

BMVA News

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

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BMVA News¹ 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 1 December 2008.

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Editorial: *Birth of a Concept – Reverse Temporal Relevance*

Every now and again there comes a time when one needs to sort out one’s office and eliminate redundant material. During such an exercise one has to discriminate between ‘ephemera’ – documents that have become dated – and ‘archival material’ which should be kept (nearly) for ever. Included in the latter category are the journals that are needed for carrying out well-informed professional research. I am no different from others in having collections in both categories and also in frequently finding it difficult to make quick distinctions as to what to throw out.

Recently I found myself agonising over shelves full of TPAMI, TIP, PRL, CVIP, CVGIP, CVIU, IVC, RTI, and more. Various ways of prioritising these come to mind: keep the archival, high impact factor journals; keep the latest journals; keep those containing seminal papers; keep long runs of journals (it is infuriating missing an issue that one suddenly needs; and in any case, it is good to have confidence that one can instantly find *any* paper in journal X or Y). Regarding time, surely the latest issues are the most relevant – even though there is a sense in which the earliest ones are the most seminal and thus the grandfathers of all later papers.

But maybe we should be quantifying all this: in particular, we should aim to keep the most relevant issues, which will normally be the latest ones. Thus we arrive at an exponential forgetting factor going back in time. However, any paper will also have a (reverse) learning curve, during which we learn about its existence and impact. These two factors lead to a relevance factor that first rises and then falls as we go

back in time – which can be modelled by combining two exponentials, leading to a bell-shaped curve much like that sometimes arising with radioactive decay. Next we need to average this over all papers. The resulting temporal relevance curve will (I surmise) peak at about –2 years, plus a reverse half-life of about 5 years. Taking reasonable estimates of the cost of shelf-space, it is worth keeping journals for four half-lives, which means that I should be eliminating all issues of journals more than 22 years old. Or maybe keep the high impact journals for longer and the low impact journals for shorter times.

The first problem with this analysis is that there is no need to keep complete runs of journals: instead, the number of issues kept can be reduced in proportion to the temporal relevance curve (and the impact factor). Another problem is that nowadays it is becoming fashionable for publishers to offer electronic issues, so one is alright while one can afford the subscription, but after that one has *nothing*. Well, not nothing if one has a subscription to the IEEE Digital Library, *and* the IET Digital Library, *and* the ACM Digital Library (which ones have I forgotten?) – and these aren't exactly cheap. Actually, if one is happy to raid people's websites (which can be time-consuming) one can arrive at a cheaper solution, though publishers now seem to be fighting that approach. In fact, the whole situation is evolving, and I have to confess that, in the present financial climate, I will continue to hoard both gold and paper, including my complete set of PAMIs.

Interestingly, my reverse temporal relevance curve is also of value when examining PhD theses. In many cases the list of references ranges from 10 to 3 years ago and then stops, for obvious reasons! So a fair number of 'minor corrections' are needed to eliminate the problem. Similarly, papers one is refereeing often used to be curtailed at about the 3-year mark. Here I've recently noticed a new effect: it is not that the latest papers have been ignored so much as all papers from the last century; somehow it is felt that any paper whose date starts with the magic number 19 is archaic and totally irrelevant. Of course, all these points can be blamed on poor training of graduate students, but do we also have to beware of social factors which mean that we have to have the latest computer, the latest car, the latest clothes, the latest hair-style, and above all only the latest references? Hardly a case of "Plus ça change, plus c'est la même chose". I must say, regarding references in papers, I haven't seen this effect before, *ever*.

Professor Roy Davies
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Prizes and Awards at BMVC 2008

BMVA Distinguished Fellow 2007

The award of BMVA Distinguished Fellow 2007 was conferred upon Bill Adaway.

This prestigious award is given to one person only each year, in recognition of service to the British Machine Vision community.

Sullivan Doctoral Thesis Prize 2007

The 2007 Sullivan thesis prize was awarded to Pushmeet Kohli for his thesis entitled "Minimizing dynamic and higher order energy functions using graph cuts".

The annual Sullivan Doctoral Thesis Prize, administered and awarded by the BMVA, is given to the author of the best thesis in a calendar year.

Best Science Paper

The prize for best science paper, sponsored by the BMVA, was awarded to Gerald Schweighofer and Axel Pinz for their paper "Globally optimal $O(n)$ solution to the PnP problem for general camera models".²

CRS Industrial Prize

The CRS Industrial Prize, sponsored by Computer Recognition Systems, was awarded to Amaël Delaunoy, Emmanuel Prados, Pau Gargallo, Jean-Philippe Pons and Peter Sturm for their paper "Minimizing the multi-view stereo reprojection error for triangular surface meshes".

Best Security Paper

The prize for best security paper, sponsored by Irisys, was awarded to Ognjen Arandjelovic for his paper "Crowd detection from still images".

Best Poster

The prize for best poster, sponsored by EPSRC, was awarded to James Philbin, Josef Sivic and Andrew Zisserman for their paper "Geometric LDA: a generative model for particular object discovery".³

² PnP means the Perspective n -Point problem – namely, how to determine the pose of a 3D object after identifying n feature points on it (and knowing whether there is a unique solution). – Ed.

³ LDA means 'Latent Dirichlet Allocation': Geometric LDA is a model for unsupervised particular object discovery in unordered image collections. – Ed.

Highly Commended Reviewers

The prizes for highly commended reviewers, sponsored by Springer, were awarded to Jan-Mark Geusebroek, Bastian Leibe, Ali Shahrokni, Josef Sivic and Jonathan Starck for their invaluable contributions to the conference.

