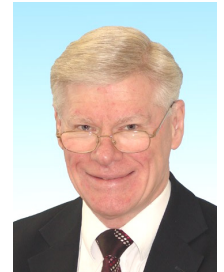


# BMVA News

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

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

**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 10 September 2018.

## Contents

Editorial: <i>Will There Be Space for Humans in the Future Deep Learning World?</i> .....	1
Travel Bursaries for International Conference Attendance .....	2
BMVA's Thesis Archive .....	2
BMVC 2018: registrations are due .....	3
BMVA Symposium: Robotics meets Semantics .....	3
Report on BMVA Workshop on Reinforcement Learning... 4	
Upcoming BMVA Technical Meetings .....	5
BMVA Distinguished Fellow 2019 – <i>Call for Nominations</i> .....	5

## Editorial: *Will There Be Space for Humans in the Future Deep Learning World?*

Long ago, as a schoolboy I hated rugby, as I always found myself cold, wet, muddy and bored in an uninviting corner of a rugby field. The problem was that I never got the ball: consequently, I didn't get any practice, and therefore could only get worse – in contrast with my fellows, who were

always improving and even enjoying themselves. The same thing happened in cricket, where the others always said, “come on, chaps, we'll get him out first ball”, which they always did, and so I fared no better there either. Arguably, these were only games, so it didn't matter. Anyway, I made sure it didn't matter, as the less practice I got with ball games, the more practice I got with swimming, and I gradually improved so much as to become swimming captain at school, and even won my final individual medley race against the light blues at college. This points to another truth: in life, or in a job, one may start on a par with other people, but you may be marginally better at some aspect of the work and others may be marginally better at different aspects. Then, when a particular task comes up, or a particular course needs to be taught, it will be given to the person who has even the tiniest superiority in that aspect, and he/she will then get more practice, knowledge and experience in it. Meanwhile, the other parties will not gain: indeed, their levels of knowledge and experience for that aspect will tend to atrophy. On the other hand, they will all gain practice, knowledge and experience in the tasks *they* are given. The outcome is that, even people who are initially quite well matched will gradually diverge from each other, and they will all end up with their own areas of expertise and experience. Clearly, the original situation was one of multiple unstable equilibria. However, it gives us all the hope, and the chance, of matching the job market well.

Nevertheless, jobs are not easy to come by. Long ago, people tended to have jobs for life, but capitalism, the growth of the markets and the emergence of frighteningly powerful behemoth companies have changed all that. Nowadays, one can't envisage the shape of the world even 10 years into the future, and it's difficult to know how long the company or institution you are currently with will exist, let alone employ you. So one has to have one's wares set out continuously, perhaps on the web, perhaps as a blog. When I was young, my father (who grew up during the Great Depression) used to emphasise the importance of degrees and other qualifications, though nowadays this advice may sound both a bit 'blue sky' and long in the tooth. However, skills and experience do form a sound hedge against job insecurity.

Interestingly, job problems may come from within. As a young researcher working on vision, I could foresee the day

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when all I was doing would be cast aside by advances in AI: at that point I was hearing about MYCIN and other diagnostic ‘expert system’ tools, and I reckoned that I had about 10 years to make hay before having to move on to other pastures. It seems that I needn’t have worried, as AI stayed in its infancy for a good 30 years, and now what one has to fear is the march of deep neural networks – and how they are going to do easily by learning what one has been doing with greater difficulty by conventional vision programming – and above all, how they are going to be driving cars autonomously, effortlessly and safely. And all this without having to grow up as flesh and blood, and thus without gaining huge experience from handling, seeing and feeling objects in the real world. I don’t think many people fully appreciate how much of a joke this is. Except that no-one yet knows the true difficulties of providing computers with sufficient data of the right sort to guarantee success using either conventional or learning systems, or even whether deep neural networks provide the best way of building the right sort of learning systems. Actually, it isn’t vital to know the answer to that right away (except for companies that are engaged in investing big money in rivalling each other for one or other grand prize). Indeed, it is somewhat too early in the day to work out what the winning solutions will look like. In jobs terms we are now in an expansive market in which all sorts of research is being done to explore the situation. But in 3–5 years’ time, the search could be vastly narrowed, and could give way to one or two successful companies which land on the right solutions; then the job situation could implode. In academia and certain other research institutions, this may not be too serious for those incumbents who have kept alive a number of research activities – in which case it will be a question of how rapidly they can adapt their work and interests from one activity to another.

