BMVA News

BMVA News[1] is published every three months. Contributions on any activity related to machine vision or pattern recognition are eagerly sought. These could include reports on technical activities such as conferences, workshops or other meetings. Items of timely or topical interest are also particularly welcome; these might include details of funding initiatives, programmatic reports from ongoing projects and standards activities. Items for the next edition should reach the editor by 22nd January 2001.

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

Annual Report of activities

or What happens to your money?

B MVA prides itself in having more then 400 members active in the broad area of computer vision and pattern recognition. As always, we try to promote interest in this area and increase our membership. During the last year a leaflet was produced to promote our activities and it will soon be distributed to 4,000 UK recipients who are potential users of image processing and pattern recognition technology.

Our finances have been very healthy, so we are able to keep the subscription to £20. The income of BMVA comes mainly from the two major annual events it organises, namely the British Machine Vision Conference and the Medical Image Understanding and Analysis conference. BMVA then uses these money to return them to the community through the services it provides. For example, last year five technical meetings were organised on industrial inspection, colour in computer vision, surveillance, multi-scale methods and on Augmented reality. Four more meetings are planned for the forthcoming year, the first one on 3D texture on November 1st, and the others later in the year on understanding human gestures and behaviour, medical imaging and Astronomy and on Bill Adaway's unsolved problems. These meetings are free of charge to our members.

Another route via which your money go back to our members is through the various prizes and bursaries distributed during the year. Apart from the Science, the Industry and the best Demo prize which are all sponsored and given to BMVC papers, we have also the best poster prize (the value of which was doubled last year) and five bursaries to students to participate free of charge to BMVC. Five further bursaries are

also awarded per year to student members to participate to conferences overseas. BMVA run for the 6th year running the very successful EPSRC Summer School on Computer vision open to all first year PhD students in the UK who start their PhDs in the broad area of computer vision. The School is free to the EPSRC sponsored students, and BMVA sponsors five other students with bursaries £250 each.

In an effort to boost the quality of research in the UK, and in order to honour the memory of one of its most valued members who passed away prematurely four years ago, Professor Geoff Sullivan, BMVA established in the recent years the Sullivan Doctoral thesis prize. This is awarded annually to the best PhD thesis which was completed and examined during the previous calendar year.

Finally, during the last year BMVA decided to establish a special title, that of the Distinguished Fellow, which will be awarded to one person per year only, for his or her services to our community.

The government established recently the Foresight panel to report on the impact of information technology to industry in the coming years. BMVA has played an active role in these panels and has been promoting the importance of computer vision to the industry of the future. As part of its activities BMVA organised a one-day consultation meeting in DTI in London, with the support of EPSRC, IEE and UKIVA, where it invited researchers, suppliers and potential users of the technology. The meeting was co-ordinated by Tim Ellis and John Gilby from Sira who also circulated an electronic questionnaire asking the views of our members on the topic. The outcome of that meeting and the questionnaire has been written up as a report that was sent to the relevant Foresight panels. A summary of this report will be published in a forthcoming issue of the Image Processing magazine which will be distributed to all our members.

The activities of BMVA were also promoted through a guest editorial published in the special issue of the magazine Plant and Control Engineering which included a special insert on computer vision.

The BMVA newsletter has been promptly and efficiently run by Paul Rosin and brings all our news to our members, four times a year.

Finally, BMVA has been active in the International level and its efforts have been acknowledged by the international community by awarding to the UK the organisation of the International Conference on Pattern Recognition 2004. The general chairman of ICPR2004 will be Josef Kittler who co-ordinated the UK bid.