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BMVC 2008: Distinguished Fellow Presentation



Bill Adaway, *BMVA Distinguished Fellow 2007*

Here we include the speech made by Professor Majid Mirmehdi while presenting the *BMVA Distinguished Fellow 2007* award to Bill Adaway at BMVC 2008.⁴

“BMVC Delegates and BMVA Members,

It is an honour to be presenting Bill Adaway with the BMVA Distinguished Fellowship award. Many of you may not have heard of Bill, but I have no doubt you have been captured, maybe even fined, by one of his cameras! Let me first give you some facts:

After spending several years working for Ferranti and then Thorn EMI, Bill founded Computer Recognition Systems in 1981. CRS is based in Wokingham in England and it is now a worldwide trading company with offices in the UK, US, and Malaysia. Employing 80 staff, CRS, together with its subsidiary Davin Optronics, provides world class imaging systems development and manufacturing capability, and supplies

optical and electro-optical equipment to Military, Industrial, Medical and Transportation markets.

Bill’s research activities include all aspects of outdoor machine vision concerned with wide area surveillance, object tracking and automatic numberplate recognition including illumination, optics, algorithms and processing. His company has the majority share of the market in the UK for [extremely versatile and accurate] motorway and city-centre traffic speed monitoring, for example the yellow average-speed cameras along roadworks on Britain’s motorways – a prime example of image analysis in action.

Bill played a key role in establishing the BMVA, bringing an industrial perspective to discussion of its scope and objectives, and took up a place as a founder member of its executive committee. Following the formation of BMVA and the merging of Alvey Vision Club annual meetings and BPRA’s international meetings to create BMVC, he acted as a regular member of the programme committee, taking on a very substantial refereeing load. During this period BMVA worked hard to improve both the academic quality and industrial relevance of BMVC, and Bill brought a unique and invaluable perspective.

Over a very long period now, Bill has been one of the most prominent and consistent examples in the UK of someone at the ‘sharp end’ from industry engaging actively and intelligently with the academic machine vision community, contributing both to its development and to encouraging knowledge transfer. Bill has also played, for many years, an active role in advising funding bodies (particularly DTI and EPSRC). One outcome of his advocacy for the relevance of academic research to industrial practice (and vice versa) has been EPSRC and DTI support both for specific projects and for broad programmes of joint research.

On top of his direct services to the machine vision community, Bill is also a beacon of success in taking state-of-the-art vision algorithms, and building a successful business – something we ought to honour in its own right.

Bill, I present to you the BMVA Distinguished Fellow award.”

Professor Majid Mirmehdi
Bristol University
email: m.mirmehdi@cs.bris.ac.uk

⁴Thanks are due to Professors David Hogg and Chris Taylor for their valuable help in drafting this speech.

Around and About at BMVC 2008

Reception ...



The Buffet.

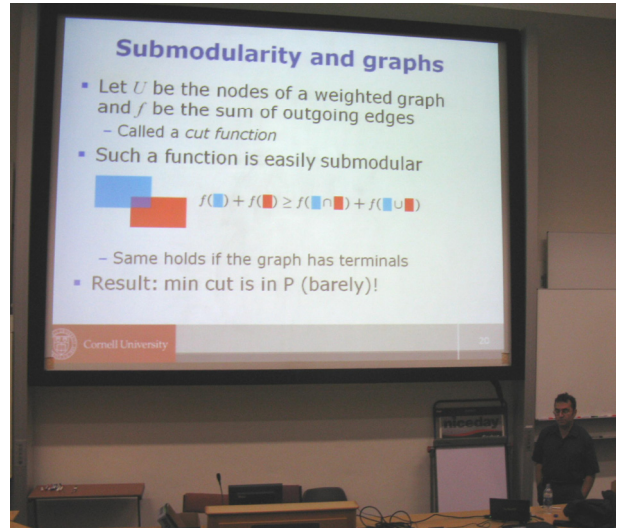


Leodian String Quartet.

Presentations ...



Philip Torr starts his Tutorial on Markov Random Fields.

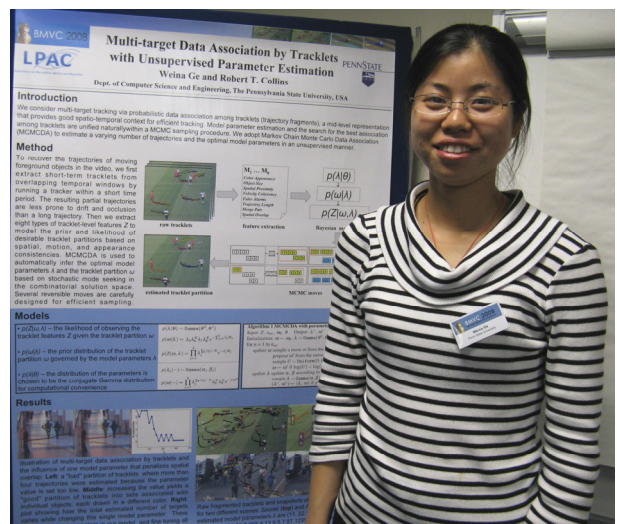


Invited speaker Ramin Zabih discusses weighted graphs and min cuts.