In the meantime, we have to note that neural networks are computation intensive and their success depends heavily on GPUs. Progress here will have to depend on devising better and faster hardware, and on employing sampling strategies for reducing the workload involved in learning. After all, computer-based AI is still extremely inefficient in biological terms, so there will be work to be done, but which of us are going to do it, and which of us will be put out for ‘retraining’ or worse? Actually, there is a potent market for retraining: maybe I ought to move into that outlet before I am pushed ... But wait, I have friends telling me that the number of applications of vision is so high that we will all be kept in full employment – as long as we can use the latest best-bet computer language: now was that Matlab, R, Python or Julia ... ?

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## Travel Bursaries for International Conference Attendance

The BMVA provides a number of travel bursaries for student members of the BMVA who are research students at UK institutions to present their work at significant international conferences within the BMVA’s remit. The maximum amount of a bursary is £750. In return for the bursary, students are asked to write a conference report for BMVA News – most of the conference reports you read in these august pages are from students who have received bursaries – or do some work for the BMVA. Details on eligibility and the application procedure are outlined on the BMVA website: note that the procedure has recently changed, and that strict deadlines now apply – as clearly indicated on the BMVA website.

Finally, note that all students who receive a bursary in 2018 will be asked to give a 20-minute talk to present their work at the ‘BMVA Showcase’ event to take place at the BCS on 28 November. Again, see the BMVA website for further details.

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## BMVA’s Thesis Archive

You probably already know that the BMVA archives PhD theses of students studying at UK institutions: in fact, it has theses dating back as far as 1996. One or two other national vision associations have started archiving theses, so the UK is, as usual, leading the way in this.

However, our thesis archive continues to evolve in line with trends in open research. From this year, we are prepared to archive modest amounts of ancillary material such as software and datasets along with theses so that researchers will be able to reproduce the findings more easily. We are also happy to ‘retro-fit’ such ancillary material with theses already in the archive.

The thesis archive is a useful resource. For example, it contains all winners of the Sullivan Thesis Prize. I would like to encourage everyone, including supervisors and students, to submit their theses to the archive. It is quick and easy to do, coming down to not much more than an email and providing a PDF version of the thesis text – see <http://www.bmva.org/theses:top> for details. Note that you do not have to have just completed your PhD to put your thesis in the archive: a recent submission was a decade after the award of the degree.

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BMVC 2018 website: <http://www.bmvc2018.org>

BMVC 2018 will be held in Newcastle upon Tyne, UK at Northumbria University. BMVC is the BMVA annual conference on machine vision, image processing, and pattern recognition. It is one of the major international conferences on computer vision and related areas held in the UK. Because of its increasing popularity and quality, it has established itself as a prestigious event on the vision calendar.

There have been 28 successful BMVCs since 1985. They were organized in many major universities in the UK, such as Cambridge (1987), Oxford (1990), Birmingham (1995), UEA (2003), Edinburgh (2006), Leeds (2008) and Imperial College London (2017). The scale of the conference has increased significantly in the past decade. In particular, the 2017 conference attracted 450 attendants and 635 full paper submissions, which was a record high. 188 high-quality research papers were accepted, in which around one-third of the workers came from Europe, one-third from Asia and one-third from North America. Apart from international researchers, the conference also attracted a wide spectrum of international companies, which sponsored the conference and used it to demonstrate their products.

