BMVA News

The Newsletter of the British Machine Vision Association and Society for Pattern Recognition

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Editor: Dr Paul Rosin
Department of Computer Science & Information Systems
Brunel University
Middlesex UB8 3PH
Tel: (01895) 274000 ext. 3632
Fax: (01895) 251686
Email: Paul.Rosin@brunel.ac.uk

BMVA News[1] is published every three months. Contributions on any activity related to machine vision or pattern recognition are eagerly sought. These could include reports on technical activities such as conferences, workshops or other meetings. Items of timely or topical interest are also particularly welcome; these might include details of funding initiatives, programmatic reports from ongoing projects and standards activities. Items for the next edition should reach the editor by 15th July 1996.

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Editorial

With the bulging contents list there's not much room left for me on this page. (All the better you may say!) Still, I was hardly deluged with articles – and even with my low expectations I was disappointed with the lack of input from the readers. As you can see, I'm following true to the editor role model I outlined last issue. Of course, it's been a busy time with ECCV taking place and the submission deadline for BMVC just gone, but no more excuses will be accepted! I'm eagerly awaiting your contributions to the next issue.

Since I haven't been sent any of your favourite quotes I'll give you another of mine. This time it comes from rather closer to home – a recent talk by a Professor here at Brunel – so I'd better not name names. A certain entity was defined as:

> a finite union of point-sets, each defined as a finite set-intersection of sets defined by an analytic equation or bounded by a set so defined

but despite the talk being entitled "Basic Geometry for Modelling" I was lost!

IPOT '96

Image Processing and Optical Technology Exhibition, Birmingham NEC, 27-29 February 1996

This is the second year that I, and the third that the BMVA, have been present at IPOT. In comparison to previous years there has been a definite increase in both the size and quality of the exhibition, making it well worth a visit by anyone working in this area, (not forgetting the abundance of free tickets that the organisers seem to send out each year).

For anyone who hasn't been before, the exhibitors at IPOT range from people selling mass spectrometers, custom ground lenses and CCD elements to the many companies attempting to sell you the latest Windows '95 version of their image processing/vision/tea-making software, (well almost). Several of the 'Big Players' in the industrial vision field were present including DataCube with a set of 4 or 5 demonstrations of hardware/software for image processing, DataCell with 4 or 5 demonstrations of hardware/software for image processing and Optimum Vision with 4 or 5 demonstrations of hardware/software for image processing... well, it loses something in translation, you really had to be there.

Unlike previous years, talking to many of the people at the exhibition I did not get the impression that any vision problem could be solved simply by plugging together some PCI or VME based hardware and running histogramming functions on a few images. Yes, many are trying to sell you their hardware/software but not as a direct solution to a specific problem; the phrase 'Platform' seemed to be used a lot. It seems the industry is keen to sell 'enabling technologies' so that customers may develop solutions to their own problems and the companies may 'grow' with their users. Hmmmm, this all sounded very nineties, however I could not help thinking that "Frank Muir was going to say BLUFF" sooner or later. On the positive side the systems demonstrations now on display are beginning to show signs of applying non-trivial algorithms to difficult industrial problems, including 3D measurement and some object recognition and location.

So with all these people here to buy and sell, what were the BMVA doing there? Promoting the British machine vision research community to industry of course. We were once again kindly provided by the organisers with a free stand for this purpose (opposite the UKIVA's stand!). The BMVA stand was manned by Neil Thacker, Evelina Bouhova and myself. We had on display about 7 or 8 posters showing examples of work in different areas of vision, 3D imaging, remote sensing, surveillance, etc., plus the BMVA video. As well as trying to attract new membership we took the opportunity to advertise the BMVC96 and sell a few copies of recent proceedings. Ok, it isn't as gimmicky as some of the other stands, but once people had given the show the once around we were kept quite busy. A lot of people wanted to know what we were selling and was it Windows '95 compatible! Quite a few of the people I spoke to seemed surprised to learn that many of their vision problems were solvable, but eyes glassed over once the dreaded phrase "University" was mentioned; the role of the BMVA as an educator has never been more important.

