

# BMVA News

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

Volume 17 Number 1  
September 2006

**Editor:** Professor Roy Davies  
Department of Physics  
Royal Holloway, University of London  
Egham, Surrey, TW20 0EX  
Tel: +44(0)1784 443497  
Fax: +44(0)1784 472794  
email: e.r.davies@rhul.ac.uk

<http://www.bmva.ac.uk/>

**BMVA** News<sup>1</sup> 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 2006.

## Contents

Editorial: <i>Mere training, or life skills?</i> .....	1
BMVA Distinguished Fellow 2005 .....	2
Prizes awarded at BMVC 2006 .....	3
BMVC 2006 – a Pictorial Record.....	3
Round-up of ICPR 2006.....	6
One-Day BMVA Meeting: Psychophysics and Vision.....	7
New Book – PR and Machine Learning .....	8
Stephen Marshall promoted to a Personal Chair.....	8
Tim Cootes promoted to Professor of Computer Vision .....	9
Best Poster Prize at IMVIP Conference.....	9
Prize-giving at the BMVA Summer School .....	9
Report on BMVA Symposium: Detection v. Tracking.....	9
New Book – Advances in Nonlinear Signal and IP .....	12
Research Funding available from the VVG Network .....	12
Call for Papers – VIE 2007.....	13
1 <sup>st</sup> Int. Symposium on E-learning – CFP .....	14
Workshop: Emerging Multimedia Standards.....	14
3 <sup>rd</sup> Int. Mobile Multimedia Conference – CFP .....	14
A Success Story for Wavelets! .....	15
Book for Review .....	15
STOP PRESS – BCS Roger Needham Lecture 2006 .....	15
Memories of Scotland.....	16

<sup>1</sup>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.

## Editorial: *Mere training, or life skills?*

This time of year, new graduate students are being taken on, and many old ones will be thinking of moving into jobs where their life skills are brought into question. Thus it is important to consider how the best training can be provided. Training graduate students is an important function in any university, and puts a lot of responsibility on supervisors. To some extent the function is one of informing the students of basic techniques, and encouraging, helping, goading, even (!) pressurising them to do their research at a steady pace, commensurate with completing a PhD in due time. Needless to say, the time element is a significant factor – not least as the Research Councils want proof that their money has been spent well and that a proper training schedule has been completed.

How other than by practice can one carry out the necessary training? When creativity is involved, practice makes perfect: indeed, it is difficult to teach how to innovate: one either can or can't do it. (Well, that is what the layman would say.) On the other hand, one can *nurture* creativity, one can provide the conditions for it to thrive, and one can help students to recognise when an important idea is emerging.

So far we have focussed on three major aspects of training – provision of basic subject-matter information, motivation, and creativity. Another important aspect is planning. Over time I have found students reluctant to plan, as plans (2 weeks on this, 3 weeks on that, ...) are always unrealistic, and are found wanting in weeks at most: any sensible student will already know this. However, it is not the plan itself that is important, but the planning. The process of planning is analytic, and makes real the passage of time, bringing an awareness that one is slipping, and encouraging one to discriminate

between different actions and paths one could take. Thus the proper reaction to the artificial yearly planning exercise is to initiate an ongoing planning update sequence. This is where a lot of life skills are involved, and is not something that is particularly special to graduate students. All of us need help with this one.

Often the problem is that we are too close to what we are doing to making planning easy. One of the most difficult problems is to know when to stop: either to give up a line of research permanently because we are obviously at a dead end; or to take a rest from a difficult problem, in the hope of getting inspiration later, and then finding a way around the brick wall rather than trying to go right through it! Of course, in either case one could be accused of not sticking to one's guns, and of not persevering (not many problems can be solved without a lot of persistence – “10% inspiration, 90% perspiration”, as they say). Sticking things out is the first lesson; when, much more rarely, to stop prematurely is a life skill that has to be learnt. Here the simplest rule is just to shelve a difficult problem, to wait for further insight or information. (At this rare level it is surprising how often one later finds that one lacked the necessary information on how to proceed: one had got a fact wrong, or had assumed too tight a universe of variability for a solution to emerge.)

But knowing when to stop can be doubly difficult. It often appears that a solution must emerge soon: “just one more heave and the problem will be cracked”. However, there are times when one tries a whole sequence of ideas, tackling the problem from totally different angles, but always with the same negative result. At this point one must explore whether there is some fundamental principle in the way: e.g. the uncertainty principle in physics will prevent position and momentum from both being known accurately, *whatever* type of probe one tries – particles, photons, and so on.

Perhaps it is part of the allure of true research that one can never know in advance whether one is working on a sterile problem. “If you can't stand the heat, get out of the kitchen!” But maybe it's worth it. The rewards can be high – the major achievement or discovery, even a Nobel prize! More likely, we are in it for the thrill of the chase, the pursuit of knowledge, the insight (yes, even that) that one gains. Anyway, what's wrong, if a lot of minor solutions emerge when one is looking for ‘the big one’: that's in the luck of the draw, and may not be so bad after all. And look what happened to Sir Alexander Fleming in 1928!

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

## BMVA Distinguished Fellow 2005



Professor Roy Davies, BMVA Distinguished Fellow 2005

The title of 2005 BMVA Distinguished Fellow was awarded to Roy Davies, Professor of Machine Vision at Royal Holloway, London. Professor Davies has been a leading figure in the areas of image processing and computer vision since the mid-Eighties and has contributed greatly to both the field and the community.