### Keynote speakers

Professor Rama Chellappa, Professor Sven Dickinson, and Professor Shaogang Gong. Details of the keynote speakers can be found at:

<http://www.bmvc2018.org/keynotespeakers.html>

### Tutorial speakers

Professor Vittorio Ferrari, Dr Ivan Laptev and Dr Abhinav Gupta. Details of the tutorial speakers can be found at:

<http://www.bmvc2018.org/tutorials.html>

### Important dates

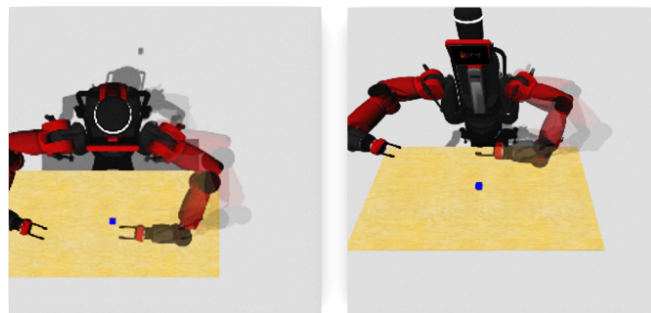
- Conference date: 3–6 September
  - Tutorial: 3 September
  - Main conference: 4–6 September
  - Workshop: 6 September (afternoon)
- Submission deadline: 30 April
- Acceptance notification: 2 July
- Early registration: 31 July
- Late registration: 19 August.

### Updates and booking

1. BMVC 2018 has received 862 submissions – a record number for BMVC conferences. Because of the large number of submissions, reviewers were given more papers to review than in previous years. Here, we sincerely thank all the reviewers for their professional services.
2. The BMVC registration process can be found here: <http://www.bmvc2018.org/registration.html> Because of the limited number of seats, delegates are advised to register as soon as possible.
3. On-site accommodation and nearby hotels can be booked here: <http://www.bmvc2018.org/accommodation.html> In particular, the onsite ensuite University accommodation has an affordable rate of £45 per night. Again, rooms are limited, so please book early.
4. An invitation letter for visa application can be obtained here: <http://www.bmvc2018.org/visainvitationletter.html>
5. Finally, thanks to all the organizers, area chairs, reviewers and authors who supported and contributed to BMVC 2018. The BMVC 2018 team is looking forward to seeing you all at Northumbria University Newcastle!

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### BMVA Symposium: *Robotics meets Semantics: Enabling Human-Level Understanding in Robots*



This one-day BMVA symposium will be held in London on Wednesday 18 July 2018.

Chair: Oscar Mendez, University of Surrey  
[www.bmva.org/meetings](http://www.bmva.org/meetings)

This workshop aims to bring together experts on *Vision-based Machine Learning and Robotics* to discuss the applicability of semantically-enabled vision to robotics.

### Programme

- 09:00 Registration
- 09:30 Keynote Talk 1: Andrew Davison, Imperial College London
- 10:20 Dense 3D reconstruction and semantic segmentation of large-scale outdoor scenes from

- passive cameras – Ondra Miksik, University of Oxford
- 10.40 Coffee and Posters
- 11.00 Keynote Talk 2: Cyrill Stachniss, University of Bonn
- 11.50 Collaborative large-scale dense 3D reconstruction with online inter-agent pose optimisation – Stuart Golodetz, University of Oxford
- 12.10 Lunch and Posters
- 13.30 Industrial Talk: Autonomous valet parking – Brian Holt, Parkopedia
- 13.50 Reinforcement learning for human-inspired grasping – Rebecca Allday, University of Surrey
- 14.10 Visual ontologies for intelligent robotics – Joanna Olszewska, University of West Scotland
- 14.30 Towards an unequivocal representation of actions – Michael Wray, University of Bristol
- 14.50 Coffee break
- 15.10 Keynote Talk 3: Daniel Cremers, Technische Universität München
- 16.00 Automated map reading: image-based localisation in 2D maps using binary semantic descriptors – Andrew Calway, University of Bristol
- 16.20 VO/localisation robustness in rainy conditions – Horia Porav, University of Oxford
- 16.40 Keynote and other presenters Panel Discussion
- 17.00 end.

