

BMVA News

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

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

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 10 March 2017.

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Editorial: *Some Off-Beam Musings about Binocular Vision*

Lying in bed in a hospital ward gives one time to relax and muse, and at the same time to think in new directions. Somehow one comes to realise that work is not the only aim in life: keeping alive and well is an even more vital

occupation. Having had a nasty eye complaint makes one all too aware how much one relies on one's sense of sight, and how easily an infection could be passed from one eye to the other and could even lead to total blindness. This thought led me to wonder how well I could master use of a white stick and/or a guide dog. Note of course that in some cases the long-time blind are able to use the echoes resulting from stick tapping as a rudimentary sonar tool, or the echoes from sharper clicks to map the surroundings even more accurately. Apparently, there's even the possibility of using ambient noise to map out the living space. Then there are machine vision sensors that can be used to map out space in order to help one see by activating tactile images on one's back, though such means are still in their infancy, having typical resolutions of only 50×50 dots; likewise, implanted electrodes in the eye or brain apparently have similar resolutions, though there is great promise for the future in all this. On the other hand, microarrays of much larger resolution must be on substrates that do not get rejected by the body, and this will probably be a serious problem for quite some time; i.e., you implant the device in the brain, which is then trained over many weeks to recognise the meaning of the new signals, only for it to be rejected in another few weeks. Fortunately, as I seem to be getting better without this sort of technology, I can forget about such solutions for now.

Nevertheless, more thoughts have been keeping me going. At my present stage the swellings of the tissues around my left eye have pushed it in the wrong direction, so I have been getting severe double vision. For a time I managed by covering up that eye. Then I found that the other eye could see less well. Obviously, the total resolution has been depleted by a factor of $\sqrt{2}$ (adding the results of two independent sensors increases the signal-to-noise ratio). However, the result seems significantly worse than this, i.e., the overall sensitivity seems to have dropped by a good factor of 2. In fact, I can explain this as due to the stereo effect of binocular vision, or the lack of it with one eye. This seems to apply to even a flat surface – I surmise because flat textured surfaces are not totally flat and may have fractal dimensions closer to 3 than 2. Anyway, multiply $3/2$ by $\sqrt{2}$ and one comes up with my observed (but subjective) value of close to 2. Of course, covering up one eye could be an overkill and is not advisable for more than a week or two, as

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.

the sense of the other eye could atrophy: people having nystagmus operations (for squint) have to keep both eyes going on an alternating basis until they are operated on.

In fact, I was permitted an interesting alternative by the hospital: I was offered a correction of the double image. What they did was to make careful assessments of my sight – specifically, assessment of the differing directions of the two eyes, and to compensate for the bad one by means of a prism. A simple prism is known to deviate light arriving at a certain angle through an angle that depends on the angle of the prism. For small angles I seem to remember from my schooldays that the deviation is approximately proportional to the prism angle. However, this approach has two flaws: (1) it will produce a lateral displacement as well as the required deviation, though I imagine the brain could learn to live with that; (2) it will produce a deviation that is constant over the whole eye, and my observation with a single finger test (i.e., no elaborate test instruments) is that my double vision varies from severe at the extreme right to zero at the centre and most of the left. In fact, the solution I was offered was that of a sheet of microprisms that vary in angle over the whole field of view – carefully adapted to my particular case. The optician chose one such thin, flexible plastic sheet from a cabinet containing what must have been somewhere between 1000 and 10,000 such sheets, snipping out an appropriate section of the appropriate one and sticking it on to one lens of my glasses. Bingo, my double vision vanished in the twinkling of an eye (or to borrow my favourite word from Fidelio, “augenblicklich”, which is the German way of saying exactly the same thing – far more economically, though perhaps less poetically). Oddly, I hadn’t heard of this technique before, but this solution is cheap and highly effective, and presumably is in wide use, though maybe many wearers won’t realise exactly how their eyes have been corrected, and non-wearers would naturally never come across it.

Before I had this correction, and when using my uncorrected glasses, I found it was so confusing walking around with double images that I was getting bad headaches because my brain couldn’t work out what was going on, but now I feel I can cope until the antibiotics do their stuff.

An interesting further aspect of binocular vision, both human and robotic, is that the algorithm in use has to match up both images, adjust the positions of the two views and then lock them together. In human vision, this means making the two eye directions converge until the two scenes match and then accept them as being from the same source. In fact, when seeing double images of a finger and moving the finger towards the left (in my case), there is a point when they suddenly jump together, which means that the images are close enough for the brain to work out the situation and to lock on to the proper interpretation. Contrariwise, when moving one’s finger to the right, the brain suddenly becomes unable to cope and it unlocks, so one again sees two images. As happens with all electronic feedback loops, the locking and unlocking positions are different and the loop exhibits hysteresis, though I had to look carefully to check that this was happening. Just be thankful if your sight is good and that your brain is managing all this transparently.

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New Arrangements for BMVA Travel Bursaries

The new arrangements for BMVA Travel Bursaries will carry forward into 2017. Note that there will be a fixed number of deadlines, as indicated on the bursary link to the BMVA website:

<http://www.bmva.org/bursaries>

Professor Lourdes Agapito
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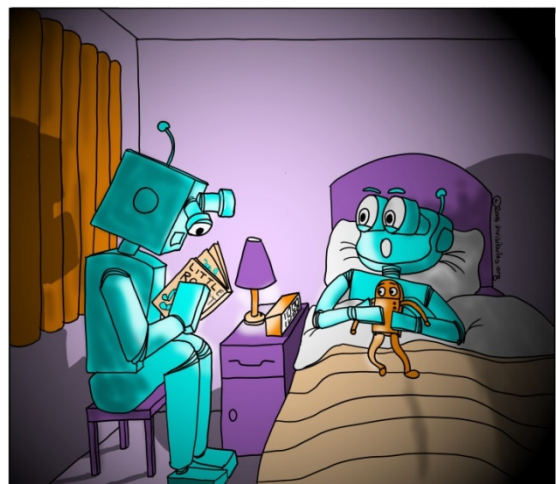
Sullivan Thesis Prize

Every year, the BMVA awards a prize for the best thesis out of those brought to its attention as having been examined in the previous calendar year. The prize is awarded in the name of Geoff Sullivan, who played a significant role in the early days of the BMVA.