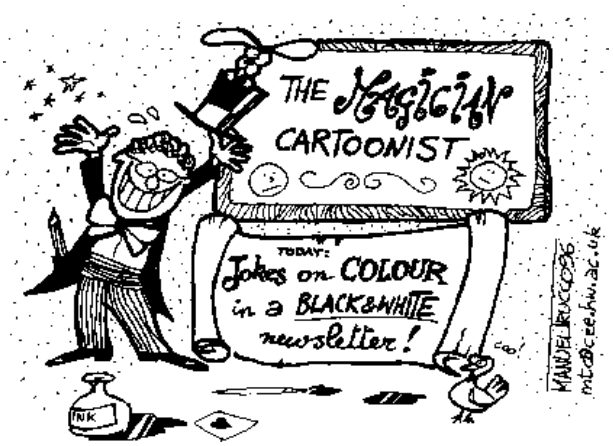
Tony Lacey
University of Sheffield
email: A.Lacey@sheffield.ac.uk

Colour in Machine Vision

On Wednesday 6th March 1996 a technical meeting on Colour in Machine Vision was held at the British Institute of Radiology in collaboration with the Colour Group. The main aim of this meeting was to discuss various aspects of human colour vision and applications of colour in machine vision. The co-chairmen were Dr. Tim Ellis and Prof. John Barbur from City University.

A very interesting talk by Prof. K. Ruddock (Imperial) opened the meeting, during which an extensive introduction to human colour vision was made. Prof. Ruddock also discussed recent developments about the post-receptoral stages of human colour vision, involving the use of brain imaging techniques (PET and MRI) to investigate the pathways connecting the cones with the brain. He also presented results of colour vision disturbances from human patients.

Dr. George Matas (Surrey) talked about colour-based object recognition and performance characterisation of such recognition systems. He claimed that the performance characterisation of a colour recognition system is a non-trivial problem, due to the large number of factors that influence the observed colour. He also introduced the colour adjacency representation of object colour, and showed its stability under a large range of conditions, eg. change of view-point, occlusion, and non-rigid change of shape and errors in segmentation.



Dr. G. Finlayson (York) presented a colour-based algorithm for recognizing objects viewed under an unknown illuminant. Using the three angles between the colour bands, combined with a sensor sharpening transform, it is possible to use the three angles as an illumination invariant index for object recognition. Also results and performance estimates were presented, showing that this can be an efficient colour indexing algorithm.

Dr. S. Sangwine (Reading) addressed the importance of colorimetric calibration for any image acquisition system. He discussed issues like the offset and gain errors, the non-linearities of the sensor, and presented ways to compensate for such effects.

Prof. J. Barbur (City) presented his research concerning the role of colour and intensity in human vision, and the way information from the eye is transferred to the brain where it is combined to produce what we call human vision. He presented results from experiments carried out with normal and abnormal subjects, which indicate that separate parallel channels have evolved that carry the colour information.

S. Olatanbosun (City) presented his method for representation of multi-coloured objects. His method takes into account both the existence and spatial arrangement of colours in an object using a colour region adjacency graph. He also presented results and discussed some performance drawbacks of this method.

The final talk was given by R. Hung (City) and was related to colour image segmentation. His method is based on merging of regions of the colour histogram according to their distance in the colour space and the frequencies of their neighbourhood colours. A diagonal matrix transformation (DMT) is used in order to spectrally adapt the data to the images stored in a colour database.

C. Boukouvalas
Vision, Speech and Signal Processing Group
Department of Electronic and Electrical Engineering
University of Surrey
Guildford GU2 5XH
email: C.Boukouvalas@ee.surrey.ac.uk

Editor's note: For more information on the Colour Group contact:

The School of Optometry and Visual Science
The City University
Dame Alice Owen Building
311-321 Goswell Road
London EC1V 7DD
fax: 0171 477 8355
email: ColourGroupGB@city.ac.uk

Letter to the Editor

Dear Sir

Both the BMVA and IEE organise several one day meetings on Vision related topics every year. I enjoy attending these meetings and London is a convenient location.

One significant difference warrants mention. The BMVA meetings are free to members whereas the IEE charges £45 to members. The non-member prices are respectively £20 and £76. (The prices are those for the recent IEE Remote Sensing Colloquium.) In my opinion the IEE prices are a severe deterrent to casual attendance by PhD students, postdoctoral researchers and others.

May I suggest to workshop organisers that they present one day meetings in the BMVA format rather than the IEE format?

Regards

Andrew Stoddart
Electrical Engineering
University of Surrey
email: A.Stoddart@ee.surrey.ac.uk

Reply from the Chairman

The writer notes an important distinction between the policies of the IEE and BMVA i.e. BMVA has no explicit charge for members to attend technical meetings whereas IEE has what might be regarded, at least in the academic community, as a significant cost. However, the issue of the level of charge to attend specific meetings is more complicated than the bald facts suggest.

