BMVA News

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

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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 31st March 1999.

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[1]The British Machine Vision Association and Society for Pattern Recognition is a Company limited by guarantee, No. 2543446, registered in England and Wales. Registered Office: Granta Lodge, 71 Graham Road, Malvern, WR14 2JS. The Association is a non-profit-making body and is registered as charity No. 1002307.

Obituary – Annette Harris

It is difficult to imagine the Image Processing Group at UCL without Annette. When she joined the IPG on the 1st April 1975, she was employed as a programmer, transferring from a similar position in another group in the same Department. A few years later, when I had lost my permanent secretary and was suffering under the strain of a string of temporaries, Annette took pity on me and offered to fill the vacancy herself. This position she held extraordinarily successfully until I retired at the end of 1996, after which she continued as secretary to Terry Fountain. Sadly, by this time, her health was severely damaged by the cancer which eventually killed her.

Annette was never 'just a secretary'. Even the title 'personal assistant' barely did justice to the nature of her work and to the dedication and skill she applied to it. Apart from the immense amount of administration entailed in supporting me as the Departmental Postgraduate Adviser , she also gave me the backup I needed first as Secretary then as Chairman of BPRA (as it was then) and, later, Secretary and President of IAPR.

When BMVA decided to incorporate, it was Annette who went through the all the compilcated documents with a fine tooth comb and in the IPG it was Annette who worked meticulously through the mind numbing bureaucratic deluge of paperwork stemming from student load statistics and grant applications, research proposals and contract accounting. Much of this would just never have been completed had she not taken on the task; her attention to detail was renowned and her energy apparently boundless.

Annette didn't suffer fools gladly but, though she hated inefficiency, she would always take pity on our incompetence. This other side of Annette could be

seen in her green fingers which lovingly tended all our office pot plants as well as the tranquil garden she and Terry shared at their home in Burgess Hill. Her love of music was expressed in her membership of a local choir (which sang movingly at her funeral) and this choir would sometimes accept engagements abroad, giving Annette the opportunity to spend more time in foreign travel, which she much enjoyed.

Many BMVA members will know that Annette was their Membership Secretary, most of whose efforts, though vital to the efficient operation of the Association, were carried out behind the scenes. Thus for some, 'Annette Harris' was just a signature on a piece of paper. For those of us who knew and worked with her, she was a friend and colleague we will greatly miss and will always remember with respect and affection.

Michael Duff

At Annette's funeral, when we were invited to look at our own personal snapshots of her life, I found myself remembering three separate occasions: her telephoning me to say she would collect me at Waterloo to drive me to the IPG Christmas party because I had just had an operation; her 'talking me down' a sheer cliff in Santa Fe when she must have seen in my face the fear of heights I was too embarrassed to voice; her telling me in one breath that she had to have further chemotherapy and in the next asking me to help arrange a surprise retirement party for Mike at UCL.

Annette always just got on with the job; she was a no-nonsense girl who never sought the limelight and it would not have occurred to her how much we would admire her brave fight against cancer. I never saw her lose her determination nor her humour and her courage and friendship will stay with me always.

Sue Duff

Technical Meetings

As some of you will be aware, a new BMVA email list has been setup at the academic mailbase (`www.mailbase.ac.uk`) in order to better distribute information to our members about future meetings and events. Many of you will have been automatically registered and should have already received postings. However, due to out of date/absent email address from our records, many of you may not be aware of this new service. The BMVA would therefore like to encourage you and your colleagues to subscribe. You do not have to be a current member to join, see `www.mailbase.ac.uk/lists/bmva/` for further information. The list is moderated to ensure that you will receive only official BMVA messages. Anyone wishing to send out postings on the list should send the message direct to myself at the email below.

To join the bmva list send the following command, (typing your own personal names instead of firstname(s) and lastname)

join bmva firstname(s) lastname

as the only text in the body of an email addressed to:

`mailbase@mailbase.ac.uk`

Richard Bowden
Meetings Officer
email: `richard.bowden@brunel.ac.uk`

EPSRC Update

EPSRC support for Machine Vision research has been relatively buoyant in the last twelve months. Eleven research grants have been funded through the Systems Architecture "responsive mode" operation of IT & Computer Science programme covering a wide range of research areas within machine vision and image processing, including radar imaging, document analysis, underwater automation and mammography. It is interesting to note that two of these grants were funded under EPSRC's "fast stream" for first-time applicants, while a third was from a new EPSRC Advance Fellow for equipment to establish their research programme. Support for such young researchers is clearly important for the future of the UK research base in the field.

