number of papers submitted (100) was lower than last year I am pleased to report that the standard of papers has remained high. The Programme Committee was able to select 39 papers for podium presentation and 29 for presentation as posters based on the ranking of each paper by three referees and the ensuing discussion at the Papers Meeting. These papers plus those presented by the two guest speakers are printed in these proceedings. Whilst the majority of the papers submitted came from the UK, 11 were received from overseas reflecting the high esteem in which this national conference is held.

Once again the conference is fortunate to receive two eminent, internationally renowned guest speakers: Professor Jitendra Malik from the University of Berkeley, USA and Professor Nicholas Ayache from INRIA, Sophia-Antipolis, France. We are also fortunate to have a pre-conference tutorial on "Artificial Neural Network and Computer Vision" given by Dr Roger Boyle and Professor David Hogg of the University of Leeds.

Finally, I would like to thank all those who have worked with me patiently over the last year assisting with the preparations for the conference: the referee's, the local organisers, the administrative staff and all those who contributed papers. Preparing a conference is a team effort and I hope that those of you attending the conference will find the programme of papers a stimulating and a valuable contribution to the field of research which engages so much of our time.

David Pycock
Birmingham, July 1995



Programme Review Committee

Mr W. G. L. Adaway	(Computer Recognition Systems)
Mr J. Anderson	(British Aerospace, Sowerby Research Centre)
Prof B. Buxton	(University College, London)
Dr R. Cipolla	(Cambridge University)
Dr A. F. Clark	(Essex University)
Prof E. R. Davies	(Royal Holloway London)
Dr T. J. Ellis	(City University)
Dr E. R. Hancock	(York University)
Prof D. C. Hogg	(Leeds University)
Dr J. I. Illingworth	(Surrey University)
Prof J. Kittler	(Surrey University)
Dr P. F. McLaughlan	(Oxford University)
Dr M. Petrou	(Surrey University)
Mr D. Pycock	(The University of Birmingham)
Prof G. D. Sullivan	(Reading University)
Prof C. J. Taylor	(Manchester University)
Dr N. A. Thacker	(Sheffield University)
Mr T. Trew	(Philips Research Laboratories, Redhill)
Dr M. Varga	(DRA, Malvern)

Local Organisers

David Pycock	(Conference Chair)
Colin Thomas	(Exhibition Coordinator)
Ela Claridge	(Advertising and Publicity)
Michael Spann	(Poster Session Coordinator)
Pattie Jarvis	(Secretarial Support)

Contents

Volume One

Medical Computer Vision, Virtual Reality and Robotics Promising Research Tracks Professor N Ayache, <i>INRIA, Sophia-Antipolis, France.</i>	1
Automated 3D Registration of Truncated MR and CT Images of the Head. C Studholme, DLG Hill and DJ Hawkes, <i>UMDS, Guys Hospital.</i>	27
An Efficient 3D Deformable Model with a Self-Optimising Topology. AJ Bulpitt and ND Efford, <i>University of Leeds.</i>	37
Texture Analysis using Local Property Maps. PP Smyth, CJ Taylor and J Adams, <i>University of Manchester.</i>	47
Texture Anisotropy, Symmetry, Regularity: Recovering Structure and Orientation from Interaction Maps. D Chetverikov and RM Haralick, <i>Hungarian Academy of Sciences, Hungary.</i>	57
A Bayesian Approach to 3D Surface Fitting and Refinement. N Turner and ER Hancock, <i>University of York.</i>	67
Scale Space Surface Recovery using Binocular Shading and Stereo Information. AG Jones and CJ Taylor, <i>University of Manchester.</i>	77
An Adaptive Eigenshape Model. A Baumberg and DC Hogg, <i>University of Leeds.</i>	87
Automated Pivot Location for the Cartesian-Polar Hybrid Point Distribution Model. T Heap and DC Hogg, <i>University of Leeds.</i>	97
Non-Linear Point Distribution Modelling using a Multi-Layer Perceptron. PD Sozou, TF Cootes, CJ Taylor and EC Di Mauro, <i>University of Manchester.</i>	107
Robust Statistical Model-Based Cell Image Interpretation. P Zhou and D Pycocock, <i>The University of Birmingham.</i>	117