He was educated at Cardiff High School and Jesus College Oxford. He obtained his BA in Physics in 1963, and his DPhil in 1967. The title of his thesis was *Electron and Nuclear Resonance Studies in Solids*. Roy's early career at RA level was based on spin transitions for nuclei and the related electronics, leading to the development of the “Davies Electron-Nuclear Double Resonance” technique, better known as the “Davies ENDOR” technique, ..., a method that 32 years later is still regularly referenced in Physics journals. His interest in electronics, noise, and signal extraction or recovery led to a book which integrated the entire area. The book, *Electronics, Noise and Signal Recovery* published in 1993 very neatly encapsulated the essence of the various courses taught by Professor Davies at Royal Holloway over the years.

The book for which Professor Davies is most well known to computer vision students, researchers, and

academics all around the world is the one now in its 3<sup>rd</sup> Edition, *Machine Vision: Theory, Algorithms, Practicalities*, originally published in 1990.

Professor Davies' combined interest in image analysis and real-time systems has kept him in popular demand by industry for investigating industrial vision problems. Indeed, over a fair period of time a large proportion of his research funding has come from grants related to food inspection. This led to his third book in 2000, *Image Processing for the Food Industry*.

Overall, Professor Davies' career has been involved with making sense of data, and not just images, and in part by negotiation of noise and clutter in a systematic way. His DSc awarded by the University of London in 1996 reflects this major preoccupation.

Professor Davies' authority, popularity, and standing in the community are unbounded and this is reflected by the simple fact that he has examined around 100 PhD students, which must be about as many as anyone else in the UK. He has served the vision community through his tireless participation in the BMVA, the IEE, and on many editorial boards (Pattern Recognition Letters, Real-Time Imaging, etc) over the years.

The BMVA is privileged to add Professor Davies to its list of Distinguished Fellows.

Dr Majid Mirmehdi  
 BMVA Chairman  
 email: chair@bmva.ac.uk

## Prizes awarded at BMVC 2006

The following prizes were presented at BMVC 2006:

**Science Prize:** David Cristinacce and Tim Cootes (Manchester) *Feature Detection and Tracking with Constrained Local Models*

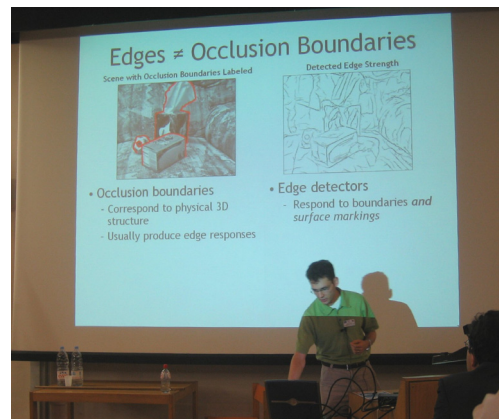
**Industry Prize:** Mark Everingham, Josef Sivic and Andrew Zisserman (Oxford) *"Hello! My name is... Buffy" – Automatic Naming of Characters in TV Video*

**Poster Prize:** Nicholas Apostoloff (Oxford) and Andrew Fitzgibbon (Microsoft) *Automatic video segmentation using spatiotemporal T-junctions*

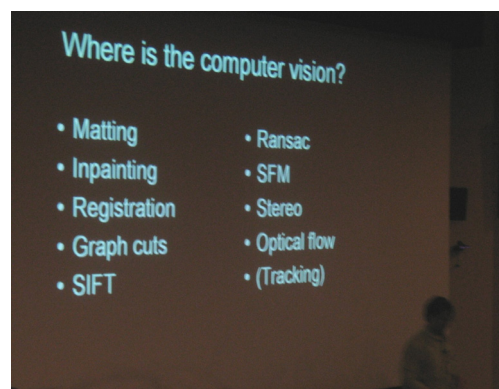
**Sullivan Thesis Prize:** Rob Fergus (Oxford) for his thesis entitled *Visual Object Category Recognition*.

Professor Mike Chantler  
 Heriot-Watt University  
 email: m.j.chantler@hw.ac.uk

## BMVC 2006 – a Pictorial Record



Andrew Stein makes a point about the distinction between edges and occlusion boundaries that is central to his approach.



In his conclusion, invited speaker Brian Curless considers how relevant his talk has been to computer vision – in a way reminiscent of the "Where's the beef?" question of American politics. In Brian's case the answer is essentially "everywhere".



Mark Everingham makes a welcome sign of things to come – "No user involvement ...".



Mike Chantler, Tim Ellis and Majid Mirmehdi take a welcome break between talks.



Mike Chantler and Neil Thacker taking their poster-judging duties seriously (in common with a good number of other members of the BMVA Executive Committee!).

### At the dinner in the Playfair Library



Mike Chantler reads out the names for the first prize of the evening: next to him, from left, Majid Mirmehdi, Brian Curless, Bob Fisher and David Kriegman; at the front left, Dmitry Chetverikov can be seen.



Mike Chantler presents David Cristinacce (far left) and Tim Cootes with their Science Prize.



Josef Sivic (far left) and Mark Everingham receive the Industry Prize from Mike Chantler, in the absence of Andrew Zisserman.



Josef Sivic shows the Sullivan Thesis Prize certificate, which he received on behalf of Rob Fergus, who unfortunately couldn't be present.



Špela Ivekovic, Manuel Trucco and Rowland Sillito enjoying the informal part of the proceedings! (Špela and Rowland were amongst the valiant troop of student helpers who did so much to make the conference a success.)



Majid Mirmehdi, BMVA Chair (right), presents Roy Davies with the Distinguished Fellow award.