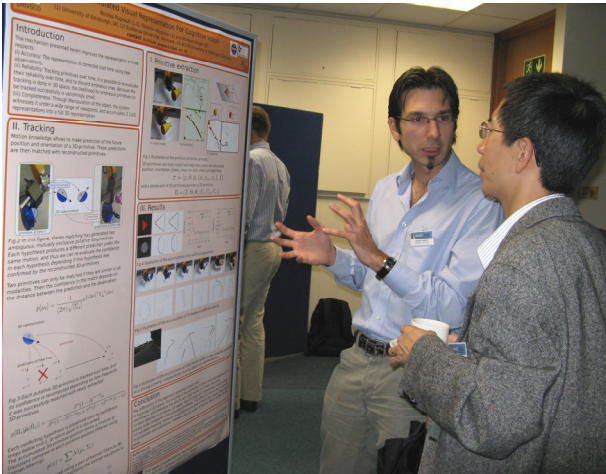


Mark Everingham (Chair) asks invited speaker Cordelia Schmid a key question.

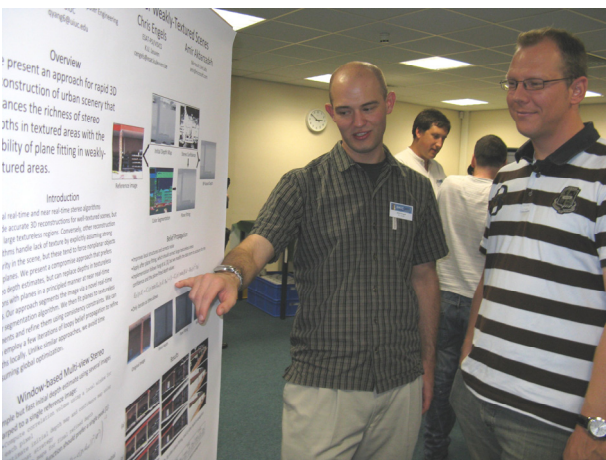
Posters ...



Weina Ge (Penn State University) with her poster.



Nicholas Pugeault (Edinburgh) talks to Li-Qun Xu (right).



Chris Engels (KU Leuven) presents his poster.

Time to relax ...



Drinks before dinner.



Patrick Buehler (Oxford), Ondrej Chum (CMP Prague), James Philbin (Oxford), Florian Schroff (Oxford).



Majid Mirmehdi, Bill Adaway, David Hogg, Marcus Hennecke.

Conference Banquet ...





Majid Mirmehdi and Mark Everingham.

Prizes and Awards ...



Springer Highly Commended Reviewer: Ali Shahrokni (University of Oxford).



Springer Highly Commended Reviewer: Phillip Zehnder receives a prize on behalf of Bastian Leibe (ETH Zurich).



Springer Highly Commended Reviewer: Liam Ellis receives a prize on behalf of Jonathan Starck (University of Surrey).



EPSRC Best Poster: James Philbin (University of Oxford) receives a prize from Wendy Howie (EPSRC).



Best Science Paper: Gerald Schweighofer (Graz University of Technology).



IriSys Best Security Paper: Thomas Woodley receives a prize on behalf of Ognjen Arandjelovic (University of Cambridge).



Sullivan Thesis Prize 2007: Andrew Fitzgibbon receives a prize from Majid Mirmehdi on behalf of Pushmeet Kohli (Oxford Brookes University/Microsoft Research).



CRS Industrial Prize: Amael Delaunoy (INRIA Rhone-Alpes) receives a prize from Bill Adaway.



BMVA Distinguished Fellow: Bill Adaway receives his award from Majid Mirmehdi.



Bill Adaway proudly shows his certificate!

Workshop ...



Invited speaker Francois Bremond (INRIA Sophia Antipolis) with organizer Jordi Gonzalez (Universitat Autònoma de Barcelona).



Jordi Gonzalez introduces the workshop.

Thanks are due to postgraduate students Dima Damen, Sam Johnson and Patrick Ott for the huge help they gave in providing pictures, and to Mark Everingham for overseeing the process and providing me with all the necessary information to compile this ‘Around and About’ gallery.

Professor Roy Davies
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Report on IWDM 2008

The 9th International Workshop on Digital Mammography (IWDM 2008) was held on 20–23 July at the El Conquistador Hotel and Country Club in Tucson, Arizona, USA.

This bi-annual conference is the main forum for research within the field of mammography and breast imaging. As such, its 9th incarnation covered a diverse range of topics – from the physical practicalities of new image hardware and image analysis algorithms for detecting and diagnosing cancers to clinical trials of new equipment and software. The eclectic mix of work presented was mirrored in the composition of conference delegates, with researchers from physics, engineering, computer vision and image analysis, together with clinical radiologists and administrators of mammography screening programs. As ever, this provided ample opportunity for discussion and debate.

2008 saw a record number of papers submitted, resulting in 68 accepted as oral, and 35 accepted as poster presentations. The conference ran single-track, with oral presentations grouped into sessions on Breast Density, Texture and Risk; Clinical Experiences; Breast Imaging Physics, Image Analysis and CAD (Computer-Aided Detection); Modelling and Simulation; Digital Breast Tomosynthesis; and Image Quality and Quality Assurance.

In addition, three keynote speakers were invited to the conference. Firstly, Karen Lindfors MD, Professor of Clinical Radiology and chief of Breast Imaging, University of California, presented a talk entitled “Dedicated breast CT: initial clinical experience”, in which she described work in developing a custom-made breast CT machine. A key point of the presentation was that the 3D image volumes had been acquired at the same radiation dose as two-view mammography, seemingly overcoming one of the main limitations in using CT as a screening tool. Moving from 2D X-ray mammograms to 3D modalities was a dominant theme

of the conference, and this talk was a fitting opening to the proceedings.