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The synthesis of the new Executive Committee of BMVA

The executive committee of BMVA consists of ten members, five of which are elected every year with two years rotation period. This year there were five nominations for the five positions that became vacant and so no election took place. The only change in the committee was the replacement of Steve Maybank by Tony Pridmore. Steve served as the publicity officer during the last year and we are all grateful for his input at the meetings and his services as a committee member. Tony was the BMVC1999 organiser, and we are happy to welcome him on board. So, the elected members of the new committee are: Mr Adaway, Dr Bowden, Dr Cootes, Prof Davies, Dr Ellis, Prof Kittler, Prof Petrou, Dr Pridmore, Dr Rosin and Dr Charles Taylor. Prof Chris Taylor remains as the ex-officio secretary of the BMVA company, and Dr Varga as the company's treasurer for the time being. However, all jobs within the committee will be decided in the first meeting of the new committee in late October.

In its efforts to broaden its basis, BMVA, in addition to the elected members of the committee, it also co-opts certain other members. So, in addition to the above names, the executive committee also includes Dr Courtney from VAL of Manchester University, Dr Gilby from Sira, Dr Pollard from Hewllet Packard and Dr Siebert who represents the Scottish Chapter and the Imaging Faraday partnership. Finally, the organiser of the past BMVC, Dr Mirmehdi is also a member of the committee for the coming year.

Prizes at BMVC 2000

Over the years BMVA has created a series of prizes for the BMVC papers in order to stimulate and encourage high quality submissions and presentations. Four such prizes are distributed each year. The prizes at BMVC2000 were awarded during the BMVC2000 banquet, as follows:

The best poster prize went to Broadhurst and Cipolla from Cambridge, for their poster "A Statistical Consistency Check for the Space Carving Algorithm".

The prize is worth £200 and is awarded to the best poster judged by members of the programme committe not only for its appearance, but also for its content, both factors being equally weighted.

The best demonstration prize is sponsored by UKIVA and it was awarded to Karaulova, Hall, and Marshall from Cardiff University for their demo "A Hierarchical Model of Dynamics for Tracking People with a Single Video Camera". The prize, £200 worth, was given to the recipients by Don Braggins on behalf of UKIVA.

The third prize is the Industry prize awarded to the paper which is most industrially relevant and is sponsored by CRS (Computer Recognition Systems). It is worth £500 and this year it was awarded to Magee and Boyle from the University of Leeds for their paper, "Detecting Lameness in Livestock using Resampling Condensation and Multi-stream Cyclic Hidden Markov Models".

Finally, the Science prize, awarded to the best paper from the scientific point of view, was this year sponsored by Hewllet Packard. It is worth £500 and it was awarded to Maciel and Costeira from Instituto de Sistemas e Robotica, Portugal, for their paper "Robust Point Correspondence by Concave Minimization".

Sullivan doctoral thesis prize

The Sullivan doctoral thesis prize this year was awarded to **Gareth J Edwards** for his PhD thesis entitled "Learning to identify faces in images and sequences". The prize is awarded to the best thesis that has been examined during the calendar year prior to the BMVC at which it is awarded and it is given during the BMVC banquet. BMVA is already soliciting nominations for next year's prize among theses that have been examined during the calendar year 2000.

First Distinguished Fellow of BMVA

BMVA decided to create a special award in order to honour some of the most prominent members of our community in recognition of their services. It was decided that every year, one person, and only one person per year, will be awarded the title of the BMVA Distinguished Fellow. Earlier in the year a special subcommittee was set up with the sole task to seek nominations. BMVA is very pleased to announce that its first Distinguished Fellow is Professor Michael Duff, fIEE, fIAPR, fRSA, from the Physics Department of University College London.

Professor Duff started his career as a physicist in the 50s, and like most physicists of the time he was spending his time looking at images of the bubble chamber, chasing exotic particles. Unlike most physicists, however, when it became obvious that the computers of the time were not powerful enough for anybody to do any serious image processing with them, he set off to build his own computer! Thus a brilliant career in computer architectures started. The first outcome of his work was UCPR1 in 1967, which was based on ideas evolving from studies of mammalian vision and in particular on models of the retinal architecture.