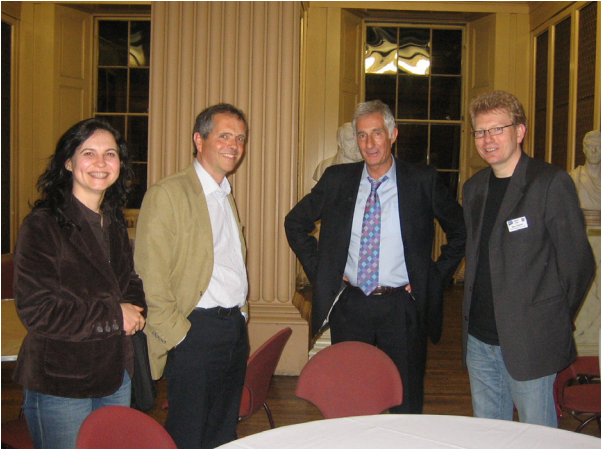
Mike Chantler makes a point with invited speaker David Kriegman and Teresa Gallagher (David's wife).



Abhir Bhalerao, Nasir Rajpoot and Joan Davies (Roy's wife) having a quiet word after the dinner.



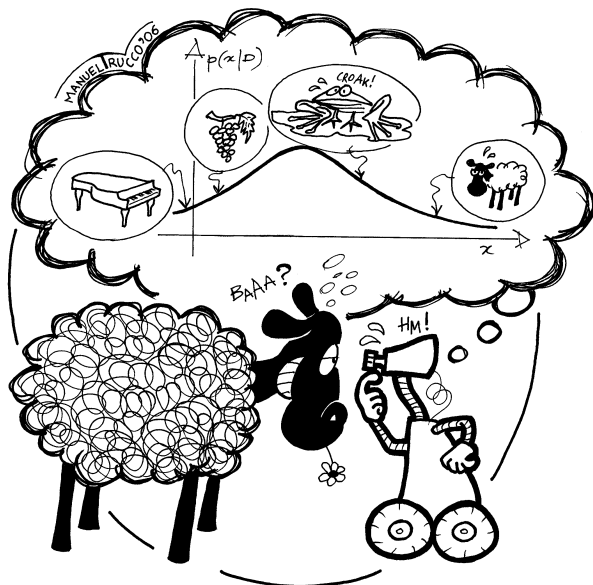
Two invited speakers, Brian Curless and David Kriegman, with Teresa Gallagher (David's wife); accompanying them, host Bob Fisher (far right) and Tim Lukins (student helper). Sadly, Tim sports the only kilt and sporran seen at BMVC!



Aphrodite Galata, David Hogg, Chris Taylor and Mike Chantler caught for a quick photo just before leaving the Library.



Three student helpers (Toby Collins, Rowland Sillito and Scott Blunsden) relax between whiles in the bar.



The BMVC bag design skilfully produced by Manuel Trucco (reproduced here with his kind permission!).

## Round-up of ICPR 2006



Night view of Hong Kong from the peak, as seen by the Surrey team attending ICPR 2006.

ICPR was held in Hong Kong this year. The warm humid weather meant that the air was somewhat hazy and there was a slight risk of getting caught in a rainstorm. Even so, the views of the city from The Peak were stunning, as were the views of the skyscrapers from the Morning and Evening Star Ferries.

**Invited Talks.** The first talk was the KS Fu prize lecture, given by Josef Kittler from the University of Surrey. This talk centred on the key issues in the pattern recognition field, including the importance of context, modelling, dimensionality and small sample size. Other interesting invited talks included those of Alex Pentland at MIT and Oliver Faugeras at INRIA. Pentland has been looking at proposing the outcome of social activities like speed-dating using unconscious cues such as voice pitch and motion (measured using an accelerometer), with a surprising amount of success (80%). Hyper-speed-dating anyone? Faugeras discussed his group's research into obtaining a set of variational principles for computer vision. This idea, commonly used in physics, is used to describe natural phenomena using a pair of nested functions and allows complex behaviour to be described relatively simply.

**Descriptors.** Many papers proposing new descriptors were presented, including one by Tian and Kamata. They proposed a transformation invariant descriptor based on integrating the intensities of successively larger image regions. The pixels were ordered using a Hilbert scan. Huang, Chen and Chung presented a descriptor called the contrast context histogram, based on finding the relative intensity in a region to the centre point in a log-polar coordinate system. Since the method relies only on multiplication and subtraction, and not on the roots and arc-tangent functions of SIFT, speed-ups are obtained without loss of matching accuracy.

Ros and Laurent showed that many salient region detectors select regions at image singularities. These are

not always described efficiently, so they demonstrate a method based on wavelets to improve the description efficiency.

**Advances in Methodology.** Mita, Kaneko, and Hori presented a metric for measuring the similarity between an image and an object class that is robust to intra-class variation, noise and illumination. The method works by finding the gradient sign of the vectorised image at each point, and generating a probability map using multiple reference images. A sum of log-likelihoods is used to measure similarity. The method is fast and robust since stable probabilities implicitly receive higher weighting.

Brooks and Tar Abel introduced a generalised method for inverse compositional alignment which works for any function where an analytic derivative is available. The method relies on recomposing the Broyden–Fletcher–Goldfarb–Shannon optimisation method to make certain terms constant. This yields significant speed-ups (43%) without any cost to convergence performance.

**Pattern Recognition.** Cao and Haralick described how high-dimensional data can lie in a manifold of lower dimensionality. They then demonstrated a method to cluster data in non-linear manifolds. Fred and Jain attempted to cluster features by trading off the average pairwise stability and cluster stability, by utilising a collection of different clustering algorithms with varying parameters.

Paclik, Novovicova and Duin discussed a method to train a similarity measure to a given class by applying the normalised correlation to particular regions in training images. In comparisons with models built using AdaBoost and PCA, the trained similarity measure performed well and scaled better in terms of computational cost.