If you are in the final stages of writing up your thesis, please consider submitting it to the BMVA’s thesis archive: all the information is on the BMVA website. If you are supervising a PhD student who you think has done particularly well, please consider entering him or her for the Sullivan prize; again, the procedure is on the website.

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Bedtime Story, anno 2084



"... but the naughty little regularisation term *wasn't* convex, so poor Little Robot had to go to bed without converging."

invisibules.org

Andrew Kay
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BMVC 2017

28th British Machine Vision Conference
Imperial College London
4–7 September 2017
<http://bmvc2017.london/>

The British Machine Vision Conference (BMVC) is one of the major international conferences on computer vision and related areas. It is organised by the British Machine Vision Association (BMVA).

Call for papers

Authors are invited to submit full-length high-quality papers in image processing and machine vision. Papers covering theory and/or application areas of computer vision are invited for submission. Submitted papers will be refereed on their originality, presentation, empirical results, and quality of evaluation.

All papers will be reviewed doubly blind, normally by three members of our international programme committee. Accepted papers will be included in the conference proceedings and the DoI indexed by BMVA. Please note that BMVC is a single-track meeting with oral and poster presentations and will include two keynote presentations and one tutorial.

Topics include but are not limited to the following:

- Statistics and machine learning for vision
- Stereo, calibration, geometric modelling and processing
- Face and gesture recognition
- Early and biologically inspired vision
- Motion, flow and tracking
- Segmentation and grouping
- Model-based vision
- Image processing techniques and methods
- Texture, shape and colour
- Video analysis
- Document processing and recognition
- Vision for quality assurance, medical diagnosis, etc.
- Vision for visualization, interaction, and graphics
- Object detection and recognition
- Shape-from-X
- Video analysis and event recognition
- Illumination and reflectance.

Keynote speakers

Richard Szeliski, Facebook, USA
<http://szeliski.org/RichardSzeliski.htm>

Pietro Perona, California Institute of Technology, USA
<https://www.vision.caltech.edu/Perona.html>

Submission guidelines

Paper submission and registration both use CMT. Paper registration is performed by registering as a user with CMT and entering a paper title and abstract. This will result in the allocation of a 'paper ID', which indicates registration is completed and should be used in preparation of the review copy. You will be able to make edits and upload new paper

drafts until the final deadline. Submitted papers should be prepared according to the published specification for formatting and style. Please be sure to read both the formatting instructions and policies before submission.

Important dates

Submission deadline:	2 May
Author notification:	4 July
Camera-ready deadline:	18 July
Author registration deadline:	18 July
Conference tutorials:	Mon 4 Sept
Main conference:	Tu–Th/5–7 Sept
Workshops:	Thurs 7 Sept.

See the following page for major details:
<http://bmvc2017.london/paper-submission/>

Organisers

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Stefanos Zafeiriou, Imperial College London

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Sponsorship

If you are interested in sponsoring BMVC 2017, would like to discuss a custom package, or require more information, please contact the Sponsorship Chair.

More information on the sponsorship packages is available at <http://bmvc2017.london/sponsorship/>.

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Computer Vision for Animal Biometrics

Special Issue of IET COMPUTER VISION

Editor-in-Chief: Professor Majid Mirmehdi, University of Bristol

For enquiries regarding this Special Issue please contact the Guest Editors:

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- Robert Fisher, University of Edinburgh: rbf@inf.ed.ac.uk
- Sai Ravela, MIT: ravela@mit.edu

Scope

The development of computer vision approaches that detect and describe animal life in image or video data is an emerging subject in machine vision. The first real-world applications are now becoming available to assist work in a variety of areas, including ecology, agriculture, conservation, and the behavioural sciences.

This special issue seeks to bring together and organise a collection of recently developed approaches in this domain. It is intended to provide an international forum for researchers to report recent developments in the field in an original research paper style.

Topics

- detection and recognition of animals
- automated visual species classification
- visual population count and census applications
- individual animal identification
- animal tracking and movement analysis
- monitoring animal traits, behaviour and health
- real-world animal biometrics systems.

Submission guidelines

All papers must be submitted through the journal's Manuscript Central system:

<http://mc.manuscriptcentral.com/iet-cvi>

All submissions are subject to the journal's peer-review procedures. The authors should follow the journal's Author Guide at <http://digital-library.theiet.org/journals/author-guide> when preparing papers for submission to the Special Issue.

Important dates

- Deadline for manuscript submission: 31 Jan 2017
- Publication of Special Issue: Dec 2017.

Call for papers

http://digital-library.theiet.org/files/IET_CFP_CV_ABIO_FINAL.PDF

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Computer Vision in Healthcare and Assisted Living

Special Issue of IET COMPUTER VISION

Editor-in-Chief: Professor Majid Mirmehdi, University of Bristol

For enquiries regarding this Special Issue please contact the Guest Editors:

- Francisco Florez-Revuelta, Universidad de Alicante, Spain: francisco.florez@ua.es
- Dimitrios Makris, Kingston University, UK
- Susanna Spinsante, Università Politecnica delle Marche, Italy
- Alexandros Andre Charaoui, Google Inc., Switzerland
- Majid Mirmehdi, University of Bristol, UK.

Scope

In our ageing society, the proportion of people who need healthcare support and a safe and assistive environment is clearly increasing. Hence, there is a growing demand for technological solutions for the purpose of prevention, diagnosis and rehabilitation, not only to support clinicians, but also to enable patients to self-manage their health and wellbeing. Computer Vision is well placed to provide such solutions. In the last decade, enormous advances have been made with regard to automated and reliable recognition of image or video content, such as face, object and motion recognition, and gesture and activity recognition. Additionally, the affordability of modern depth sensors, such as the Microsoft Kinect, Asus Xtion Pro live, PrimeSense Carmine and Leap Motion, represent a huge leap forward, enabling 3D modelling and body pose estimation in real time with low cost and mostly simple setup solutions. In active and assisted living (AAL), the aim is to develop intelligent environments within which people's health can be monitored and assistance can be provided to deliver comfort, safety and eHealth services, among others.