A Generic Deformable Model for Vehicle Recognition. JM Ferryman, AD Worrall, GD Sullivan and KD Baker, <i>The University of Reading.</i>	127
Pose and Structure Recovery using Active Models. AD Worrall, JM Ferryman, GD Sullivan and KD Baker, <i>The University of Reading.</i>	137
Flexible 3D Models from Uncalibrated Cameras. TF Cootes, EC Di Mauro, CJ Taylor and A Lanitis <i>University of Manchester.</i>	147
Active Shape Models and the Shape Approximation Problem. A Hill, TF Cootes and CJ Taylor, <i>University of Manchester.</i>	157
3-D Reconstruction and Camera Calibration from Images with Known Objects. G Socher, T Merz and S Posch, <i>Universität Bielefeld, Germany.</i>	167
Recovery of Intrinsic and Extrinsic Camera Parameters using Perspective Views of Rectangles. TN Tan, GD Sullivan and KD Baker, <i>The University of Reading.</i>	177
Uncalibrated X-Ray Stereo Reconstruction. D Talmage, A Noble and A Zisserman, <i>University of Oxford.</i>	187
Active Contour Models for Shape Description using Multiscale Differential Invariants. JA Schnabel and SR Arridge, <i>University College London.</i>	197
Contour Fitting using an Adaptive Spline Model. D Rueckert and P Burger, <i>Imperial College of Science, Technology and Medicine.</i>	207
Ground Plane Obstacle Detection of Stereo Vision under Variable Camera Geometry Using Neural Nets. Y Shao, JEW Mayhew and SD Hippisley-Cox, <i>University of Sheffield.</i>	217
Depth Sensing by Variable Baseline Triangulation. J Clark and AM Wallace, <i>Heriot-Watt University.</i>	227
A Comparison of Four Algorithms for Estimating 3-D Rigid Transformations. A Larusso, DW Eggert and RB Fisher, <i>University of Edinburgh.</i>	237

A Neural Network for Egomotion Estimation from Optical Flow. A Branca, G Convertino, E Stella and A Distante, <i>CNR, Bari, Italy.</i>	247
Equal-Distance Sampling of Superellipse Models. M Pilu and RB Fisher, <i>University of Edinburgh.</i>	257
Affine Reconstruction from Lines. E Thirion, T Moons and L Van Gool, <i>Katholieke Universiteit Leuven, Belgium.</i>	267
Searching for Grasping Opportunities on Unmodeled 3D Objects. M Rutishauser and M Stricker, <i>Swiss Federal Institute of Technology, Switzerland.</i>	277
3-D Interpretation of Imperfect Line Drawings. R Chung and K-L Leung, <i>The Chinese University of Hong Kong, HongKong.</i>	287
Automatic Interpretation of Outdoor Scenes. NW Campbell, WPJ Mackeown, BT Thomas and T Troscianko, <i>University of Bristol.</i>	297
Sub-pixel Reconstruction of a Variable Albedo Lambertian Surface. H Shekarforoush, M Berthod and J Zerubia, <i>INRIA, Sophia-Antipolis, France.</i>	307
Surface Reflectance Model Estimation from Daylight Illuminated Image Sequences. R Love and ND Efford, <i>University of Leeds.</i>	317
Smart Feature Detection using an Invariance Network Architecture. AJ Lacey, NA Thacker and NL Seed, <i>University of Sheffield.</i>	327
Robust Model-Based Boundary Cue Generation for Cell Image Interpretation. P Zhou and D Pycok, <i>The University of Birmingham.</i>	337
Image Difference Threshold Strategies and Shadow Detection. PL Rosin and TJ Ellis, <i>Institute of Remote Sensing Applications, Italy.</i>	347
Convergence Properties of Curvature and Torsion Scale Space Representations. F Mokhtarian, <i>University of Surrey.</i>	357

Volume 2

Smart Cars and Smart Roads.

Prof J Malik, J Weber, O-T Luong and D Koller

University of California, Berkeley, USA. 367

Tracking and Measuring Drivers Eyes.

D Tock and I Craw, *University of Aberdeen.* 383

Iris Localisation for a Head-Mounted Eye Tracker.

H Tunley and DS Young, *University of Sussex.* 393

Tracking and Recognising Hand Gestures using Statistical Shape Models.

T Ahmad, CJ Taylor, A Lanitis and TF Cootes,

University of Manchester. 403

Generating Spatiotemporal Models from Examples.