Fisher presented detailed research into the performance of classifiers as noise level, dimensionality and number of classes are varied. Empirically obtained performance plots for these variations were shown, with particular focus on the effects of these parameters at extreme points. This work is at an early stage, but already interesting results have been obtained.

**Conclusion.** Unfortunately this is only a taste of the conference, since it consisted of about 1000 papers presented in 5 separate tracks. Even so, it was possible to see some interesting new work.

Nicholas Dowson  
University of Surrey  
email: [n.dowson@surrey.ac.uk](mailto:n.dowson@surrey.ac.uk)



The Surrey team at the top of the Hong Kong peak while sightseeing during ICPR.



Jia-Jia doing his best to ignore ICPR tourists!

## One-Day BMVA Meeting: Psychophysics and Vision

This meeting is scheduled to be held at the Royal Statistical Society during November 2006. For more precise details, keep your eye on the BMVA website:

<http://www.bmva.ac.uk/meetings/index.html>

In recent years various funding bodies, including the European Commission and the EPSRC, have acted to support research in the areas of modelling of human visual perception. This is a very challenging problem which requires knowledge from a broad range of scientific disciplines. The solution is likely to require many decades of sustained and well-directed effort in order to achieve significant progress. Gone are the days when we might have expected a simple solution to these issues. Realism is required in order to moderate our

expectations of what we are likely to achieve in our own lifetimes. Despite this, the number of research areas interested in this same fundamental issue will ensure that the topic cannot be ignored, and the intellectual challenges involved may well continue to be an important training ground for many future scientists and engineers.

The purpose of this one-day BMVA meeting is to bring together researchers from areas of biological modelling, psychophysics and computer vision, to discuss the strengths and weaknesses of the tools available for the investigation of human visual perception. It is intended that as well as covering material describing the latest results in understanding human vision, there will be more general talks which summarise the experiences and opinions of representatives from these disciplines. Time will be allocated for discussion of the issues raised so that the possibilities for consensus and future synergies between these fields can be explored. If you have views on this subject please attend and join in with the discussions.

Although the agenda has been organised by invitation, some space is still available for additional speakers which fit in with the objectives of the meeting. If you wish to discuss the possibility of making a presentation, please send an email to Neil Thacker.

Dr Neil Thacker  
Manchester University  
email: [neil.thacker@manchester.ac.uk](mailto:neil.thacker@manchester.ac.uk)

## New Book – Pattern Recognition and Machine Learning

by Christopher M. Bishop

This completely new textbook provides a comprehensive introduction to the fields of pattern recognition and machine learning. It is aimed at advanced undergraduates or first-year PhD students, as well as researchers and practitioners. No previous knowledge of pattern recognition or machine learning concepts is assumed. This is the first machine learning textbook to include a comprehensive coverage of recent developments such as probabilistic graphical models and deterministic inference methods, and to emphasize a modern Bayesian perspective. The book is suitable for courses on machine learning, statistics, computer science, signal processing, computer vision, data mining, and bioinformatics, and extensive support is provided for course instructors.

- Springer (2006)
- 738 pages
- Full colour
- 431 exercises

Full details, including a sample chapter, appear at:  
<http://research.microsoft.com/~cmbishop/PRML>

Professor C.M. Bishop  
Microsoft Research, Cambridge  
email: [christopher.bishop@microsoft.com](mailto:christopher.bishop@microsoft.com)

## Stephen Marshall promoted to a Personal Chair



Professor Stephen Marshall

Dr Stephen Marshall has just been promoted to a personal chair at the University of Strathclyde. His interests lie in non-linear image processing including mathematical morphology and methods based on logic and rank ordering. He has developed operator design techniques using genetic algorithms for film and video restoration and this work is now being commercialised. Current projects include document image processing for electronic banking, FPGAs for image processing and genomic signal processing. An edited book with Professor Giovanni Sicuranza on *Recent Advances in Non Linear Signal and Image Processing* has recently been published in the EURASIP series and an authored book on logic-based image processing will be published by the end of the year with SPIE. I'm sure many of you know Stephen and will join me in passing him our warm congratulations!

Professor Roy Davies  
Editor, BMVA News  
email: [e.r.davies@rhul.ac.uk](mailto:e.r.davies@rhul.ac.uk)



## Tim Cootes promoted to Professor of Computer Vision



Professor Tim Cootes

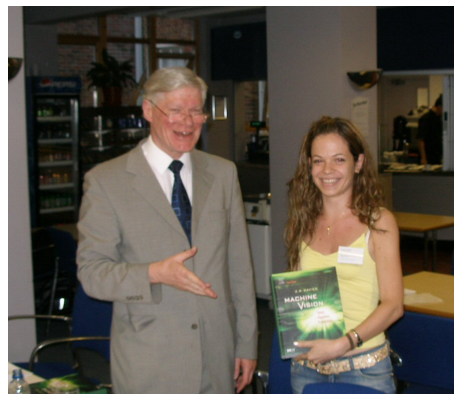
On 1 August Tim Cootes was promoted to become a Professorial Research Fellow at the University of Manchester. He has long come to prominence as co-ordinator of the now widely used active shape models and active appearance models, and has used these for a great many applications ranging from face and gesture recognition to medical scans. His website has just reminded me that his interests are even wider and more general, and span the study of diffeomorphisms (smooth, invertible mappings) between images, as well as the use of all these methods for tracking. A good few of us will also recall that Tim was a highly effective Chair of the BMVA, a position he retired from just one year ago. I'm sure I can feel warmth from a great many of you as I pass on to Tim our sincerest congratulations!