Binary sensors were traditionally deployed, though they are limited in their ability to help with complex scenarios, while visual sensors, whether located in the environment or worn by the person, provide a richer modality to analyse the person's activities and the environment. In healthcare, non-intrusive visual sensors may estimate and track the human body's physical state to provide real-time feedback to clinicians and/or support interactive and stimulating rehabilitation activities. As such, computer vision, pattern recognition and machine learning techniques are gaining popularity in healthcare and assisted living solutions. The aim of this Special Issue is to provide a platform for presenting those techniques and applications.

Topics

Methods and techniques

- Human behaviour analysis
- Gesture and action recognition
- Recognition of activities of daily living
- Gait analysis and Quality of motion measurement
- Social robotics

- Gamification and serious games
- Egocentric vision and Physiological monitoring
- Augmented and mixed reality.

Applications

- Tele-care and tele-health
- Prevention and management of chronic conditions
- Support to activities of daily living (ADL)
- Fall detection and prevention
- Rehabilitation and Mental health and cognitive stimulation
- Indoor and outdoor mobility
- AAL at work.

Associated issues

- Privacy and ethical issues
- Datasets.

Submission guidelines

All papers must be submitted through the journal's Manuscript Central system:

<http://mc.manuscriptcentral.com/iet-cvi>

All submissions are subject to the journal's peer-review procedures. The authors should follow the journal's Author Guide at <http://digital-library.theiet.org/journals/author-guide> when preparing papers for submission to the Special Issue.

Important dates

- Deadline for manuscript submission: 23 January 2017
- Publication of Special Issue: Q3 2017.

Call for papers

http://digital-library.theiet.org/files/IET_CFP_CV_HEALTH_ASSIS_LIV.pdf

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Report on One-day BMVA Technical Meeting: *Vision for Interaction: from Humans to Robots*

The BMVA Technical Meeting "Vision for interaction: from humans to robots" was held at the BCS headquarters in London. Organised by Andrew Gilbert (University of Surrey), it was chaired by Nicoletta Noceti (Università degli Studi di Genova) and Alessandra Sciutti (Istituto Italiano di Tecnologia).

The main goal of this highly interdisciplinary one-day workshop was to bring together contributions from the fields of cognitive science, robotics, machine vision and artificial intelligence, to corroborate the discussion on the potential guidelines to design and develop biologically-inspired computational vision models that may favour a natural interaction between artificial systems and humans.

Overall, nine interesting talks – covering the different topics of the meeting – were presented, plus 7 contributions presented as posters during the coffee breaks and at lunchtime.

The morning session, chaired by Alessandra Sciutti, started with the first keynote talk, given by Professor Antonia Hamilton (Institute of Cognitive Neuroscience, University College London). She started by highlighting that the capability of perceiving and understanding actions is an essential component of human social interaction, citing the well-known mirror mechanisms – neurons that spike both when an individual performs an action and when he just observes the same action. She also mentioned the absence of a globally accepted perceptual architecture for actions (which there is for objects or faces, for instance).



The first oral session then started with a talk given by Professor Robert Ward (Wolfson Centre for Clinical and Cognitive Neuroscience, School of Psychology, Bangor University) who demonstrated that even still neutral face images can reveal the personality trait of a person. He concluded with a question to the audience, related to the possibility of using computational methods to understand which traits of the face carry the most significant information to discriminate a person's personality.

It is well assessed that social cognition strongly relies on visual information. But what happens in the absence of visual cues? Giulia Cappagli (Istituto Italiano di Tecnologia) considered this circumstance, highlighting the importance of vision for the development of spatial and social cognition. In particular she discussed how a delay in the development of motor and language skills due to the lack of vision may compromise children's interaction abilities.

After the coffee break, Professor Tony Prescott (University of Sheffield) opened the second oral session of the morning. After introducing a new robotic platform for the study of social interaction and the development of future companion robots (Miro: a biomimetics mobile robot) he focused on the relevance of vision for the realization of a robot autobiographical memory. He exposed the theory according to which human memory can be considered as a particular attractor network endowed with the properties of compression, pattern completion and pattern separation.

How can sensory information and neural mechanisms contribute to higher-level cognitive abilities essential for social interaction? In his talk, Professor Serge Thill (School of Informatics, University of Skövde) tried to consider this interesting question, with the aim of understanding whether it is possible to start from these considerations to provide a roadmap suggesting how the same abilities may be achieved in artificial agents. The morning session ended with the

contribution of Ghaith Tarawneh (Newcastle University) who presented a review of experiments to investigate the 3D vision of the praying mantis, the only insect with stereopsis capabilities. The final aim of his work is to reverse-engineer the strategy used by these insects and possibly obtain a new computation model of stereopsis for artificial agents.

Nicoletta Noceti opened the afternoon session introducing the second keynote speaker, Professor Yiannis Aloimonos (University of Maryland). In the talk, he started from the observation that the strategy we adopt to understand an action is very similar to the way we understand language. Then, he presented an approach to action recognition based on the use of context-free grammars focusing on manipulative actions (i.e., actions involving the manipulation of a physical tool).

A double-voice talk, given by Eris Chinellato (Middlesex University, London) and Luisa Sartori (Università degli Studi di Padova) opened the oral sessions of the afternoon chaired by Nicoletta Noceti. In this interdisciplinary presentation – an ideal bridge between the cognitive topics covered in the morning and the computational side considered in the afternoon – they illustrated the bidirectional link between cognitive science and robotics for social interaction.