Continuing the theme of 3D imaging, the second keynote speech, "Breast tomosynthesis: ready for prime time?" was given by Elizabeth A. Rafferty MD, Director of Breast Imaging, Massachusetts General Hospital. Following on from initial tomosynthesis research presented at the previous conference in Manchester, Dr Rafferty described how the new modality had progressed in the last two years. The talk included both promising statistics on the ability of radiologists to detect cancers in the image volumes, and plenty of visual examples of cancers visible in tomosynthesis slices but occluded in mammograms. The talk provided an excellent introduction to the session of oral presentations dedicated to breast tomosynthesis given later that day, and gave evidence to suggest that the technology could be a viable modality for screening in the near future.

The final keynote speaker, Dr Martin Tornai, Associate Professor in the Department of Radiology and Biomedical Imaging, Duke University, gave an in-depth presentation on the application of nuclear medicine and molecular imaging techniques to diagnose and monitor breast cancers. Again, the presentation was rich with visual examples and served to highlight how new modalities can successfully be employed in breast imaging.

In keeping with the keynote speeches, the standard of presentations for accepted talks was exceptional. From a computer vision and pattern recognition point view, the advancement in CAD, and ever more realistic simulation and modelling of mammographic appearance, were of obvious interest. However, it also became clear that as modalities such as breast tomosynthesis and CT move from research into everyday use, a new range of image analysis challenges opens up. In particular, image fusion and multi-modal registration will become crucial as the range of sources from which breast images are acquired increases. Perhaps most encouraging for all delegates were the results presented from clinical trials of new technologies, demonstrating that the development of research is making a real improvement in the detection of breast cancers.

Congratulations go to the IWDM committee and all those involved in organising and running a successful conference. The El Conquistador Hotel and Country Club, nestled in the stark but beautiful Sonoran Desert, proved an impressive venue for the event – providing excellent conference facilities along with plenty of opportunities for relaxing. Most importantly, the scientific program offered a fascinating insight into the rich variety of research currently undertaken, and a

timely reminder of the challenges ahead, as breast imaging moves fully into the digital age.

My thanks go the BMVA for supporting my attendance at the conference with a travel bursary. The 10th IWDM will be held in Girona, Spain in 2010. Further details can be found at <http://www.iwdm2008.org/>.

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Segmentation of Anatomical Soft Tissue Regions in Medical Data

Call for Participation

1-day BMVA Symposium at the British Computer Society, Southampton Street, London on 5 December 2008.

Chairs

Reyer Zwiggelaar, Aberystwyth University
Xianghua Xie, Swansea University

The segmentation of anatomical structures and regions plays a significant role in most medical image analysis processes. Currently one of the challenges lies in the segmentation and/or recognition of soft tissue regions where the differences between various types of tissue can be minimal. A typical example where this work has advanced over the past ten years is the segmentation of cerebrospinal fluid (CSF), white and grey matter in brain MRI. However, noise and partial volume effects can still be a source of less than optimal segmentation results. In addition, new challenges (e.g. the subdivision of the thalamus or functional regions, or the use of alternative modalities like ultrasound) are emerging as more complicated tissue modelling/classification problems in need of solution. A second example can be found in mammography where it is possible to distinguish fatty and dense tissue, but a further subdivision into nodular, homogeneous, radiolucent and linear tissue is still an unsolved problem. In most clinical applications, across modalities, similar segmentation and recognition problems can be identified.

Papers are sought that relate to the segmentation of anatomical soft tissue regions. Topics that would be of interest include, but are not restricted to:

- data driven segmentation
- model driven segmentation
- registration
- multi-modality
- generation and use of atlases
- texture
- shape
- appearance
- ground truth
- visualisation
- feature selection
- dimensionality reduction
- functional/temporal aspects
- performance evaluation.

The meeting is aimed at bringing researchers together to present and discuss existing and novel solutions. Although the emphasis will be on medical data, (theoretical) papers proposing existing techniques from alternative application domains that are not yet used on medical data will be considered. In addition, the meeting is expected to provide an excellent introduction for researchers considering moving into this area.

Please submit a 1-page (A4) extended summary (*max* two pages, PDF preferred) by email attachment (1Mb max please!) to Reyer Zwiggelaar (rrz@aber.ac.uk) by 17:00 on Friday 10 October 2008.

Dr Dimitrios Makris
Kingston University
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Group Theory, Invariance and Symmetry in Vision

Call for Participation

1-day BMVA Symposium at the British Computer Society, Southampton Street, London on 21 January 2009.

Chair

Lewis Griffin, University College London

Geometrical methods allow analysis of structures and their configuration in a containing space. Group Theory provides an alternative perspective – analysis of structures, and their containing spaces in terms of transformations of them. This transformation perspective leads to the concepts of invariant, intrinsic properties and symmetrical structures; allows a radically

different characterization of the geometry of a space; and allows reasoning and modelling in and of the transformation space itself.

Group theory is a general tool of mathematical analysis, with applications in most numerate disciplines but with a special relationship with perception, as first noted by Helmholtz with his ideas of ‘constancy’ and later by Poincaré who reasoned that perceptual systems must be able internally to undo the effect of external transformations.

New applications of Group Theory to Computational Vision continue to be published. Some, for example understanding statistical shape variation as a distribution over the group of diffeomorphisms, arise from the general usefulness of Group Theory; others, for example invariant image descriptors, are specific to vision.

This meeting is designed as a forum where work in these areas can be presented and discussed. If you work on any of the topics below or any related topic, or if you are interested in applying or learning about them, do participate in the meeting and possibly present your work, even if it is not yet fully developed or complete.