I am sure that both the BMVA and IEE try to make decisions which they hope will best further the long term aim of promoting their technical subject areas. BMVA has decided that it would like to encourage attendance at technical meetings and that registration cost is a discouraging factor. However, holding meetings does incur significant costs and these are currently borne via the membership subscriptions and money from other income streams. At the BMVA we see this as a useful use of our members' money. However, our policy is not without its critics. Firstly, most meetings are held in London and are attended by a small fraction of our members. There has been criticism that this amounts to an unfair subsidy of a minority of members in the South-East. BMVA tries to overcome these arguments by funding regional chapters who then organise their own meetings, thereby involving more Association members. A second line of argument which suggests having meeting charges is that this would allow more meetings to be held. The subscription fees will only fund about 6-8 meetings each year. We try to address this restriction by arranging to co-organise meetings with other professional societies e.g. IEE, Royal Statistical Society, BIR, etc. This also encourages cross-disciplinary interaction. It gives our members access to meetings of other organisations at the same rates as apply to their own members.

While, I welcome and would like to encourage the suggestion that more members come forward and become involved in technical meeting organisation, I hope it is clear that the issue of meeting charges is at the end of the day a policy decision for each organisation. I hope that the majority of our members concur with the writer and agree with the policy of not charging registration fees for technical meetings.

John Illingworth, BMVA Chairman
Vision, Speech and Signal Processing Group
University of Surrey
email: J.Illingworth@ee.surrey.ac.uk

Computer Vision for Facial Identification

Report of a Scottish Chapter meeting

This meeting was hosted by the Department of Computing Science, University of Glasgow, and the Turing Institute on November 22 1995 in the Boyd Orr Building. It was attended by about sixty members of the Association.

This meeting brought together speakers from a wide range of backgrounds including computer science, mathematics, psychology, the Home Office and medical pathology. Talks ranged from the theory of data representations suitable for facial recognition to the

methods used by medical pathologists to identify unknown murder victims based upon visual matching of the skull to photographs of possible victims. Overall the meeting highlighted the diversity of applications of facial identification and the disciplines working in this field.

For further information about the Scottish Chapter contact:

Steven Beard
Edinburgh University
email: `stevenb@aifh.ed.ac.uk`

Treasurer's Report

At the BMVA Annual Open Meeting held on Tuesday 12th September Margaret Varga, the Treasurer, gave a report based on the accounts submitted to the Companies House. She briefly reviewed the main items of income and expenditure, noting the following:

1. The period covered by the accounts was for 12 months (January 1994 to December 1995). The financial position continues to be healthy with the Association having substantial reserves.
2. The one-day technical meetings and the regular mailshots are major items of expenses.
3. Detailed arrangements for the extent to which ECCV96 would be underwritten by the BMVA and by the EVS (European Vision Society) had yet to be worked out, but to date an advance of £9K had already been made by the association in order to secure reservation of facilities at the University of Cambridge as well as for the preparation (accepting and mailing submitted papers for review, publicity, etc.) of the conference. It was agreed at the EVS meeting in Stockholm during ECCV94 that the extent to which the BMVA underwrites ECCV 96 with its own reserves will be an important factor in determining the proportion of any profits the Association would expect to retain. This is particularly important in considering the much larger financial exposure the conference will be subject to as April 1996 approaches.

Questions on these items and a number of other points of detail were taken from members present at the meeting.

Book Review

Three-Dimensional Computer Vision, O. Faugeras, MIT Press, 1993

As pointed out by the emminent Americans on the back of this book this volume is indeed a tour-de-force of mathematically rigorous approaches to geometric vision. Such techniques have previously only been commonly available in the small number of larger and more active research groups around the world over the last 10 to 20 years. In writing this book the author has thus done a valuable service to the entire machine vision community by providing a reference text which may eliminate unproductive repetitions of this work in future.

In addition the book provides an excellent overview of several solutions from the established literature to various problems, such as edge detection, stereo vision and geometric model matching. All pitched at just the right level to get the fundamentals of these techniques across in a clear but concise manner. The book thus provides an invaluable source of information for machine vision degree courses and I'm sure it will prove popular with lecturers over the coming years as a recommended text.