The last oral session was opened by the talk of Alessia Vignolo (Università degli Studi di Genova). Alessia presented her research on the use of low-level visual motion features for detecting potentially interacting agents on the basis of biologically plausible dynamics occurring in the scene. She proposed a model inspired to the “Two-Thirds Power Law”, a well-known invariant of end-point human movements, and discussed all the experimental results obtained from the validation of the model on a large variety of videos of biological and non-biological motions.

Manuela Chessa (Università degli Studi di Genova) presented her work on natural human-machine interaction in shared augmented reality scenarios. She started by highlighting the main goal of NUI (Natural User Interfaces): to design new interactive frameworks, integrating human language and behaviour into technological applications that improve the quality of interaction from the human user point of view. Then, she presented her approach to NUI, which is based on the design of an experimental setup in a shared augmented reality workspace to implement a collaborative virtual environment, where multiple users may connect and interact simultaneously.

The talk given by Philip Krejov (University of Surrey) concluded the oral sessions of the meeting. The topic of the presentation was the challenging task of determining hand poses in real-time in terms of the joint positions. He pointed out why the task is so hard, explaining how hand postures are characterized by complex kinematics relationships and a not very salient texture, and how hand videos often show self-occlusions, ambiguous poses and rapid motions. To cope with these issues he proposed different methods based on depth information.

A very active discussion followed each of the talks, with a rich question-and-answer session for each presentation, enabling an actual dialogue among the representatives of the different disciplines involved. The possibility of sharing ideas was further favoured by the poster sessions – held in conjunction with coffee breaks and lunch – corroborating

the lively discussion between experts on different yet related fields of research.

Chairs: Nicoletta Noceti and Alessandra Sciutti

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BMVA Symposium: Analysis and Processing of RGBD Data



Wednesday 1 March 2017, BCS London

Chairs: Paul Rosin and Yukun Lai, Cardiff University

Keynote speakers

- Professor Adrian Hilton, University of Surrey – 4D modelling of dynamic shape from RGBD Data
- Dr Dima Damen, University of Bristol – Challenges and opportunities for action and activity recognition using RGBD Data
- Professor Ling Shao, Northumbria University – Feature learning from RGB-D data.

Call for Papers

The availability of cheap RGBD sensors has led to an explosion over the last five years in the capture and application of colour plus depth. This resulted in a demand for robust and real-time processing of data that is typically noisy and incomplete. We welcome contributions to this workshop in the form of oral presentations, posters or demos. Suggested topics include:

- Joint analysis of colour and depth
- Acquisition and Processing of temporal RGBD data
- Recognition from RGBD data, e.g., human activity detection, object or event detection
- RGBD salient object detection
- Robust processing of RGBD data
- Real-time tracking from RGBD data
- Segmentation of RGBD data
- Extracting features from RGBD data and RGBD SLAM
- Geometric and semantic modelling from RGBD data
- 3D reconstruction from RGBD data

- Application and evaluation of RGBD systems
- RGBD LiDAR processing.

This list is not exhaustive, so if you if you would like to present on anything RGBD-related, do submit an abstract. You may include links or pointers to web-based materials, demonstrations or papers giving more details. The work can be ‘in progress’, recently published, or of course novel research.

Call for participation

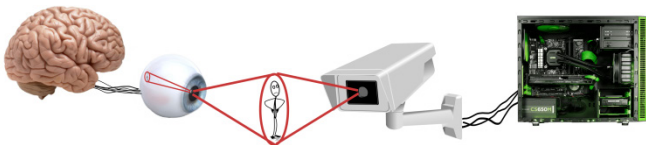
All those interested in presenting at this meeting are invited to submit a summary of their talk by 16 January [firm deadline] at <https://goo.gl/forms/q3PzYHeyEtkCsYsL2>.

Registration

Book online at www.bmva.org/meetings:
£10 for BMVA Members, £30 for Non Members, including lunch.

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BMVA Symposium: Security and Surveillance



Wednesday 26 April 2017, BCS London

Chairs: Nicolas Jaccard (UCL), James Ferryman (Reading) and Tim Ellis (Kingston)

Security and surveillance systems are now embedded in most aspects of society. Rapid technological advances in fields such as machine vision and artificial intelligence, together with ever increasing data availability, are expected to deliver a step-change in the capability of the said systems in the near future. This symposium will explore new approaches to security and surveillance, as well as their impact on society.

Keynote speakers

- Professor Sean Gong (Queen Mary) “Where to look: intelligent video beyond surveillance”
- Dr Tony Breckon (Durham), “Automatic object classification for 2D X-ray and 3D CT within an airport and border security context”
- Chris Hurrey (Hanover Associates UK Ltd.), “Biometric modalities at the border”.

Call for papers

The aim of this one-day workshop is to provide a snapshot of current and recent research into the application of imaging technologies to the challenges of surveillance and security. In spite of the pervasive deployment of imaging technologies (e.g., CCTV camera networks, X-ray scanners) the challenge of developing reliable and robust algorithms is yet to be fully met. We welcome contributions to this workshop in the form of oral presentations, posters or demos. Suggested topics across all imaging modalities include:

- People detection
- Remote surveillance
- Biometrics
- Face recognition
- People identification
- Border security
- Traffic surveillance
- Recognising activities and behaviours.

This list is far from exhaustive and we will be interested to see presentations or posters related to the wider theme of surveillance for security purposes.

Call for participation

All those interested in presenting at this meeting are invited to submit a summary of their talk by 1 March [firm deadline] at <https://goo.gl/forms/2HvqXta1gnxjIPoz2>.

Registration

Book online at www.bmva.org/meetings:
£10 for BMVA Members, £30 for Non Members, including lunch.

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Report on IWDM 2016

The 13th International workshop on Breast Imaging (IWDM-2016) is one of the most prestigious conferences in the field of breast imaging, which happens every two years. This year, it was held in Malmo, Sweden on 19–22 June in the Clarion Hotel and Congress Malmo Live with Dr Anders Tingberg chairing the scientific program committee. The International Workshop on Breast Imaging (formerly known as the International Workshop on Digital Mammography) is a platform for research groups in breast imaging, image analysis, clinicians, and representatives of medical groups from industries to show case their research and developments. It also provides a way to share discoveries, clinical practices and new developments in technology for controlling breast cancer through early detection and treatment.