Relevant topics are:

- symmetries of actual and ideal front end visual systems
- perception, detection and analysis of local and extended image symmetry
- invariant flows on images
- symmetry-based description of shapes or images for texture or object recognition
- symmetry as an indicator of affordance
- understanding texture as stochastic symmetry
- applications of groupoids in vision
- analysis of shape variation from the transformation perspective
- invariant image descriptors: local, multilocal and global
- measurement and use of facial symmetry
- invariance in colour vision
- understanding the agent environment symmetry
- methods of harmonic analysis for vision
- permutation groups in multi-object tracking
- local symmetry transforms
- the relationship between image and scene symmetry.

Please submit a 1-page (A4) summary (PDF preferred) to Lewis Griffin (l.griffin@cs.ucl.ac.uk) by 12 December 2008.

Dr Dimitrios Makris
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Dataset for ‘Action Recognition’

As part of the EPSRC-funded REASON project, we have generated a large body of virtual human action video data for the evaluation of silhouette-based action recognition methods. This dataset is now available for download by researchers in the computer vision community at <http://dipersec.king.ac.uk/VIHASI>.

We have already used the data for the evaluation of our action recognition method: the corresponding paper will be published in a few months.

We are also working on the production of ground-truth skeletons for the silhouettes provided, for which there might be more demand, for instance for pose recovery from silhouette. This will be reported in due course.

Finally, we are also putting together a dataset of real actions recorded with multiple cameras. We welcome help from the community to help us derive the ground truth for this dataset (to offer help, please contact Sergio A. Velastin).

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Another IAPR Fellowship Awarded!



Fionn Murtagh

In the last issue I reported that the BMVA had been successful in having three of its members selected as Fellows of the International Association of Pattern Recognition (IAPR). Unfortunately, I missed out one well-known member of the UK Vision community who was nominated from outside the BMVA – Professor

Fionn Murtagh of the Department of Computer Science, Royal Holloway, University of London.¹

Fionn has worked for a long while on clustering, data analysis and data mining, and many other aspects of imaging and vision, and is very widely known in the area of astronomical image analysis. He is also a leading authority on wavelet and other multiresolution methods. His most recent book (from a total of five) is: *Astronomical Image and Data Analysis*, Springer (2nd edn., 2006).

I am sure readers will wish to join me in congratulating Fionn on having his work recognised internationally with this prestigious award.

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Book Review

Stuart Hoggar, *Mathematics of Digital Images: Creation, Compression, Restoration, Recognition*. Cambridge University Press, 2006.

“Methods of Mathematical Physics” is a well established genre with titles by authors such as Courant and Hilbert, Jeffreys and Swirles Jeffreys, and Mathews and Walker. Until now there have been no comparable titles in the genre “Methods of Mathematical Image Processing”. This book fills the gap. It covers in detail the major mathematical theories and methods which are applied to digital images. Each section contains enough material for a thorough understanding of the particular topics under discussion. There are numerous references, especially to the image processing literature, but all of the key mathematical results are stated and proved in the text rather than left to the references. The style of the mathematical arguments combines both words and formulae in a manner accessible to readers without a degree in mathematics. There are numerous exercises, many of which are straightforward tests of comprehension. Answers to some of the exercises are given on the author’s web page <http://www.maths.gla.ac.uk/~sgh/>. The above qualities make the book very suitable for private study. The book is also suitable for teaching at the postgraduate level or at the final year undergraduate level for mathematicians. In a computer vision or image processing course it

¹Being from the same institution, I should have known about this earlier, but believe it or not, there are academics who spend their time working instead of boasting about their successes! – Ed.

would need to be supplemented by a more application-orientated pixel level text.

There are six parts. Part I deals with planar patterns that show a high degree of symmetry. There are exactly 17 distinct types of such patterns, classified according to their symmetry groups. The symmetry group of a pattern contains those distance preserving transformations of the plane that also preserve the pattern. Each pattern is completely described by a fundamental region with finite area and the symmetry group. The group elements act on the fundamental region, moving it from one part of the plane to another to produce the complete pattern. This part of the book contains a very large number of figures, including examples of all 17 types of planar pattern.

Part II covers standard material on vectors and matrices, including determinants, rotations, eigenanalysis, linear equations, the Cholesky decomposition (in which a symmetric positive definite matrix is written in the form UU^T , where U is an upper triangular matrix with strictly positive entries on the diagonal), and the ubiquitous singular value decomposition, in which any matrix is written in the form UDV^T where U , V are orthogonal matrices and D is a diagonal matrix.

Part III covers probability, starting with the axioms and basic rules for calculating probabilities, including Bayes theorem – $P(A|B) = P(B|A)P(A)/P(B)$. In many applications, $P(A|B)$ is the quantity of interest, for example the probability of a hypothesis A given a measurement B . The probability, $P(B|A)$, of a measurement B given the hypothesis A , can be calculated, if A is sufficiently detailed. There are a large number of worked examples to show how the rules for calculating probabilities are applied. The standard distributions are discussed, including the binomial, Poisson, normal or Gaussian, multinomial, geometric, hypergeometric and Cauchy distributions. Convolutions and the addition of random variables are described, leading up to a proof of the central limit theorem, which states that the normalised sum of a large number of independent random variables tends to have a Gaussian distribution, even though the individual random variables may be far from Gaussian. Hypothesis testing is discussed in terms of a null hypothesis and an alternative hypothesis. The null hypothesis is rejected if the measurements are contained in a low probability region chosen a priori, i.e. before the measurements are obtained. Markov chains are defined and an excellent description is given of the Markov Monte Carlo method for sampling from a complicated probability distribution. This part ends with the use of network flows for maximum a posteriori (MAP) image restoration.