If I had to be directly critical of this book it would be to say that I feel it would be difficult, after reading only this book, for others to identify suitable problems amenable to this geometric formalism, or to develop working software in order to repeat his results. On the other hand I can understand that upon reaching the 500 page mark the author may have felt that he had said enough.

Neil Thacker
University of Sheffield
email: `N.Thacker@sheffield.ac.uk`

IEE Professional Group E4

Image Processing and Vision

A list of recent past and future meetings is given below:

"Multiresolution modelling and analysis in image processing and computer vision", 21 April 1995, Digest no. 1995/077

"The application of machine vision", 24 May 1995, Digest no. 1995/113

"Low bit-rate image coding", 6 June 1995, Digest no. 1995/154

"Document image processing and multimedia environments", 2 November 1995, Digest no. 1995/191

"Multiresolution modelling and analysis in image processing and computer vision", 21 April 1995, Digest no. 1995/077

"The application of machine vision", 24 May 1995, Digest no. 1995/113

"Low bit-rate image coding", 6 June 1995, Digest no. 1995/154

"Document image processing and multimedia environments", 2 November 1995, Digest no. 1995/191

"Image processing for remote sensing", 13 February 1996, Digest no. 1996/027.

"Digital mammography", Wednesday 27 March 1996 at Savoy Place, London (organiser: Professor M.C. Fairhurst, University of Kent). The Digest no. will be 1996/072.

"Intelligent image databases", Wednesday 22 May 1996 at Savoy Place, London (organiser: Dr. C.J. Radford, DRA, Malvern). The Digest no. will be 1996/119.

Also, note the two Image Processing and Applications (IPA) conferences:

5th IEE International Conference on Image Processing and its Applications, IPA'95 (July 1995) Heriot-Watt University.

6th IEE International Conference on Image Processing and its Applications, IPA'97 *planned* to take place in Dublin during July 1997.

Intelligent Image Databases

The digital information 'explosion' has never more impact than for the case of images. The size of data sets can potentially be huge, particularly in domains such as satellite imagery and medical imagery. How to handle this information in an orderly and meaningful way poses a serious and difficult problem. This one day colloquium aims to address the problem through techniques to annotate and retrieve images according to their content. It is particularly concerned with intelligent processing techniques which enable image content to be determined automatically. Other issues such as techniques to rapidly handle and access image databases will be covered.

The colloquium which is scheduled for Wednesday 22 May 1996 at the IEE Savoy Place has attracted a very full programme for what is clearly seen as an issue of considerable importance. The provisional programme is:

"Data Modelling and Management in Sequential Image Databases: A temporal Object Oriented Approach", Lichun Wang et al (Middlesex University)

"Video Storyboards: Summarising Video Sequences for Indexing and Search of Video Databases", Peter J. Macer and Peter Thomas (University of the West of England)

"Video & Data - A Combined Intelligent Database", David Crellin (Abington Partners)

"Indexing an Image Database by Shape Content using Curvature Scale Space", Farzin Mokhtarian et al (University of Surrey)

"Image Content Descriptors - The Detection Stage", Paul G. Ducksbury et al (DRA)

"Content-Based Viewpoint-Invariant Image Annotation", Tieniu Tan (University of Reading)

"A Statistical Approach to Hierarchical Shape Indexing", Beniot Huet and Edwin Hancock (University of York)

"User Interfaces for Content-Based Image Retrieval", C L Bird et al (IBM UK Laboratories)

"Retrieval of Trade Mark Images by Shape Feature - The Artisan Approach", J P Eakins (University of Northumbria at Newcastle)

"Rapid Content Based Retrieval from Document Image Databases", Simon Lucas (University of Essex)

"A Descriptive Engine for Image Databases", N. Sherkat (The Nottingham Trent University)

"Colour-Texture Indexing", Graham D Finlayson (University of York)

"Content-Driven Navigation of Large Databases", C L Bird et al (IBM UK Laboratories)

"Neural Associative Memories for Molecular Databases", Mick Turner (University of York)

"Content-Based Image Retrieval using Colour Tuple Histograms", Rick Rickman and Paul Rosin (Brunel University)

John Radford
Defence Research Agency
St Andrews Road
MALVERN
Worcs

UK WR14 3PS
Tel: +44 (01)684 895635
Fax: +44 (01)684 894952
email: radford@dra.hmg.gb

Call for Papers: Model Building

Model based object recognition is an important paradigm in machine vision. Much work has been done on model matching and tracking. However, there is less effort addressing the difficulties associated with fully automatically acquiring models of both objects and environments. In December it is planned to hold a one-day BMVA meeting entitled "Building Models of Objects and Environments using Computer Vision Techniques". Prospective contributors are asked to submit a short abstract describing their current work in this area. The deadline for contributions is 1 August 1996.