The Clarion Hotel Conference Venue

The meeting started on Sunday 19 June with a welcome reception by Dr Anders Tingberg at the conference venue in the heart of Malmo. There was an exhibition area where the representatives from different industries could exhibit their new progress in technology.



Gala Dinner

The day ended with the gala dinner at Malmo town hall. It was situated in the oldest and largest city square. The building showed the excellent architectural styles across three centuries of Swedish nobility. The dinner took place in one of the halls in the town hall that exhibits many paintings showing the history of Malmo. The mayor of Malmo gave an excellent talk about the history and importance of Malmo in world history. This was a great chance to meet people from different nations and to discuss their research and culture. The five winners of student research fellowship awards were announced and the prizes were given during the dinner.

On the third day (21 June) the program started with a Sectra morning symposium. Mr Anders Granlund and Mr Ian Judd, the product managers of Sectra, discussed the evolution of breast imaging PACS including breast density, business analytics and dose monitoring in breast imaging. It was followed by presentations focussing on density assessment and tissue analysis from breast images. This was followed by presentations concentrating on radiation dose and classifications. After the lunch the second poster session took place. The majority of the posters concentrated on image processing, CAD, breast density and new technologies. I was very lucky to present my poster in this session: many experts from research groups and industrial representatives showed interest in my work and discussed the possibilities of the work in a clinical setting. It was a wonderful experience to share my work with experts in the breast imaging field. The poster session was followed by a keynote speech on spectral mammography by Dr Eva-Maria Fallenberg, an expert radiologist from Charité Universitätsmedizin, Berlin. This was followed by presentations on scientific works concentrating on contrast-enhanced digital mammography.

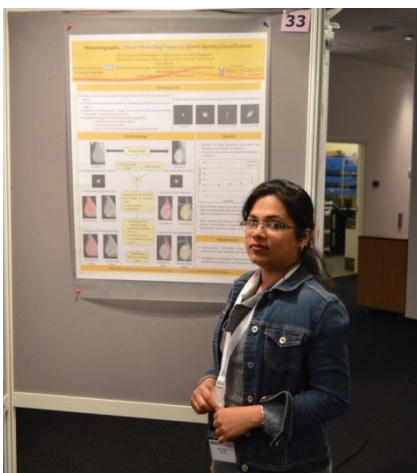
On the last day (22 June) the program started with a keynote speech by Professor Marco Stampanoni from ETH Zurich, on X-ray phase contrast mammography. This was followed by presentations on work on phase-contrast breast imaging in mammography, work on phantoms, simulation models and virtual clinical trials in digital mammography and tomosynthesis. The program ended with a small closing ceremony where the three winners for the best poster awards were announced.



Presentation by Keynote Speaker Dr Sophia Zackrisson

On the second day (20 June) the program started with the Siemens breakfast symposium and discussions on dose and quality control in Breast Tomosynthesis. Three keynote speeches were presented on the same day by Dr Sophia Zackrisson from Lund University, Professor Nico Karssemeijer from Radboud University Medical Centre and Dr Savannah Partridge from the University of Washington, Seattle. The keynote speakers gave an in-depth talk on tomosynthesis, deep learning and breast MRI. The first set of 26 posters were presented after lunch. The majority of the posters were on the capture of mammography, tomosynthesis and breast CT. It was a wonderful experience to see a variety of work on different modalities of breast imaging by researchers, clinicians and industry. I was able to go through all the posters and discuss their work with the presenters. It was interesting to get an idea about the different methods and techniques used by others for different applications in different modalities.

Other than the presentations, posters and keynote speeches, it was a platform to see the technical products and scientific works by commercial giants like Siemens, Sectra, GE Healthcare, Teledyne, BARD, Eizo Nordic AB, Fluke Biomedical Raysafe, Fujifilm Nordic AB, Mermaid Medical, Philips, Toshiba Medical Systems, etc. They demonstrated a wide range of solutions to a wide range of problems in medical imaging and exhibited their new products to the public. The representatives gave a warm welcome to all the delegates and were ready to introduce their product and building connections. In addition, it was noticeable that a lot of presentations and posters in the conference gave insights on the importance of deep learning as a good way of solving many problems with medical imaging and CAD systems. The other important area under focus was the importance of tomosynthesis in early detection of cancer and its chances in the future.



My poster presentation

Indeed, it was a significant moment in my academic life to be a part of a prestigious conference, which specifically concentrated on my research field of breast imaging. I was happy that my poster, entitled “Mammographic Ellipse Modelling towards BIRADS Density Classification” interested many experts. Overall, the workshop was a huge success in bringing together research people from academia and industry working in this field and giving them a platform to share their ideas and increasing the networking opportunities. Finally, yet importantly, I must express my sincere gratitude and thanks to BMVA for providing me with the funds for this trip.

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Report on ICIP 2016

The 23rd annual IEEE International Conference on Image Processing (ICIP 2016) took place on 25–28 September in Phoenix, Arizona, USA. Phoenix was settled in 1867 and is today one of the largest sprawling cities in the USA by land area. The city is located in the sunniest region in the world. Measuring 3872 hours of *bright* sunshine annually, dwarfing the annual UK average of just 1493 hours.



The blue sky may be distracting but there’s no missing what was going on at the Convention Center.

ICIP is a broad conference that accepts work from a range of topics covering compression, 3D reconstruction, deep learning and medical imaging, with an acceptance rate in 2016 of about 45%. This year the platinum patrons were the industrial giants Google/YouTube and Intel, with Arizona State University providing event support. The vast range of topics applied to a varied array of problems provides useful insight and exposure to where Computer Vision and Machine Learning are reaching into all walks of life and serves to stimulate discussion between other computer science disciplines.