Part IV covers information theory and coding. It contains an excellent discussion of arithmetic coding, undistracted by the details of particular implementations, and a proof of Shannon's noiseless coding theorem which gives a lower bound on the mean number of bits required to send a message. Minimum description length and Kolmogorov complexity are defined. In these theories it is possible to assign probabilities to individual objects. The probabilities depend on the particular device or program used to manipulate the objects. A full discussion of channel capacity is given, together with a proof of the channel capacity theorem which specifies an upper bound on the rate at which information can be transmitted reliably through a noisy channel.

Part V covers the Fourier transform and the related discrete cosine transform. All the usual topics are covered in detail, including the convolution theorem, the fast Fourier transform which is essential for the efficient implementation of the Fourier transform, and band pass filtering. It is shown that the discrete Fourier transform approximates the continuous Fourier transform to the level of accuracy of the trapezoidal rule for approximating the integral of a function. A proof of the Shannon sampling theorem is given. This specifies the number of regularly spaced samples needed to construct a band-limited function. Applications of convolution filtering to edge detection are described, and Sobel edge detection and Marr-Hildreth edge detection are compared. The effect of blur due to motion through a distance a in the x direction is modelled by convolving the image with a function with Fourier transform $\text{sinc}(\pi ua) \exp(-i\pi ua)$. The effect of a lens on light rays is calculated using Gaussian optics, in which the lens is assumed to be thin and the rays are assumed to be near parallel to the optical axis. Models for blurring due to the lens and blurring due to the propagation of light through the atmosphere are described, and deconvolution-based image restoration is discussed. This part concludes with a long and detailed discussion of wavelets and multiresolution decompositions of images.

The final part, Part VI, contains an excellent description of splines, including B-splines, which are based on convolution powers of the function defined to be 1 on the interval $[0, 1]$ and zero elsewhere. If the convolution power is large then the resulting spline approximates to a Gaussian function. The links between B-splines and wavelets are explored and B-splines are applied to the modelling of complicated surfaces in 3D space. Neural nets are defined and the backpropagation and infomax algorithms for updating the weights in a neural net are described. In backpropagation, first order gradient descent is used to minimise an error function which measures the discrepancy between the current

classification and the correct classification. The latter is assumed known for a training sample. The aim in infomax is to maximise the mutual information between the input to the net and the output. The book closes with discussions of the Hough transform and tomography, in which the 3D internal structure of a solid object is inferred from the attenuation in X-rays passing through it in different directions.

The above list is only a sample of the vast amount of material included in this book. I recommend it to anybody with an interest in the mathematics of digital images, both as a reference book and for the detailed study of particular topics.

Professor Stephen Maybank
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- 15.00 Generic computer vision through genetic programming, Olly Oechsle and Adrian Clark (University of Essex)
- 15.30 Tea and Coffee
- 15.55 Learning models of graphs from data, Richard Wilson (University of York)
- 16.25 Active learning used to tune a parameter of an image analysis algorithm, L.D. Griffin, D. Sadybekova, M. Lillholm and J. Muir (UCL)
- 16.55 Closing remarks and finish

Note that a registration sheet is included with this issue of BMVA News so that members can book a place and lunch at the meeting.

Dr Dimitrios Makris
Kingston University
email: d.makris@kingston.ac.uk

Symposium on Machine Learning

1-day BMVA Symposium at the British Computer Society, 5 Southampton Street, London on 29 October 2008.

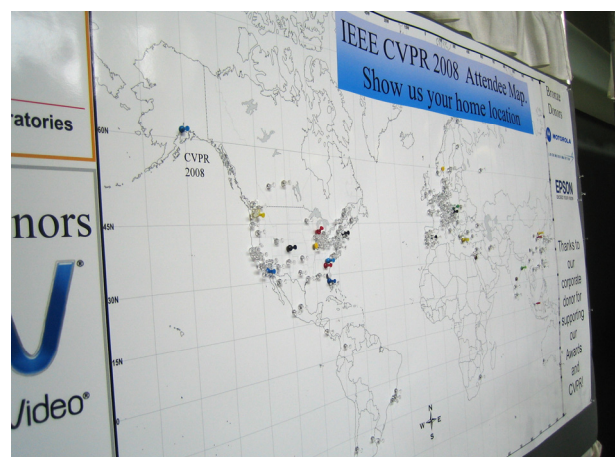
Chair

Maria Petrou, Imperial College London

- 09.30 Registration and coffee
- 09.55 Welcome and Introduction
- 10.00 **Keynote 1:** Support Vector Machines: a geometric interpretation, Sergios Theodoridis (University of Athens, Greece)
- 11.00 Learning to recognise objects with the tower of knowledge, Mai Xu and Maria Petrou (Imperial College London, EEE)
- 11.30 Learning event and object categories from video, Muralikrishna Sridhar, Anthony G Cohn and David Hogg (University of Leeds)
- 12.00 Storyboard sketches for content-based video retrieval, John Collomosse and Graham McNeill (University of Bath)
- 12:30 Incremental unsupervised learning of mixture models, Cyril Charron and Yulia Hicks (Cardiff University)
- 13.00 Lunch
- 13.30 **Keynote 2:** Learning and approximation with spiked stochastic neuronal networks, Erol Gelenbe (Imperial College London, EEE)
- 14.30 A stochastic circuit for learning transformations, Zeynep Engin, Jeff Ng and Anil Bharath (Imperial College, Bioengineering)

CVPR 2008 Conference Review

You could be forgiven for thinking that this year's CVPR conference, held in Anchorage, Alaska, about a million miles from anywhere (all the extra, unnecessary air travel makes me weep), would be small. Well, it wasn't. With over 500 accepted papers (an acceptance rate of around 30%), 62 of them orals, there was plenty of research on show, and the 3 panel discussions, 10 tutorials and 17 workshops probably helped to boost the number of delegates, which was over 1200. The organisers set up a map of the world for attendees to pin their home towns on, and it showed a broad range of origins, with the majority coming from the US, Europe and China.