Over the following two decades, heading the UCL Image Processing Group, he developed these ideas with the series of eight increasingly complex multiprocessor systems, generally categorised as Cellular Logic Image Processors (CLIP0 to CLIP7), ranging from arrays of 25 to 9216 processors. One of these (CLIP4) was put into commercial production. The CLIP programme was given the British Computer Society Technical Award for 1985. In recent years, this project has developed into various studies of computer architectures based on nanoelectronics, funded by DARPA and the European Community.

During all this period, his work on computer architectures was accompanied by studies in parallel algorithm design and applications to real problems in

applied image processing.

However, the contributions of Professor Duff do not stop here. In 1967 he founded a discussion group on Pattern Recognition, which in 1976 developed into the British Pattern Recognition Association. It was this Association which in the mid eighties joined forces with the then Alvey Vision Club to form BMVA as you know it today. Throughout all these years Professor Duff has been working in raising the profile of the UK community in the international scene by being an active member of IAPR (to which BMVA is affiliated). He has served as the secretary of IAPR for four years and as its president from 1990 to 1992. He has been chairing or is member of various IAPR committees and since 1998 he has been the IAPR newsletter editor.

BMVA this year proudly honours him with the Distinguished Fellow title.

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Vision in Foresight Workshop Report

Friday 30th June, 2000-10-09 DTI, 1 Victoria Street, London

The aim of this one day meeting was to gaze into the crystal ball and identify key vision applications to the Foresight programme (see `www.foresight.gov.uk`). The meeting was organised in collaboration with IEE, Sira, UKIVA and EPSRC, and was attended by more than 50 participants from academics, users and suppliers of vision systems.

The day began with an overview of the Foresight programme from Julie Carney, Director of Foresight. Julie outlined the structure of the programme, which is divided into a number of thematic (crime prevention; the ageing population; Manufacturing 2020) and 11 sectoral areas (built environment and transport; chemicals; defence, aerospace and systems; energy and natural environment; financial services; food chain and crops for industry; healthcare; information, communications and media; materials; retail and consumer service). She emphasised the importance of organisations participating under the Associate Programme (of which BMVA is a member),

whose contribution would provide valuable input to the panels considerations.

Jim Fleming (EPSRC) then provided a brief summary of the conclusions of the Vision Theme Day held recently in London (see July Newsletter for more details).

Richard Brook (Chief Executive of Sira and workshop chairman) in his introduction emphasised the need to promote vision to the Foresight panel, to ensure it features in their considerations as an important driver across a wide range of advanced technology applications. It was not going to be possible to discuss all the areas where vision could contribute in a one day workshop, and the organisers had selected four topics that spanned a number of the Foresight sectors.

The remainder of the day was devoted to considering a number of vision application areas relevant to Foresight. The morning discussion session highlighted two: surveillance and industrial processes; the afternoon: retail and financial services. Each topic was spotlighted by a 10 minute introduction (Tim Ellis, John Gilby, Bernard Buxton and Derek Hill respectively), followed by a 20 minute discussion.

The first session on surveillance raised issues of the need for authenticating image data for evidential purposes. This would only be the first stage in a process for managing whole volumes of digital image data produced during criminal proceedings, and video and image standards (e.g. MPEG7) will need to embody tamper-proof methods of tagging. Face recognition still presents a challenging task, and has yet to be solved when very large face databases are needed.

Although CCTV systems are becoming increasingly commonplace, investment is largely in the camera hardware than in any automatic analysis. Intelligent cameras with on-board processing and wireless communications will supplant existing analogue video systems and provide a platform for distributed and cooperative processing across camera networks, though considerable research is needed to develop robust and reliable systems. However, the decreasing cost of digitally networked cameras (e.g. webcams) reduces the margins for system installers and adding intelligence to the camera will exacerbate this problem.

Kerry Mashford (OST, Manufacturing 2020) used a video generated from the Manufacturing 2020 taskforce that identifies e-commerce as the key technology of the future in manufacturing, and the relationship between manufacturer and customer will become closer and longer-term, and must embrace the

means to foster this. The convergence of multimedia technologies on the Web will be important for vision technologies, and the entertainment industry will be increasingly important users.