An Intel tech demo of real-time lane detection algorithm that was rapidly created using OpenVX

The packed schedule started with a day of tutorials. The morning sessions kicked off with deep learning, High Dynamic Range (HDR) video, distributed visual processing and embedded processing with OpenCV and OpenVX. The afternoon covered topics including computational photography, image understanding from high resolution Earth observations, visual forensics and security, and recently developed image analysis techniques.

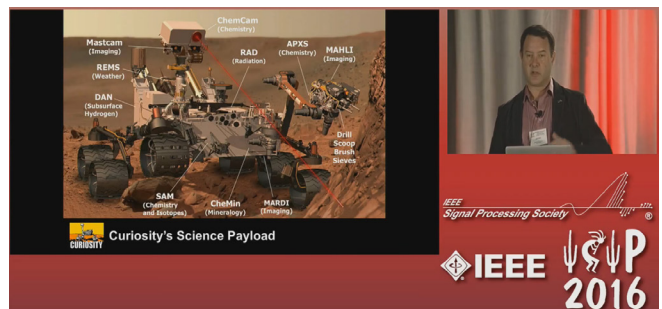


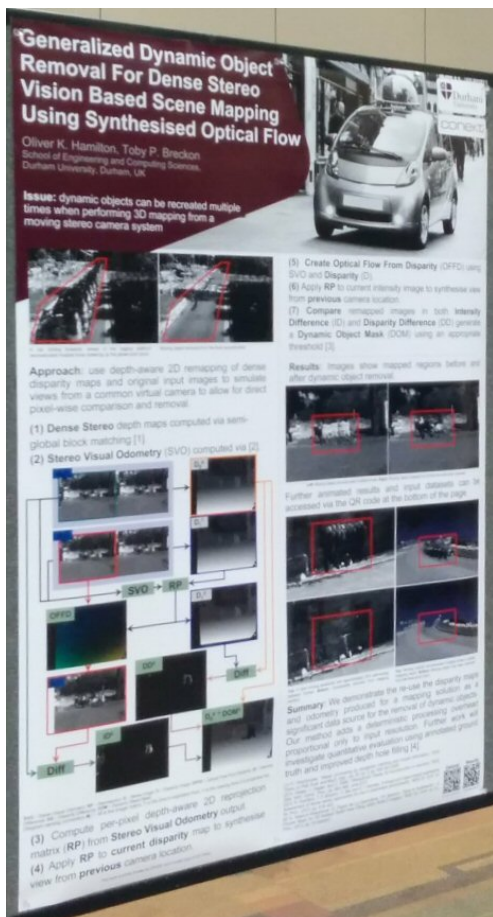
Image from the ICIP YouTube live stream of the first plenary session

Each day started with a plenary session that was streamed live on YouTube. Recorded streams are still available to view on the IEEE ICIP YouTube channel (<https://www.youtube.com/channel/UCr6j7tJxQTTQoQH0HctIIXQ>): I highly recommend them. Lectures and poster sessions ran concurrently all day and spread throughout the Phoenix Convention Center.

With such a large number of papers (913 listed) across a variety of topics attempting any meaningful review here will inevitably result in neglecting a significant amount of work.



Poster presentations in the main hall



Our poster

One thing that clearly stood out about the research was the prevalence of machine learning. A count of papers that featured at least one of the keywords (deep, neural network, learning) totalled 140 (15%). Deep learning in particular appears to be applied to almost every aspect of computer vision these days – less so in terms of tackling the problems within the field of deep learning, but more focused on turning the tool towards traditional computer vision tasks. This was highlighted even more so by the panel session on Monday afternoon titled “Deep learning: is this the end or

the beginning of computer vision?” with brilliant panellists Kari Pulli (Intel), Jonathon Shlens (Google), and Ivana Tosic (Ricoh Innovations) providing their take on the potential of deep learning as a tool and where next it can take computer vision.

As usual with any good conference, our hosts put on social events to sample the culture and provide the chance to meet fellow attendees in a less formal environment. The first event was the welcome reception held on the Sunday night at The Heard Museum which is “dedicated to the sensitive and accurate portrayal of Native arts and cultures”. A well-stocked and tasty buffet with a selection of local beers and wines helped with the festivities while many of the Europeans were fighting off jetlag. The second event was the Award Dinner and Show, on the Tuesday evening, located at The Boulders Resort in Carefree, Arizona. This provided a backdrop of stunning natural rock formations and the iconic scenes of the sun setting behind towering cacti.

Once again the organisers of ICIP put together a great conference that was informative and enriching in both academic and cultural senses. With the next destination being Beijing, China I am sure the team will be successful in planning an equally fascinating conference with plenty of science and culture mixed in. I can highly recommend attendance of ICIP; although it may not have the same level of focus in our field as another conference, the opportunity to obtain a greater picture of the wider computer vision community should be taken. Finally, I would like to thank the BMVA for providing financial support to attend ICIP 2016.

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STOP PRESS – Congratulations!

Congratulations are due to Lourdes Agapito, who gave her professorial inaugural lecture on 5 October 2016. Please follow me in congratulating her!

I expect to have further details and photos of the event in the next issue of BMVA News.

Roy Davies
 Editor

MIUA 2017**Call for papers**

The 21st Medical Image Understanding and Analysis Conference, MIUA 2017, will take place in Edinburgh on 11–13 July.

The MIUA series of conferences is organised in the UK for communicating research progress within the community interested in biomedical image analysis. Its goals are the dissemination and discussion of research in medical image processing and analysis and aims to encourage the growth and raise the profile of this multi-disciplinary field. These conferences feature keynote speakers, tutorials, workshops, and oral and poster presentations.