Delegate markers from around the world

Each morning and afternoon started with posters, the alleys of which were initially too narrow to make

touring them easy, but this was improved somewhat for later sessions. On the first day I attended an oral entitled “Unifying discriminative visual codebook generation with classifier training for object category recognition”, which is one of those nice generalising papers that I always like. In the evening the prizes were announced, with the Best Paper Award going to two papers – the first on efficient sliding window search by a group from Tübingen, and the second on an optimization framework for second-order smoothness priors in stereo, by myself and my colleagues. Naturally, we were very pleased with this! People also voted for the location of the conference in 2010, which was chosen to be San Francisco.

A poster that caught my eye on the second day was entitled “In defense of nearest-neighbor based image classification”, which suggests that nearest-neighbour models have previously been undervalued. Some good oral presentations were “Epitomic location recognition”, which does what the title suggests, and “Closing the loop in scene interpretation”, which links together previous methods of the authors (Hoiem, Efros, Herbert) well.

The second evening heralded the banquet (and a simultaneous student evening), a boisterous affair at the Sheraton hotel. The main course was an extraordinary fusion of meat, fish, fruit and veg, the like of which I’m sure I’ll never see again, and the pudding was one of the richest chocolate cakes I’ve ever eaten: in one area of the hall people were applauded when they finished it! There was some light entertainment from a comedian (though I think he wasn’t having much luck) and some pretty good native dancing.

The last day included my favourite oral session, on selected topics (the catchall session), which had some interesting and well presented talks on a bidirectional similarity measure, which was used to shrink images, a constant time algorithm for bilateral filtering – an increasingly popular method – and a study on calibration of underwater camera systems.

There were several demos at the conference, including a stand from Point Grey, who were showing off some of their camera hardware, including a compact 5×5 array of cameras that allows synthetic focussing and depth of field alteration. Apparently they haven’t found an application for these yet, so if you’re interested, get in touch with them. I do think it was a shame there were no invited talks in the main conference (there were some in the workshops) – as these allow the speakers far more flexibility in terms of level of detail, and scope of the talk, which makes for a much more interesting time for the audience.

Anchorage itself wasn’t the prettiest of cities, but Alaska more than makes up for it with some stunning scenery and wildlife. I had a few days holiday after the conference, and took a trip up to Denali State Park for a glimpse of Mt McKinley and a bear or two, but unfortunately saw neither because of some wet and overcast weather – despite being very close to both (I later learned!). However, this was certainly compensated for by a wonderful trip down to Seward, on the Kenai Peninsula, where I climbed up the side of the Exit Glacier to see the Harding Ice Field (an extremely large area of ice), and also took a wonderful cruise on which I saw killer and humpback whales, sea otters, porpoises, seals, a bear, some glaciers calving into the sea, plenty of sea birds and a bald eagle.



Glaciers and whales ...

I am very grateful to the BMVA for their sponsorship, which made my attendance at the conference possible.

Oliver Woodford
Oxford University
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A Book with a Difference!

Sotirios Persidis, *Mathematical Handbook*. ESPI Publishing, ISBN. 978-960-7610-12-6

Pattern Recognition and Computer Vision scientists as we are, we still need a resource book for mathematical formulae and theorems – whether it is to be used as a reference for our research or as a resource for our teaching. This mathematical handbook is a book with a difference: it is an ‘alive’ book! The concept of alive books was conceived by the author, Professor Persidis of the Aristotle University of Thessaloniki: the book is



brief and contains only the absolute skeleton of what you need. However, once you buy it, you gain access to a web-based system, where there are links to proofs, examples, applications, etc. It is a pleasure to hold such a concise and comprehensive handbook of mathematics, that appears deceptively small and light. It is easy to carry it around and it is easy to consult it. In reality of course, you are holding a vast amount of information, continually updated and enhanced. The web page at which you can find all the extras you might need is extremely easy to access. The files are neatly labelled with the page number of the book and all you have to do is to type your email address and the page number: the extra information you requested reaches you as a pdf mail attachment file within seconds. The whole concept of an alive book is extremely clever and simple. I found this resource very useful, and I believe this is the shape of things to come when we talk about the future of publishing.

Professor Maria Petrou
 Imperial College London
 email: maria.petrou@imperial.ac.uk

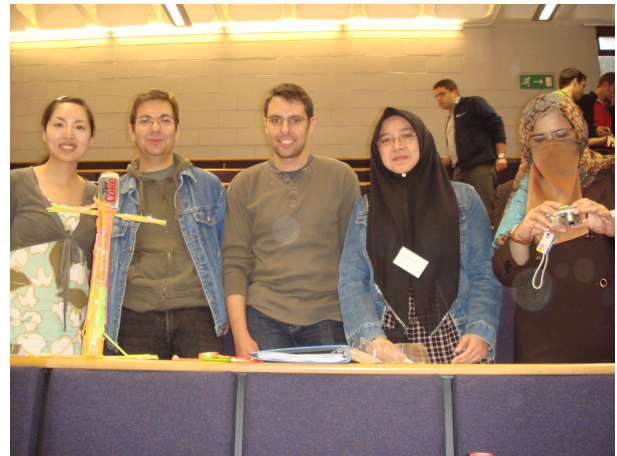
Vision & Imaging at the IET

The Institution of Engineering and Technology has recently renamed its *Visual Information Engineering* Group (TPN) the *Vision & Imaging* TPN,¹ all the better to represent its true interests to its members and to the outside world. Hence in future those who attend its meetings and conferences and look at its website should keep this new label in mind. For the benefit of readers, the *V&I* TPN runs a parallel but distinct path to BMVA, and aims to keep its eye on industry as much as on academic developments in the subject.