For further details please feel free to contact:

Dr John Illingworth
Vision, Speech and Signal Processing Group
Department of Electronic and Electrical Engineering
University of Surrey
Guildford
Tel: 01483 259835
email: J.Illingworth@ee.surrey.ac.uk

Seventh British Machine Vision Conference

BMVC96

9–12 September 1996
The University of Edinburgh

The British Machine Vision Conference is the main UK conference for machine vision and related topics. The conference is a single-track meeting with both oral and poster presentations. In addition to the contributed papers, there will be talks by invited speakers and a pre-conference tutorial programme (free to registered students).

General Chair
Robert B Fisher
University of Edinburgh
rbf@aifh.ed.ac.uk

Programme Chair
Emanuele Trucco
Heriot-Watt University
mtc@cee.hw.ac.uk

Local Arrangements
Gillian M Hayes
University of Edinburgh
gmh@aifh.ed.ac.uk

Industrial Links
Paul Siebert
The Turing Institute
P.Siebert@turing.gla.ac.uk

Invited speakers

Prof Jan-Olof Eklundh, KTH Stockholm,
Attention and figure-ground segmentation in active vision

Prof Aaron Bobick, MIT Media Laboratory,
Computers seeing action

One-day tutorial

9 September
Vision through optimisation (provisional title),
Dr Tim Cootes (University of Manchester),
Dr Neil Thacker (Sheffield University

Important Dates

Deadline for paper submission	29 April 1996
Notification of acceptance	10 June 1996
Deadline for camera-ready copy	8 July 1996

Postdoctoral Fellowship Available

ITMI APTOR, Research Studies and Technology group, Meylan France

ITMI APTOR seeks candidates interested in carrying out a postdoctoral fellowship in computer vision. The prospective fellow must be a citizen of an EC country *other than* France. The fellowship would be for 6-24 months, and may start as early as January 1997.

ITMI APTOR is involved in the design, development and implementation of flexible automation systems using computer vision and perception technologies.

Since its founding in 1982, the company has delivered over 200 industrial vision systems across a broad

spectrum of application fields. It has been especially active in the following four major application domains:

- Pattern recognition and classification;
- Quality control, inspection and measurement;
- Optical Character Recognition (OCR);
- Guidance of robot arms and for mobile robotics

These have been supplied to a range of clients in the space, military and industrial fields with a diversity of the operational constraints e.g. time constraints, robustness to noise, to lighting conditions, etc.

These systems are based on a broad range of sensors including: CCD cameras, infra-red, radar, sound, sonar, etc. The company's reputation is based on such experience of constrained operational applications, in conjunction with the mastering of the most advanced technologies in computer perception.

The techniques and methods employed within ITMI APTOR include:

- Scene modeling using active laser rangefinders/passive stereo vision;
- Image motion detection and estimation;
- Real-time tracking of multiple objects;
- 2D pattern recognition in images using neural networks or classical pattern recognition methods;
- 3D object recognition techniques from 3D data;
- Road following based on colour image segmentation;
- Multi-sensor fusion for scene modeling and for the estimation of physical properties of a scene surface (e.g. temperature, roughness, orientation, relative dielectric constant);
- Segmentation and interpretation of satellite images.

ITMI APTOR also develops embedded systems for real-time vision (specialised architectures and hardware) for applications in navigation, trajectography, modeling, tracking etc. The Research Studies and Technology group has about 20 staff, many with PhDs working on various aspects of advanced technology apart from vision such as ATM, Machine Learning and in-car navigation systems.

ITMI APTOR participates actively in national and international R&D programs (EUREKA, ESPRIT,...) and collaborates with the major research laboratories in France and throughout the world. It comprises 180 staff with the majority at Meylan near Grenoble, France.

To apply please send CV plus names of 3 referees to Patrick Courtney as soon as possible, and in any case before 15th May 1996. For more information or informal enquiries, please contact Patrick Courtney at:

ITMI APTOR
61 chemin du Vieux Chene
38244 Meylan CEDEX
FRANCE
Tel: +33-76-41-4017
Fax: +33-76-41-2805
email: `Patrick.Courtney@itmi.cgs.fr`