This theme was continued by John Gilby, who addressed the problem of product and process design and innovations that might create a 'killer' application for vision. Users of vision explained that the machine vision community is a long way from really understanding their needs, and that any 'generic' solution could never hope to cope. This barrier will only be overcome with greater dialogue, but would be aided by effective metrics on system performance and reference to some national standards.

One suggestion from the audience was that it was quite feasible to manufacture a $200 3D scanner with current technology, but that the lack of market demand would never justify its development, though similar arguments were initially applied to computers, pocket calculators and flat-bed scanners.

After lunch, the idea for killer applications was also taken up by Bernard Buxton, who identified the human-computer interface as a significant problem of great interest, and currently receiving much attention (e.g. Microsoft). This would not be limited to a means for emulating mouse movements, but would enable the computer to continuously monitor and interact with humans. He illustrated this with an example of a system that would monitor a person's size and shape (and weight) and make recommendations to items of clothing in their wardrobe that would no longer fit, and order replacement items automatically over the Internet. He also envisaged a vision 'spreadsheet' that would fill the semantic gap between algorithms and users – a vision equivalent of Photoshop.

Derek Hill identified a number of key developments in the healthcare area that would employ vision: gene therapy, extended mass screening programmes, keyhole surgery. In addition, the increasing volumes of multimedia patient data will need more sophisticated tools for visualisation and interaction to support interpretation. The discussion began by suggesting that Europe was better placed than the UK to compete with the USA in this area of technology. The possibilities of replacing visits to your GP by home consultations directly over the Internet were an inevitable extension of current technology, and that remote diagnosis of video-based observations was a distant but real possibility. 'Gadgets' were identified as healthcare products that could be used by consumers as advisors that could provide a level of reassurance or advice on particular medical conditions (e.g. skin disease).

Richard Brook summarised the day's discussions; the problems for industry to exploit the market potential of vision and the opportunities that were manifestly inevitable, but against the background of the past failures of vision to live up to expectations. Mass markets products are inevitably difficult to predict, and may often be generated by seemingly trivial or frivolous tasks.

A further report on the meeting will appear in a forthcoming article in Image Processing magazine, and will be available on the Foresight web pages for comments.

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ACCV 2000

The Fourth Asian Conference on Computer Vision (ACCV2000) was held at the Grand Hotel in Taipei City, Taiwan during 8–11 January 2000. The theme of this conference was "Computer Vision in the New Century" and aimed to provided researchers and experts working at frontier of the computer vision theory and applications a forum to interact and exchange technical. The conference lasted for three days and had parallel sessions including 3 plenary talks; 6 invited sessions 100 research papers presented orally and 78 research papers were presented in two poster sessions. Authors from 23 countries were present.

ACCV2000 was opened on the morning of 8 January 2000 by Dr. C.Y. Chang (Chiao Tung University, Taiwan) with a very welcoming opening speech. Promptly follow the speech was the first plenary talk that was given by Prof. M. Sakauchi, titled "Construction of Multimedia Mediation Mechanism". This talk introduced and discussed a new framework for multimedia information applications and services developments.

The second plenary lecture was given by Prof. T. Kanade on the topic of "Real Time Vision - Interaction among Algorithms, Hardware and Control". In this talk Prof. Kanade discussed the issues that concerned the design and implementation of a real-time vision system regard to latency, bandwidth, reliability, etc. These issues were discussed and illustrated

by using an ongoing research project of a vision-based autonomous helicopter.

The final plenary talk, "Variational methods in Computer Vision from Theory to Application", was given by Dr. O. Faugeras. The lecture discussed the use of variational methods in computer vision developments. Dr. Faugeras has shown that variational methods can be extremely useful for successful computer vision algorithms and systems developments. The presentation consisted of numerous examples to illustrate both the theoretical and practical strengths of such methods in the context of computer vision developments.