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



Mark Sugrue (Royal Holloway) receives his Best Poster Prize at the Irish Machine Vision and Image Processing Conference in Dublin during early September.

## Prize-giving at the BMVA Summer School



Joint winners of the poster prize, Margarita Chli (top) and Nataliya Nadtocha (bottom) receive their book prizes from Roy Davies at the BMVA Summer School in July. Margarita's poster was entitled *Efficient Loop-Closing For Single Camera SLAM*, and Nataliya's poster was entitled *Facial Emotion Dynamics: Understanding, Modelling and Animation*. (Roy hopes this occasion will set a trend boosting sales of his book!)

## Report on BMVA Symposium: Detection vs. Tracking<sup>2</sup>

A one-day BMVA Symposium on Detection vs. Tracking was held on 5 July 2006 in a heated UCL seminar room. The event, which was chaired by Dr Richard Bowden of CVSSP, University of Surrey, had had to be relocated from the British Computer Society due to the unexpectedly high turnout of over one hundred delegates, on a par with a typical BMVC. The presentations given ranged from inspirational subject overviews through to interesting current research activities and proposals for important future avenues of research. The day was a great success and discussions were continued down the pub after the event. This document is intended to give a brief overview of each of

<sup>2</sup>A pictorial record of this meeting appears in the June issue of BMVA News – Ed.

the presentations given at the event and perhaps to summarize some of the key issues raised.

The symposium started with a keynote address from Professor Andrew Blake of Microsoft Research entitled *Tracking = Detection + Adaptation + Estimation*. Motivating the discussion by illustrating some interesting applications such as autonomous navigation and improvements in teleconferencing technologies, the talk concentrated on presenting the essence of the probabilistic frameworks adopted by most tracking and detection algorithms. Both tracking and detection require the estimation of an object state,  $x = (X, y)$ , given observation data,  $z$ , and parameters  $\theta$  (e.g. from dynamical model). The important distinction was drawn between  $X$ , representing the low-dimensional, high-variance components of  $x$  (e.g. for a face – rotation, scale, translation), and  $y$ , representing the components of  $x$  with low variance (e.g. smiling). Tracking algorithms have been implemented using data likelihood models (Lucas and Kanade) in combination with both dynamical models for prediction (e.g.  $p(x_t|x_{t-1})$ ), and detection algorithms (Viola–Jones). The objective is to estimate  $p(x_t|z_1, \dots, z_t)$  (as opposed to detection where the objective is to estimate  $p(x_t|z_t)$ ). The presentation examined the need for a recovery strategy (such as fast detection, e.g. Viola–Jones boosted classifiers) for non-causal systems where probabilistic filters fail. However the possibility of abandoning tracking entirely due to the success of fast detection algorithms was rebuffed by the observation that tracking is ultimately more efficient and smoother. Finally the task of unifying the frameworks for detection and estimation was proposed as an important future task.

Matthew Jenkins from the University of Oxford's Robotics Research Group presented a summary of his and Ian Reid's research into optimal importance sampling for Human Motion Tracking (HMT) using persistent, low-level image features. They proposed an approach to HMT that combines image-driven and model-driven techniques. This is contrasted to other approaches that use a fast detector as a recovery strategy for tracking failures. Instead of learning a human detector, persistent low-level features (Harris corners tracked/matched over a number of frames) are used to guide the weak motion model driving the high-level person tracker. It was argued that by avoiding training person detectors, the reliance on *a priori* knowledge of the appearance or likely pose variation of the person being tracked is removed.

Following this a presentation entitled *Simultaneously Modelling and Tracking (SMAT) using Mutual Information* was given by Nicholas Dowson of CVSSP at the University of Surrey. The presentation began by introducing the adopted tracking method of region-

template matching via optimisation with demos of function surface optimisation using the Levenberg–Marquardt algorithm. Mutual Information (MI) was introduced as the similarity measure (function being optimised) between the region and the template. The Template Update problem was then discussed (when should the template be updated?) before describing the SMAT approach to overcome problems. This approach involves on-the-fly construction of a model of appearance, by storing every exemplar and fitting a multi-component appearance model to the exemplars. The approach was shown to track in real time, but more robustly than existing methods.

Dr Andrew Davison from Imperial College London tackled the symposium's title 'Detection vs. Tracking' by arguing that it is a question of computational cost. Tracking, a *top-down* approach whereby image search regions are limited by prior information (e.g. estimated location from prior frames) was shown to always reduce the image processing work over *bottom-up* detection strategies that search the entire image. However this gain is traded off against the computational cost of making the predictions (maintaining state estimates in probabilistic filters) – sometimes it's *cheaper* to search the whole image than first work out where to look. Recent work using mutual information to provide a measure of a particular feature's contribution to pose estimation was also presented. This allows the development of strategies that can consider image processing cost of measurement vs. benefit. Future work toward theoretically describing the performance crossover point between top-down tracking and bottom-up detection was then discussed. It is expected that the frame-to-frame uncertainty in object estimates will influence this crossover point and therefore use of higher frame rates will favour tracking over detection. Detection is expected to outperform tracking in situations where the motion is unpredictable or where the frame rate is low.

After a hot and sticky lunch (not the food), Jiri Matas of CVSSP at the University of Surrey presented a novel object representation for tracking. Entitled *Learning Efficient Linear Predictors for Motion Estimation*, the talk introduced the use of constellations of spatially localised linear predictors, learnt from a single training image, to represent the object being tracked. Support for the linear predictors is provided by pixels selected such that their intensities allow for least square predictions of the transformations applied to the training image during the learning stage. The talk also dealt with the computational complexity trade-off for the precision of the predictors and how optimal predictors are selected. As each linear predictor establishes a putative correspondence from frame to frame, RANSAC is used to fit a motion model to the set of correspondences: this

provides robustness to occlusion. The learned tracker was shown to achieve frame rates generally higher than 30 frames per second despite the MatLab implementation.