A Baumberg and DC Hogg, *University of Leeds.* 413

Statistical Background Modelling for Tracking with a Virtual Camera.

S Rowe and A Blake, *University of Oxford.* 423

Detection and Tracking of Independent Motion.

JC Clarke and A Zisserman, *University of Oxford.* 433

Self-alignment of a Binocular Robot.

ID Reid and PA Beardsley, *University of Oxford.* 443

The Active Camera as a Projective Pointing Device.

AJ Davison, ID Reid and DW Murray, *University of Oxford.* 453

Multi-Sensor Multi-Target Tracking - Strategies for Events that become Invisible.

D Hutber and Z Zhang, INRIA, *Sophia-Antipolis, France.* 463

Structure, Pose and Motion of Bilateral Symmetric Objects.

TN Tan, *The University of Reading.* 473

Implementation of Oriented Filters for Arc Detection.

Y Wen and JP Oakley, *University Manchester.* 483

Convex Hulls, Occluding Contours, Aspect Graphs and the Hough Transform.

M Wright, AW Fitzgibbon and RB Fisher, *University of Edinburgh.* 493

Robust Recognition of Scaled Shapes using Pairwise Geometric Histograms. AP Ashbrook, NA Thacker, PI Rockett and CI Brown, <i>University of Sheffield</i>	503
A Buyer's Guide to Conic Fitting. AW Fitzgibbon and RB Fisher, <i>University of Edinburgh</i>	513
Using Light Polarization in Laser Scanning. J Clark, E Trucco and H-F Cheung, <i>Heriot-Watt University</i>	523
Statistical Grey-Level Models for Object Location and Identification. TF Cootes, GJ Page, CB Jackson and CJ Taylor, <i>University of Manchester</i>	533
Segmentation and Recognition of Printed Arabic Characters. BMF Bushofa and M Spann, <i>The University of Birmingham</i>	543
Robust Tracking of Circular Features. XD Pan, TJ Ellis and TA Clarke, <i>City University</i>	553
The Propagated Instruction Processor. TJ Fountain and CD Tomlinson, <i>University College London</i>	563
Robust Computation of Optical Flow. E-P Ong and M Spann, <i>The University of Birmingham</i>	573
Learning the Distribution of Object Trajectories for Event Recognition. N Johnson and DC Hogg, <i>University of Leeds</i>	583
Multiresolution Motion Estimation/Segmentation Incorporating Feature Correspondence and Optical Flow. PD James and M Spann, <i>The University of Birmingham</i>	593
Modelling Compatibility Coefficient Distributions for Probabilistic Feature-Labeling Schemes. WJ Christmas, J Kittler and M Petrou, <i>University of Surrey</i>	603
Probabilistic Relaxation as an Optimizer. AJ Stoddart, M Petrou and J Kittler, <i>University of Surrey</i>	613
Multi-Variate Cross-Correlation and Image Matching. RB Fisher and P Oliver, <i>University of Edinburgh</i>	623

Optimal Grouping of Line Segments into Convex Sets. B Parvin and S Viswanathan, <i>The University of California at Berkeley, USA.</i>	633
Extending Semantic Edge Labelling. G Zhang and AM Wallace, <i>Heriot-Watt University.</i>	641
Robust Matching by Partial Correlation. Z-D Lan, R Mohr and P Remagnino, <i>INRIA, Rhone-Alpes, France.</i>	651
Recognition and Location by Parallel Pose Clustering. WJ Austin and AM Wallace, <i>Heriot-Watt University.</i>	661
Prototyping Parallel Algorithms using Standard ML. NR Scaife, GJ Michaelson and AM Wallace, <i>Heriot-Watt University.</i>	671
An Interactive CAD-Based Vision System. B M-Rouhani, AD Worrall and JADW Anderson, <i>The University of Reading.</i>	681
Medical Image Registration Incorporating Deformations. PJ Edwards, DLG Hill, JA Little, VAS Sahni and DJ Hawkes, <i>UMDS, Guys Hospital.</i>	691
Towards an Automatic Human Face Localizations System. KC Yow and R Cipolla, <i>University of Cambridge.</i>	701
Sign Language Recognition: an Application of the Theory of Size Functions. C Uras and A Verri, <i>Università di Genoa, Italy.</i>	711
Index of Authors.	721