While Systems Architectures provides the main funding stream within EPSRC for generic machine vision research, additional funding for applied research is provided other programmes. All three of EPSRC's engineering programmes have supported Machine Vision research grants in 1998, and most recently Machine Vision researchers have been very successful in seeking funds through the Healthcare Informatics Programme, which is jointly sponsored

by IT & Computer Science and Engineering for Infrastructure, the Environment and Healthcare Programmes. Total EPSRC commitment in 1998 to new grants relevant to Machine Vision was in excess of £2.2 million, with a further £2 million likely to be announced under the Healthcare Informatics Programme early in 1999.

On the policy side, past-funded Machine Vision research will be subject to some scrutiny in 1999, with the review of the Integrated Machine Vision Programme likely to take place in the autumn. EPSRC is also expecting to conduct a review of the support provided for UK participation in the Imaging Understanding Environment (IUE) programme. Further details on these policy initiatives will be released as plans are finalised later in the year.

Further information on EPSRC support for Machine Vision research can be found through our web site `www.epsrc.ac.uk`. Any specific queries you might have can also be addressed to me by phone, fax or e-mail. I look forward to hearing from you.

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Data Compression

A report on the BMVA technical meeting December 1998. Held at the British Institute of Radiology 36 Portland Place, London. Chaired by Dr. Margaret Varga.

The BMVA's December technical meeting was entitled "Data Compression", with speakers and attendees coming from academic, military, and industrial backgrounds. Six areas of research were presented covering a broad range of data compression and data transfer techniques and philosophies. Four of the presentations focused on image encoding techniques while the other two presentations discussed very low bit rate representation and transfer of image sequences.

David Gibson of Bristol University started the day with a talk entitled "High Ratio Compression of Natural Outdoor Images". Due to the overwhelming volume of image data present on the Internet and World Wide Web, it is necessary to have new, intelligent methods for image representation and analysis. It was suggested that, given automatic classification of images using neural network technologies, regions within an image can be described by their boundary and a descriptive label such as car, sky, road, etc. With up to 40 regions of interest this encoding can describe a full colour, 768 by 512 image with compression ratios of greater than 1000 to 1. The decoding stage uses a set of predefined images and algorithms to reconstruct a representation of the original image such that a human user can easily recognise the content.

Paul Arthur of the Defence Evaluation and Research Agency then gave a talk entitled "Robust Coding Techniques for Imagery Transmission Over Error-prone Communication Media". The lossless, uncorrupted transmission of images over very low bandwidth, high frequency radio communications channels is made difficult by fluctuations in atmospheric conditions and the ionosphere. A technique was proposed that encodes an image as a set of binary blocks and bit planes after despeckling and palette reordering and optimisation. The structure of this encoding enables extensive error checking on decoding, without the need for traditional error checking code. The technique gives compression ratios of 4 to 1, which is less than JPEG, however, if the transmission is corrupted the image quality is affected much less.

Ioannis Koufakis of University College London ended the morning session with a talk entitled "Linear Combinations of Face Views for Low Bit Rate Face Video Compression". Model or object based coding techniques could provide a system for real time video conferencing. A method was described that extracts 2D information such as, texture, eye and mouth shape and face rotation, from a set of facial posses. After an initial data transfer, only changes in a small set of coefficients need to be sent across the network in order to deform a model in a realistic manner that reflects a video stream of a persons face and its various movements. Compression ratios in excess of 1000 to 1 are obtained which is far in excess of traditional DCT based techniques that fail at ratios greater than 600 to 1.

Paul Cockshot of Glasgow University began the afternoon session with a talk entitled "The Strathclyde Compression Transform". Hand held mobile video phones are being developed requiring very low bit rate data transfer and simple compression/decompression algorithms. A new, efficient, transform, that avoids floating point arithmetic and maximises the use of previous frames was presented.

The technique involves the use of YUV colour space, neural network derived codebooks, hierarchical vector quantisation and lookup tables which gives very high bit rates with relatively low noise levels.

Stuart Clark of Harriot Watt University presented the penultimate talk, entitled "Sonar Image Compression". Sonar imaging of the sea-bed produces vast amounts of data, much of which is speckle noise, insignificant texture which is inefficiently compressed by DCT based techniques. In order to retain areas of potential interest and increase compression ratios a texture description based process was proposed. After using bit planes to find texture boundaries, insignificant areas of texture are approximated using a combination of PDF's, auto-covariance functions and k-nearest neighbours. High quality images with compression ratios of 65 to 1 were demonstrated and compared to the low quality and low compression ratio images generated by DCT based techniques.

Margaret Varga of the Defence Evaluation and Research Agency gave the final talk, entitled "Content-based Image Compression". When compressing certain images it is important ensure the retention of important information or features within the image. A content based technique was presented that combines the high compression ratios obtained using lossy techniques with the detail preserving qualities of lossless techniques. Using a combinaton of wavelets, quadtrees and vector quantisation an image is recursively decomposed to give levels of detail. With 300 relevent details preserved, compression ratios of over 89 to 1 are obtained with this method, unlike the general image degredation associated with fractal and JPEG techniques at high compression ratios.