Following this talk, a presentation entitled *Joint tracking and classification using the TBM* was given by Gavin Powell of DIF/DTC from Cardiff University that looked at how a continuous version of the transferable belief model (TBM) can be integrated with trackers to provide robust classification. The TBM, an extension of Dempster–Shafer theory, allows for a probability function to be created over the decision space and for beliefs to be transferred as and when new evidence becomes available. The talk described how the continuous version of the TBM allows for problems to be solved that are computationally impractical with the discrete version and that it shows greater flexibility to describe, *a priori*, the targets to be classified. It was also shown that the TBM provides a variety of information that assists in analysing the quality and reliability of the classification and how this additional data can be used as prior information for future iterations of the tracker.

Imed Bouchrika from the University of Southampton gave a presentation entitled *People Detection using Gait for Visual Surveillance* that introduced a method using analysis of gait motion for classifying detected moving objects as either people, groups of people or undefined. Initial detection of moving objects is achieved using an adaptive background subtraction method to identify moving regions. Taking advantage of the fact that people walking tend to have periodic moments where their feet remain stationary whilst the rest of their body remains in motion, a Corners Proximity Image (CPI) was introduced to aid classification. Essentially, by accumulating corner detections over a number of frames it was shown that peaks appear around the feet. A feature vector is extracted from the CPI and a *k*-nearest neighbour classifier is used. Results were presented that show the success of the method on the PETS and SOTON databases for people and foot detection tasks respectively.

Fei Yan of CVSSP at the University of Surrey presented *A Layered Data Association Algorithm for Object Tracking in Clutter with Application to Tennis Video Analysis*. The approach builds data associations on both ball detections and then trajectories in order to track the ball in low-quality tennis video sequences. Initial ball candidates are obtained by frame differencing. ‘Seed triplets’ are formed if enough candidates are found within a small spatio-temporal window of each candidate. For each triplet, a dynamic model is fitted and recursively optimised by incorporating candidates consistent with the dynamics: this results in ‘tracklets’. A graph-theoretic approach is then used to link the

candidate tracklets into a consistent ball trajectory. Graph nodes are tracklets and edges are attributed a distance that reflects the compatibility of the two connected tracklets. A maximal-flow algorithm is used to partition the graph into subgraphs relating to each play in shot and the Dijkstra algorithm is then applied to find the optimal paths. Experimental evidence was presented that demonstrates the algorithm’s robustness to clutter and abrupt changes in direction.

An approach capable of simultaneous recognition and localization of multiple object classes using a generative model was then presented by Krystian Mikolajczyk, also of CVSSP at the University of Surrey. By building a novel hierarchical representation (using a combination of KD-tree and agglomerative techniques) the approach allows for the representation of individual images as well as various object classes in a single, scale and rotation invariant model. The recognition method is based on a codebook representation where appearance clusters built from edge-based features are shared among several object classes. A probabilistic model allows for reliable detection of various objects in the same image. The efficiency of the approach is due to fast clustering and matching methods capable of dealing with millions of high-dimensional features. Results were presented that showed excellent performance on several object categories over a wide range of scales, in-plane rotations, background clutter, and partial occlusions. It was stated that the performance of the proposed multi-object class detection approach is competitive with state of the art approaches dedicated to a single object class recognition problem.

Zsolt Husz from Heriot-Watt University presented *Hierarchical, model-based tracking with particle filtering* in which the importance of models and *a priori* knowledge for tracking was discussed. The trade-off between the computational overhead of fully model-based tracking techniques and simpler detection-based approaches that used (learnt) appearance models was highlighted. A Hierarchically Partitioned Particle Filter (HPPF) was introduced to track human figures, where the human model encompasses *structure* (hierarchically modelled – i.e. torso parameters pass influence onto limb part parameters) *postures* (i.e. priors on body poses) and *dynamics* (in the form of transitional priors between poses). The likelihoods are derived from matching the edge map and silhouette of the input frame. Higher importance is given to non-occluded and hierarchically superior parts. Results were presented on both synthetic (CMU Graphics Lab Motion Capture Database) and real (CAVIAR) databases and demonstrated the ability of the approach to track the human model in monocular views. Further, recovery of body pose including occluded leg positions could be seen in most cases.

To end the day, Mark Sugrue of Royal Holloway, University of London, gave a presentation entitled *Motion Distillation* in which a tracking paradigm modelled on the dual-channel form–motion architecture of the human visual system was introduced. Focusing on pedestrian tracking in outdoor environments, the approach uses no prior knowledge of tracked objects or scene characteristics whilst integrating detection and tracking steps. Indicating the weakness of tracking approaches that rely on frame-to-frame appearance matching for cases where the tracked object deforms in order to move, an approach was introduced whereby a dedicated motion channel is used to detect and track objects whilst the appearance of the tracked object is recorded and used for disambiguation. The motion channel, computed using spatio-temporal wavelets, provides useful sub-target level speed information allowing for the discrimination of slow and fast moving regions of the target – hence the title *Motion Distillation*. It was shown that, for simple tracking, the technique was considerably cheaper than, for example, a temporal median filter and that, due to implicit scaling, the resulting search space is also greatly reduced. Sample results were presented that compared the approach to the temporal median filter when applied to outdoor scene pedestrian tracking (including some sequences from CAVIAR) and demonstrated the method's high sensitivity to moving objects and robustness to non-motion noise.