My presentation was on the use of an n-tuple classifier for automatic initiation of a model fitting algorithm. This is used to enable automatic estimation of salmon bio-mass underwater from stereo video images. The paper was very well received and in conversations afterwards people showed considerable interest in the research work on which it was based. I exchanged contact details with two people who specifically expressed a wish to make further contact with the research team.

I consider that my attendance at the conference was both successful and useful. The materials that were presented in the conference were of very high standard, and have broadened my view and knowledge of research and development in the field of computer vision. In addition the salmon bio-mass research project gained new international exposure within the image analysis community. I hope this may benefit both the project and the research group.

I would like to thank the British Machine Vision Association who contributed to my conference fee and the Douglas Bomford Trust who contributed to my travelling costs.

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Image Processing for the Food Industry

E.R. Davies,
World Scientific, Singapore, 2000,
ISBN 981-02-4022-8. (289 + xx pages)

During the last two decades, image processing has been applied very successfully to a range of industrial tasks, including but not restricted to inspection, measurement, grading counting, sorting, process monitoring, object location and machine control. While applications have been found in many other areas, such as medicine, surveillance, fingerprint analysis, satellite image analysis, military target identification and tracking, it is the industrial sector that has benefitted most. This is due in large part to the fact that the factory environment can be controlled, at least locally. The presentation of objects to the camera and the lighting can be optimised for each application. In some circumstances, the product itself can be modified, making automatic visual inspection easier and more reliable. The process of acquiring, processing and analysing images for industrial inspection requires a much wider engineering involvement and outlook than is suggested by many of the existing books on Digital Image Processing. Hitherto, machine vision technology has been applied quite extensively to mechanical, electrical and electronic engineering components and materials, where close tolerances are the norm. However, opto-electronic inspection is ideal for food and pharmaceutical products, since it is completely hygienic and does not distort even soft, semi-fluid materials. Moreover, given suitable sensors, it is capable of detecting a wide range of product defects, including colour, shape, size, texture, number, alignment, surface contamination, foreign bodies, over/under filling, missing components (e.g. cherries on cakes), machining operations (decoration, cutting, trimming, crimping, etc), packing, etc. In view of the greater range of variation in the size, shape and colour of food and natural products, compared to most engineering artifacts, different techniques are sometimes required. In particular, food inspection systems often need to be more intelligent and may well employ self-adaptive learning techniques.

This specialised volume is particularly welcome at this time, as it is covers the broad topic suggested by its title, in a scholarly way. In the first half (Chapters 2–7), the approach is fairly conventional: a wide range of image processing operators is described and, in many cases, pseudo-code for them is provided. While there are some text-books already in existence which cover the theoretical basis of image processing in a more comprehensive manner, Prof. Davies has concentrated on those techniques that are relevant to ensuring high-quality food products. In Part 2, he describes the application of those techniques to a wide range of food-related tasks. He immediately turns his attention to image acquisition, and lighting in particular (Chapter 8), rather than image processing. In Chapter 9, he discusses the inspection of

baked goods and in Chapter 10 turns his attention to cereal grain inspection. He then addresses the issue of inspection using x-ray sensing (Chapter 11), while in Chapter 12 he discusses the role of vision systems in agriculture. Fish and meat processing is covered in Chapter 13. Finally, the systems issues relating to opto-electronic food-inspection devices are outlined, in Chapter 14. A look at the future prospects for this technology finishes a well-rounded discourse that has covered many different topics.

This well-written monograph is a joy to read. The breadth of coverage in a book of this size is impressive. The author draws on his own extensive experience, and that of many other workers, to empha-

sise his thesis that image processing is a very useful practical tool, not just an academic study, devoid of practical application. For this reason, I shall encourage my own students to study it in detail. Lack of knowledge and the commercial organisation of the food industry have to a large extent inhibited the adoption of this technology. Prof. Davies more than adequately resolves the former of these difficulties.

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