The meeting brought together many exciting ideas and techniques within the field of data compression. Of particular interest were the development and uses of content based compression systems with the combination of lossless and lossy techniques. As the amount and variety of digital information continues to grow, research into more intelligent and high level methods of data compression and transfer will also develop.

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Introductory Techniques for 3D Computer Vision

by Emanuele Trucco and Alessandro Verri

Prentice Hall, 1998

In his foreword to this book, Tomaso Poggio describes the familiar situation of being asked what should be read by newcomers to computer vision and being forced to give a lengthy answer, listing books and papers and giving instructions as to what can be gained from each. Poggio goes on to say that from now on his answer will be short – he will recommend Trucco and Verri. This makes very good sense. Introductory Techniques for 3D Computer Vision provides exactly what its title suggests; a clear introduction to the basic problems of 3D computer vision and the tools and techniques used to address those problems.

The early part of the book covers image formation, noise characteristics and removal and the extraction of image features. This is perhaps not surprising. What is different about this book, however, is that even standard material is clearly seen from a computer vision perspective. The sections on optics, radiometry and geometric image formation are quite short, but provide concise explanations of the most frequently needed concepts. The chapters on image features cover deformable contours and surface patch extraction from range images as well as the more usual edge and corner detection. A full chapter is dedicated to camera calibration, providing a clear statement and theoretical treatment of the problem followed by pseudocode versions of selected calibration algorithms and guidelines on when and how they should be used. This pattern is repeated throughout the book, making it a useful text both for those seeking a fundamental understanding of the field and the more knowledgeable reader needing a shortcut to a practical solution.

Later chapters are dedicated to particular areas of 3D computer vision: binocular stereo, motion, single image techniques (including shape from shading and texture and the recovery of albedo and illuminant direction) and object recognition. Most of the central topics are discussed, though active vision is mentioned only briefly. The text is clear throughout, with definitions, algorithm summaries and key points neatly highlighted. In places a few more examples of the output of the techniques described would be useful, particularly to aid comparison of alternatives, but this is a minor point. Each chapter ends with solid references to papers and web sites where further results can be found.

Perhaps the best way to judge a book is to consider how you use it. In the few weeks since I received this one I have shown and recommended it to one academic colleague, experienced in active sensing but new to computer vision, one postgraduate needing a deeper understanding of shape from shading and two undergraduate project students wishing to implement specific techniques. This is a very practical book, it includes a survey of useful mathematical software, for example, and the first appendix is given over to experimental evaluation of vision techniques. Poggio's foreword may be a little effusive, but it is in essence true – Introductory Techniques for 3D Computer Vision deserves to become a standard text in the field.

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The Challenge of Image Retrieval

2nd UK Conference on Image Retrieval

25 & 26 February 1999
Forte Posthouse Hotel
Newcastle upon Tyne

Building on the success of this first conference, the 1999 event again aims to bring together researchers and practitioners in the fast-growing area of image retrieval. BMVA members working in the field of image or video retrieval, or wanting to learn more about recent developments, should find much to interest them.

This two-day event will consist of a mixture of submitted and invited papers covering both technical and human aspects of research and innovation in image retrieval. Our keynote speaker will be Dr Michael Swain from the Alta Vista development team at Compaq Computer Corporation, who will talk on image searching on the Web. There will also be discussion sessions on the current state of the art in content-based image retrieval, and the impact of MPEG-7 and other emerging standards for multimedia content description.

For further information, see our Website at `http://www.unn.ac.uk/iidr/conference.html` or contact

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IEE Professional Group E4

• **25 March 1999:** Colloquium to be held at the IEE, Savoy Place on "Document Image Processing and Multimedia '99" (DIPM'99)

• **May 1999:** Colloquium to be held at the IEE, Savoy Place on "Motion analysis and tracking", organisers: Andrew Calway and Miroslav Bober

Further details and registration forms for these two events can be obtained from:

tel: 0171 240 1871
fax: 0171 497 3633
email: `events@iee.org.uk`

• **12–15 July 1999:** Seventh International Conference on Image Processing and its Applications (IPA 99), at the University of Manchester.

IPA 99 aims to cover the whole range of topics of current interest in the image processing field, including in particular image communication, image interpretation, image analysis, architectures and applications. Prior to the main conference (13–15 July), a tutorial will be held on 12 July covering the following range of topics: colour in image processing; low level vision requirements; video database searching; an introduction to advanced methods for the subjective evaluation of image quality and the use of visual models.

The full programme will be available shortly from:

IPA 99 Secretariat
IEE Conference Services
Savoy Place
London WC2R 0BL
tel: 0171 344 5472
fax: 0171 240 8830
email: `ipa99@iee.org.uk`
www: `http://www.iee.org.uk/Conf/`