All in all the day went well and all the talks were well received. Commendations should be extended to all delegates who demonstrated robustness to high temperatures and humidity whilst maintaining good levels of interest and concentration. A further commendation should be extended to those who gave the presentations that kept us all attentive to the end.

Liam Ellis  
University of Surrey  
email: l.ellis@surrey.ac.uk

## **New Book – Advances in Nonlinear Signal and Image Processing<sup>3</sup>**

Edited by Stephen Marshall and Giovanni L. Sicuranza

The aim of the book is to present a review of emerging new areas of interest involving nonlinear signal and image processing theories, techniques, and tools. More than 30 leading researchers have contributed to this book covering the major topics relevant to nonlinear

<sup>3</sup>This extract was reproduced, with permission, from the Hindawi Publishing Corporation website.

signal processing. These topics include recent theoretical contributions in different areas of digital filtering and a number of applications in genomics, speech analysis and synthesis, communication system, active noise control, digital watermarking, feature extraction, texture analysis, and color image processing.

For full details, see the publisher's website: <http://www.hindawi.com/books/spc/volume-6/index.html>

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

## **Research Funding available from the VVG Network of Excellence!**



The VVG Network of Excellence exists to fund cross-disciplinary research in the intersection of Vision, Video and Graphics. Typically a researcher from a laboratory of one kind (vision, video or graphics) is funded to spend time in a laboratory of another kind. Students, Research assistants, and academics have all been supported. Researchers can come from or go to industry or overseas. The network is able to act as a 'marriage broker' between laboratories.

VVG can fund the living cost, accommodation, travel and out-of-pocket expenses (such as loss of tuition fees) for the researcher. Apply for as much as you can justify, typical awards are a few thousand pounds.

Anyone may apply. Administration is very light – just couple of sides of A4. Applications are processed by rapid (emphasise rapid) peer review.

For details on how to obtain VVG funding contact Peter Hall.

Dr Peter Hall  
University of Bath  
email: pmh@cs.bath.ac.uk

## CALL FOR PAPERS – VIE 2007

Visual Information Engineering 2007 – *Bridging the Gap between Theory and Applications*. 25–27 July 2007, Royal Statistical Society, London

### Chair

Sergio A Velastin, Kingston University

### Organising committee

- Farzin Deravi, University of Kent
- Paola Hobson, Motorola, UK
- Ebroul Izquierdo, Queen Mary, University London
- Li-Qun Xu, BT Research and Venturing, UK
- Yiannis Kompatsiaris, Informatics and Telematics Institute, Greece
- John Robinson, University of York

### Conference theme

The IET Visual Information Engineering conference 2007 (VIE 2007) addresses the fundamental elements of image, video and graphics research and development. Key technical areas include the growing convergence of computer graphics and computer vision/image processing which is an increasingly important area in commercial multimedia applications development. The conference provides an ideal opportunity for researchers, practitioners and educators in the VIE community to share results and advancements in a high quality, peer reviewed environment, and creates an important networking forum in which academic and industrial participants can discuss the future of VIE technologies and the convergence of imaging technologies with other domains.

Topics of interest include, but are not limited to:

1. Visual information retrieval. Image and video interpretation, low-level and semantic based classification, annotation and retrieval.
2. Image and video analysis, segmentation, motion analysis and tracking and event detection for surveillance.
3. Graphics, visualisation, animation, rendering, image and video-based model synthesis, synthetic image generation and manipulation.
4. Architectures and implementation, image acquisition, hardware.
5. Block-based/scalable coding and compression, transcoding and streaming.
6. Image and video communication, networking, low bit-rate and wireless technology, high definition video transmission and consumer devices for visual

media consumption.

7. Visual media management, multimedia database management, watermarking, privacy, and digital rights management.
8. Applications: TV, HDTV, D-Cinema, video and mobile communications, robotics, medical, forensic, security and surveillance, industrial inspection, handwriting analysis/recognition, post-production, biometrics, virtual and augmented reality, advanced and immersive telepresence, and computer/video games.

### Paper Submission and Publication

Prospective authors are invited to submit full papers of up to 6 pages using the on-line system at <http://conferences.theiet.org/vie2007>. Accepted papers will be published in the Conference Proceedings published by the IET. Exceptional papers will be invited for consideration for a Special Issue of the IET Proceedings on Vision and Image Processing.

### Important Dates

- 12 February 2007: Submission of full papers
- 2 April 2007: Notification of acceptance
- 30 April 2007: Submission of camera-ready papers

### Call for workshops and special sessions

Proposals for tutorials of 1 hour duration on emerging fundamental topics of Visual Information Engineering are welcomed. A tutorial proposal of 4–6 pages describing the topic, expected benefits of the tutorial, and a short biography of the proposed tutor may be submitted using the on-line system at: <http://conferences.theiet.org/vie2007>. Prospective tutorial proposers may discuss their proposal in advance with John Robinson (email: [jar11@ohm.york.ac.uk](mailto:jar11@ohm.york.ac.uk)).

Proposals for conference special sessions on new research areas related to Visual Information Engineering are also welcomed. A special session proposal of 4–6 pages describing the topic, objectives of the session, list of proposed contributors may be submitted using the on-line system at <http://conferences.theiet.org/vie2007>. Prospective special session proposers may discuss their proposal in advance with Yiannis Kompatsiaris (email: [ikom@iti.gr](mailto:ikom@iti.gr)).

Dr Sergio. Velastin  
Kingston University  
email: [sergio.velastin@iee.org](mailto:sergio.velastin@iee.org)

## 1<sup>st</sup> International Symposium on E-learning and Emerging Digital Technologies – Call for Papers

12–13 February 2007

The symposium will be held at the Institute of Physics, 76 Portland Place, London W1B 1NT.