### Posters

- Grounding symbols in multi-modal instructions – Yordan Hristov, University of Edinburgh
- A novel waypoint-based navigation method that combines visual and natural language percepts to aid sample-based planning methods – Emmanuel Kahembwe, University of Edinburgh.

### Registration

Book online at [www.bmva.org/meetings](http://www.bmva.org/meetings): BMVA Members, £16, non-Members, £36 (lunch included in both cases).

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## Report on BMVA Workshop on Reinforcement Learning in Computer Vision

The BMVA Symposium on Reinforcement Learning in Computer Vision took place on 9 May 2018. It offered an abundance of high-quality research talks within the topic. First, Dr Sen Wang from Heriot-Watt University, Edinburgh, presented the topic of learning robot localisation and navigation from vision. Dr Wang described some of his recent works on vision-based robot localisation and navigation, with a focus on deep reinforcement learning. He also covered the problem of the reality gap between the real world and simulation problems, as the robotic problems in the real world are very different from games or simulated

environments where deep reinforcement learning has been successful. In order to mitigate this problem, the approaches to transferring knowledge from simulation and improving data efficiency of deep reinforcement learning were discussed.

After this talk, Sinisa Stekovic from TU Graz presented his work adapting the standard experience replay approach for the task of learning multiple similar environments. He discussed the main contribution of his work – Replay Memory Management (RMM) – a strategy that preserves the variance of experiences in the replay memory by considering sample similarities during the discard phase. Also, he demonstrated that the agent that uses the proposed RMM strategy is able to maintain good predictions for the corridor environment that has not been visited for a longer period of time. He suggested that sample selectivity in the replay memory opens up the possibility of maintaining a good representation of the environment while reducing the required size of the replay memory.

After the coffee break, Dr Subramanian Ramamoorthy gave his talk on new tools for human-robot interaction. Dr Ramamoorthy covered the methods, developed in his laboratory, which tackle the challenge to make the robot capable of interaction in order to achieve abilities to act with increasing levels of skill.

After the lunch break, Professor Shimon Whiteson described some of the unique challenges involved in learning control policies that enable teams of agents to coordinate their behaviour to achieve a common goal. He also described some of the techniques developed in his laboratory for addressing these challenges, by factorising multi-agent value functions, reducing variance in multi-agent gradients, and coordinating multi-agent exploration. Finally, Professor Whiteson presented some results of these methods applied to micromanagement problems in the StarCraft video game. Following this plenary talk, Dr Dmitry Kangin discussed some of the challenges involving the state-of-the-art reinforcement learning for machine vision applications. He also described some of the techniques developed in Exeter University jointly with Dr Nicolas Pugeault, proposing the idea of combining reinforcement and supervised learning for autonomous control. In addition, Dr Kangin gave some examples and demonstrations from his work involving autonomous driving problems in SpeedDreams/TORCS simulator.

After the coffee break, Dr Anil Bharath discussed the role of simulation environments in acting based on visual data, as well as the ways to overcome the reality gap, when the simulated behaviour is translated into the actions in the real world. Dr Bharath described the research in this field carried out in his lab.

The event ended with a plenary discussion on the importance of reinforcement learning in the context of computer vision.

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## Upcoming Meetings

We are now looking for volunteers for meetings in late 2018 and 2019: please contact me if you are interested in finding out more.

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## BMVA Distinguished Fellow 2019 – *Call for Nominations*

The BMVA Executive Committee seeks nominations for the *Distinguished Fellow 2019* award. This prestigious award is given to one person only each year in recognition of his/her services to the British Machine Vision Community. The nominees must be distinguished researchers, based in the UK, who have contributed significantly to the field of research and the reputation of the British Machine Vision Community both nationally and internationally. Nominations, *with a few lines of rationale*, should be sent to Professor Roy Davies, Chair of the Distinguished Fellow Award Panel, by 1 September 2018.

Professor Roy Davies  
Chair, Distinguished Fellow Award Panel  
email: e.r.davies@rhul.ac.uk