Invited speakers

- Ingela Nyström: Professor in Visualisation and Head of the Division of Visual Information and Interaction at the Department of Information Technology, and Director of the Centre for Image Analysis in Uppsala University, Sweden; Vice-Chair of the Council for Research Infrastructure in Sweden
- Jinah Park: Professor in the School of Computing at the Korea Advanced Institute of Science and Technology (KAIST, Daejeon, South Korea), Head of the Computer Graphics and Visualisation Research Laboratory and Head of KAIST Research Group of Future Emerging Technology on Medical Imaging
- Daniel Rueckert: Professor of Visual Information Processing and Head of the Biomedical Image Analysis Laboratory at Imperial College London; Fellow of the Royal Academy of Engineering, MICCAI and IEEE Societies.

Tutorial

Dr Constantino Carlos Reyes Aldasoro: Senior Lecturer in the Department of Electrical and Electronic Engineering at City University London, Senior Member of the IEEE. Author of *Biomedical Image Analysis Recipes in MATLAB: for Life Scientists and Engineers* (ISBN 978-1-118-65755-3, Wiley-Blackwell).

Paper submission

Authors are invited to submit full papers of length 8–12 pages (1 column – LNCS Springer format) showing original research contributions under the topics of the conference. On this occasion, the conference proceedings will be published in the Springer CCIS – Communications in Computer and Information Science. A selection of the best papers will be invited to submit an extended version to the

special issue “Selected papers from MIUA 2017” of the Journal of Imaging.

The registered attendants will have the possibility to book a 1-day trip to the Scottish Highlands on Friday 14 July. Please email MIUA.2017@ed.ac.uk for more information about how to make the reservation.

Please find the call for papers and more information at the conference website: <https://mua2017.wordpress.com>.

Conference topics

- Big data processing
- Clinical and scientific evaluation of imaging studies
- Computer-aided pathology
- Computer-aided radiology
- Computer-assisted surgery
- Data compression and anonymization
- Data fusion
- Decision support
- Discovery of imaging biomarkers
- Human computer interaction
- Image enhancement
- Image interpretation
- Image-guided intervention
- Image formation and reconstruction
- Image perception
- Image registration
- Image segmentation
- Intelligent imaging systems
- Machine learning in imaging
- Modelling and simulation
- Motion analysis
- Multi-modality image analysis
- Pattern and feature recognition
- Protocol development and standardization
- Quantitative image analysis
- Shape analysis
- Software development
- Super-resolution algorithms
- Statistical methods in imaging
- Systematic testing and validation
- Texture analysis
- Time series analyses
- Virtual reality
- Visualisation.

Important dates

Paper submission opens:	1 October 2016
Paper submission deadline:	24 February
Author notification:	31 March
Camera-ready papers due:	24 April
Early-bird registration due:	12 May
Conference:	11–13 July.

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Report on ECCV 2016

The European Conference on Computer Vision (ECCV) is a prestigious biennial conference covering a broad range of topics in computer vision. It is organised on even years in alternation with the IEEE International Conference on Computer Vision (ICCV). The most recent series was held in Amsterdam during 8–15 October 2016 including four days of workshops and tutorials. All tickets to the conference were sold out a month before the starting date, indicating the rising popularity of computer vision in research. I was very fortunate to be financially supported by BMVA in presenting our work as a poster.

Just to briefly state the paper statistics, ECCV 2016 had 1480 valid submissions of which 415 (26.6%) were accepted. Beside 28 orals and 342 posters, this series adopted a novel type of presentation called ‘spotlight’, which was first introduced at CVPR 2016 and comprises a 5-minute talk without follow-up questions. 45 papers were selected as spotlights. All orals and spotlights were presented as posters as well. In addition, all posters were uploaded online with the aim of allowing greater access to published work.

During the conference, the weather was mostly mild with the average temperature around 8 Celsius. The first three days were dedicated to 22 separate workshops, which were held in various locations around the city centre including the University of Amsterdam and Pathé Tuschinski, which is regarded as one of the most beautiful cinemas in the world. Due to the proximity between the venues, it was easy to travel by tram or cycle. I personally hired a bike with handbrakes for the purpose of commuting, and it only took first few minutes of riding to become familiar with right-hand traffic.



Audience in the *Geometry Meets Deep Learning* Workshop

The workshops covered a wide range of topics, mainly inspired by the recent success of neural net-based approaches. One of the popular workshop choices entitled “Geometry Meets Deep Learning” focused on bridging the gap between traditional geometry-driven 3D vision and deep learning. Various high-profile speakers shared their views on the potential of deep learning in solving geometric problems such as localization. Also, an interesting talk by Intel demonstrated how 3D game engines could be used to generate large amounts of synthetic data for road segmentation with the aim of feeding it into data-hungry neural nets.

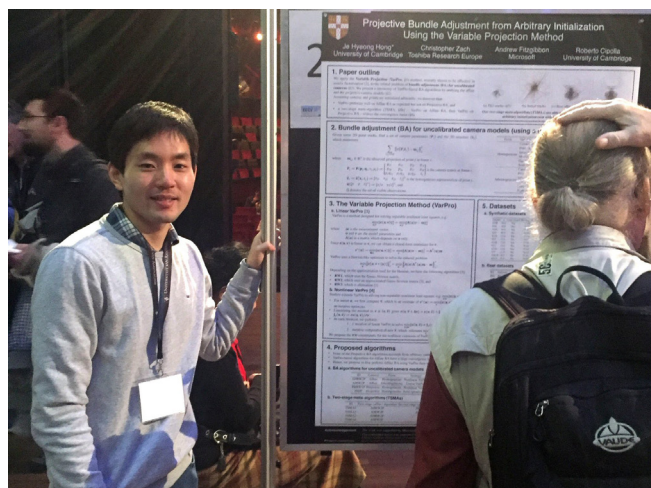
The main conference was held at Koninklijk Theater Carré, which is a Neo-Renaissance theatre located near the river Amstel. The first day started with a brief welcome presentation followed by oral and spotlight sessions. Just before the coffee break, there was a short opening ceremony

comprising several dancers with LED light suits depicting robots. Small lunch packs and plates of finger food were provided along with unlimited supplies of tea or coffee.