<http://www.iee.org/Events/elearning2007.cfm>

The Symposium is organised by the IET Visual Information Engineering (VIE) Network

### Background and goals

The aim of this two-day international symposium is to provide a multi-disciplinary discussion forum, bringing together researchers, developers and practitioners working to exploit digital technologies and multimedia content for interactive and personalised e-learning. One strand of the symposium will be on future trends in e-learning technologies, including devices and networks to support mobile and ambient learning, video coding and streaming technologies, real-time video analysis and semantic events archiving, multimodal human-machine interfacing, smart conferencing cataloguing, grid computing, innovative e-learning tools and applications such as adaptive hypermedia systems. It will also cover recent advances in technologies and delivery platforms and services aimed at providing learning anywhere, at any time to anyone, thereby enabling the creation of flexible social learning networks.

A second strand will be considering the pedagogical and human/social dimensions of e-learning and how they can be supported with the innovative use of new technologies. This will include the effective design of new e-learning services through the use of conceptual frameworks, pedagogical design and learning theories, and tools to support social and informal learning. It is intended that technical experts and researchers, e-learning content/service providers and users from all of these areas can get together in one place to network and discuss issues relevant to the e-learning sector. Special sessions will also be organised with invited speakers coming from relevant industry, e.g., e-learning platform and service providers, EU and national research funding bodies, government initiatives and user communities, etc.

### Important dates

Paper submission deadline: 13 November 2006

Notice of acceptance: 27 November 2006

Camera-ready paper required: 8 December 2006

### Organising Committee

- Dr Li-Qun Xu (Co-Chair), BT Group PLC
- Professor John Robinson (Co-Chair), University of York
- Dr Michael Gardner, University of Essex
- Professor Ebroul Izquierdo, Queen Mary, University of London

Dr Li-Qun Xu  
BT Group PLC, UK  
email: [li-qun.xu@bt.com](mailto:li-qun.xu@bt.com)

## Workshop: Emerging Multimedia Standards

This will take place on 29 November 2006.

This workshop will cover the latest advances in multimedia technology, including in particular: mobile networking, video streaming, audio conferencing, digital television, semantic multimedia, and enabling tools such as content representation, storage, transmission, interaction, search and retrieval.

For further information, please contact Professor Ebroul Izquierdo.

Professor Ebroul Izquierdo  
Queen Mary, University of London  
email: [ebroul.izquierdo@elec.qmul.ac.uk](mailto:ebroul.izquierdo@elec.qmul.ac.uk)

## 3<sup>rd</sup> International Mobile Multimedia Communications Conference – Call For Papers

27–30 August 2007, at Queen Mary, University of London

<http://www.mobimedia.org/>

MobiMedia 2007 aims at providing a unique international forum for the presentation and discussion of the latest technological advances in mobile multimedia, networking and applications. It intends to bring together relevant forums, projects, institutions and individuals engaged in related research, and link them with industrial development engineers who could exploit the underlying emerging technology.

MobiMedia is particularly relevant for those interested in multimedia, digital television, video coding, video mail, video phones, sensor networks, telemedicine, distributed VR, digital content engineering, and distance learning.

### Important Dates

15 March 2007: Submission of extended summary  
 15 May 2007: Notification of acceptance  
 15 June 2007: Submission of camera-ready papers

**Chair:** Ebroul Izquierdo

Professor Ebroul Izquierdo  
 Queen Mary, University of London  
 email: ebroul.izquierdo@elec.qmul.ac.uk

### A Success Story for Wavelets!

A team led by Professor Izquierdo at the Multimedia and Vision Research Group has developed an advanced solution for seamless encoding and decoding of video (aceSVC). The system encodes video in such a way that it can be optimally adapted to any channel capacity, display resolution and size or end-user preferences. As in traditional video coding, the main modules of aceSVC are the encoder and the decoder: aceSVC also provides an adaptation module or extractor. aceSVC is based on a novel, highly flexible wavelet decomposition scheme. The research on adaptive decorrelation

functions has resulted in a novel and highly efficient module featuring technology developed within the Queen Mary MMV Group. This technology has been bought and patented by Motorola Research UK. It has also resulted in more than €0.8 million funding from the EU for the Group.

For further information on the Group's scalable video coding (SVC) technology and other work, see:  
<http://www.elec.qmul.ac.uk/mmv/index.html>

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

### Book for Review

As always, the book will be sent out on a first come-first served basis, so contact me immediately if you would like to do a review. (If you are doubtful, go for the *quick view* option, and then return the book to me if you feel you really can't do the review.)

*Nearest-Neighbor Methods in Learning and Vision – Theory and Practice*

Edited by Gregory Shakhnarovich, Trevor Darrell and Piotr Indyk

The MIT Press, March 2006: Pp. 280, £29.95

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

## STOP PRESS – BCS Roger Needham Lecture 2006

**Dr Andrew Fitzgibbon will give the BCS Roger Needham Lecture:**

“Computer Vision and the Geometry of Nature”

This will take place on 23 October 2006 at The Royal Society, 6–9 Carlton House Terrace, London.

For booking details, see the BCS website:  
[www.bcs.org/events/needhamlecture](http://www.bcs.org/events/needhamlecture).

Christine Duma  
 BCS Events Manager  
 email: christine.duma@hq.bcs.org.uk

## Memories of Scotland



View from Stirling Castle. The statue is that of King Robert The Bruce (1267–1305).



View of Ben Lomond from Loch Lomond. Notice the clouds swathing the peak. For future reference, I can vouch for the whole-day coach tour around Loch Lomond, The Trossachs and Stirling Castle, which was excellent – Ed.