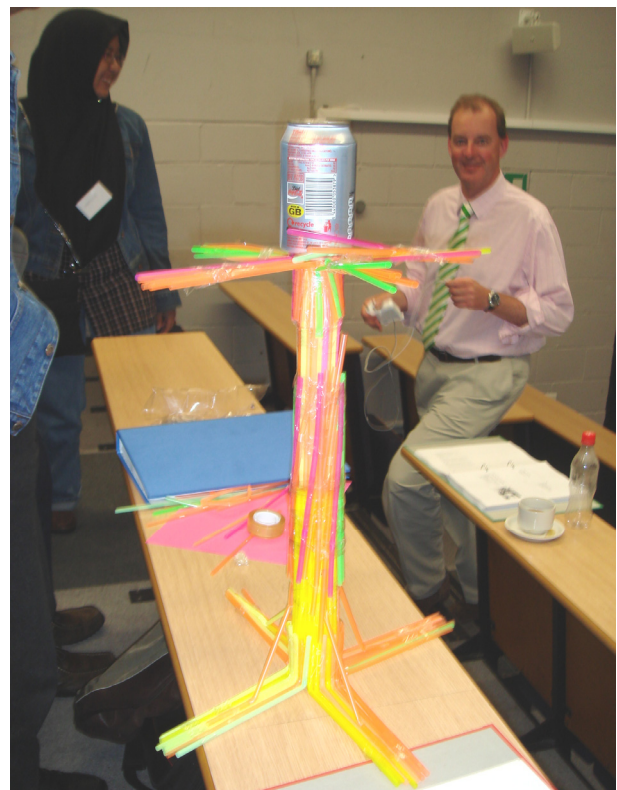
Professor Roy Davies
 Editor, BMVA News
 email: e.r.davies@rhul.ac.uk

¹Technical and Professional Network.

High Jinx at the BMVA Summer School!



A group of postgraduate students ...



... and the results of their exercise. Richard Harvey (UEA) presides!

These two photographs were sent in some time after the EPSRC/BMVA Summer School and seemed well worth including – illustrating that useful group work can also be fun!

Professor Roy Davies
 Editor, BMVA News
 email: e.r.davies@rhul.ac.uk

Elections to the BMVA Executive Committee

Members of the BMVA Executive Committee are elected to serve for two years. There are ten elected members, with the period of service interleaved for five of the ten. This results in five members of the Committee standing down each year and new elections being held for the five vacant positions. The members who stood down this summer were:

- Professor Mike Chantler
- Dr Adrian Clark
- Professor Tim Cootes
- Dr Aphrodite Galata
- Dr Neil Thacker

Of these five, Tim Cootes has not stood for re-election, but we hope to see him back on the Committee after a rest period. I would like to thank Tim for his outstanding contribution to the Committee over the past few years.

In Tim's place, Jim Graham was nominated and elected. As a result, the list of elections to the Committee for the next two years is:

- Professor Mike Chantler
- Dr Adrian Clark
- Dr Aphrodite Galata
- Dr Jim Graham
- Dr Neil Thacker

Professor Majid Mirmehdi
Bristol University
email: m.mirmehdi@cs.bris.ac.uk

Call for Expression of Interest to Host BMVC 2010

The BMVA Executive Committee would like any interested parties to inform them of their interest in hosting BMVC 2010. At this stage only an expression of interest is required: pending discussion by the Executive Committee, successful expressions of interest will be asked to supply an official bid to hold the conference.

For the expression of interest please supply the following details:

- Main contact for the conference – full postal address, telephone and email
- Prospective members of the conference organising committee
- Provisional dates for the conference, with a confirmation of provisional booking, details of accommodation, rooms bookings for conference venue and meals.

BMVC is traditionally held in the first two weeks of September and runs from Monday afternoon with a tutorial session and full conference single track podium and poster sessions Tuesday through to Thursday lunchtime. A separate tutorial workshop is often held on the Friday, involving limited local organisation, but mostly managed by the independent proposer.

The main conference auditorium must be large enough to accommodate 150+ delegates and must be a tiered auditorium with adequate A-V facilities. For further information on preparing a proposal to run BMVC please refer to:

http://www.bmva.org/w/bmvc_proposals

Please send expressions of interest to the BMVA Chairman, Prof. Majid Mirmehdi by 28 October 2008.

Professor Majid Mirmehdi
University of Bristol
email: m.mirmehdi@cs.bris.ac.uk

Successes at Cranfield!

The Cranfield vision group were part of the winning Stellar Team in the MoD Grand Challenge (August 2008). See the whole story (articles, photos, videos, interviews) at:

<http://www.cranfield.ac.uk/news/pressreleases/2008/page25492.jsp>

<http://www.mod.uk/DefenceInternet/DefenceNews/EquipmentAndLogistics/StellarTakesTopModPrizeForBattlefieldInnovators.htm>

http://www.guardian.co.uk/science/2008/aug/19/grand_challenge_weapons

<http://news.bbc.co.uk/1/hi/technology/7570902.stm>

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