Main conference in the Koninklijk Theater Carré

During the four days of the main conference, no plenary or keynote lectures were given – unlike other conferences – and each day consisted of two sets of 1-hour oral, 30-minute spotlight and 1.5-hour poster sessions. The oral and spotlight sessions were categorized into 8 groups – segmentation, scene understanding, optimization, image and video processing, neural nets, structure-from-motion, 3D vision and tracking. Each poster session had a mix of different topics, providing opportunities for presenters to look around other peer-reviewed work from the same field. The main stage of the theatre was packed with delegates attending various poster presentations and asking questions. Our work “Projective Bundle Adjustment from Arbitrary Initialization using the Variable Projection Method” was amongst the first batch of posters presented on the first day. This early-presentation schedule allowed me to take off all the pressure on the first day and enjoy viewing other high quality presentations at the conference.



After a busy poster session

Many firms including Amazon, Facebook, Google, Intel, Microsoft, Qualcomm and Xerox hosted publicity and recruiting events in the hallway and a theatre lounge. Microsoft demonstrated their new HoloLens prior to its official launch in November. Some of these companies hosted their own parties in the city, and I had a chance to

attend one organised by Microsoft. These parties served as hotspots for informal gatherings between fellow researchers.



Activity at the Microsoft party

The best paper was awarded to Kim et al.’s “Real-time 3D reconstruction and 6-DoF tracking with an event camera”. Barron and Poole’s paper “The fast bilateral solver” received an honorable mention. A full list of awards can be found on the ECCV website:

<http://www.eccv2016.org/>.

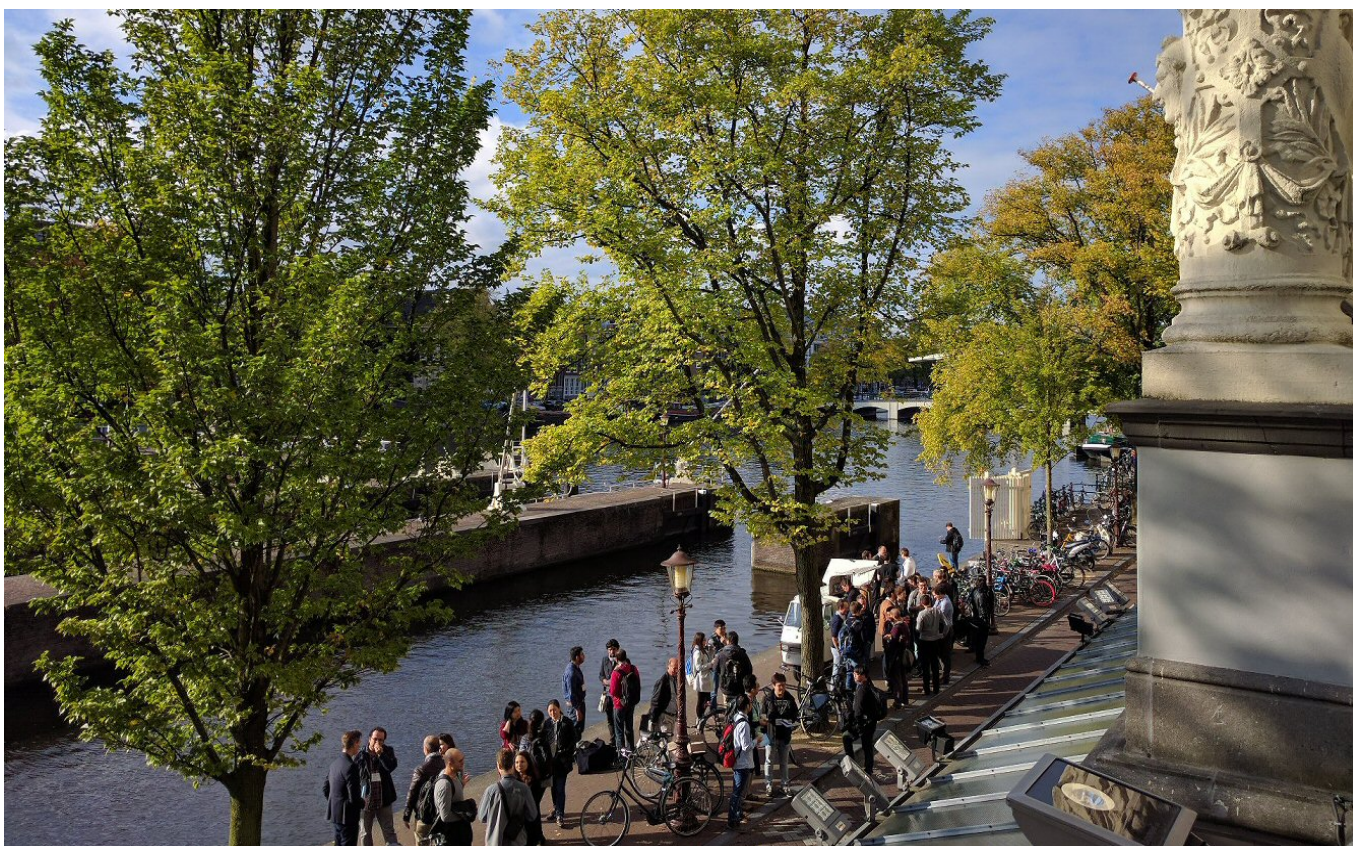
In this conference, each delegate received a free ticket for a cruise ride through some of the 165 canals in Amsterdam. The conference dinner was held on a cruise ship called Ocean Diva but I was unable to attend this event as I had to take care of a companion who had been injured in a bike accident.



River Amstel

Finally, I would like to sincerely thank BMVA for their generous financial support towards my travel to Amsterdam – without which I could not have attended or met great researchers in the field. In addition, I would like to thank Roberto Cipolla, Andrew Fitzgibbon and Christopher Zach for all their support throughout my PhD.

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Outside the conference venue



Day and night in Amsterdam, courtesy Je Hyeong Hong

