

Artificial Intelligence and Augmented Intelligence for Automated Investigations for Scientific Discovery

Machine Intelligence Showcase 2018

26/10/2018

Centre for Machine Intelligence, University of Southampton

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AI3SD Network+

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Network: Artificial Intelligence and Augmented Intelligence for Automated Investigations for Scientific Discovery

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1 Event Details

Title	Machine Intelligence Showcase 2018
Organisers	Centre for Machine Intelligence, University of Southampton
Dates	26/10/2018
Programme	Programme
No. Participants	200
Location	Centre for Machine Intelligence, University of Southampton

2 Event Summary and Format

This event was run by the Centre for Machine Intelligence (CMI) and was designed to be a showcase of the work that is being conducted in different areas of machine learning at the University of Southampton. This was the first event of its kind for the CMI as it was only launched earlier this year. This event was a full day showcase, hosted at the University of Southampton. The programme was made up of a number of presentations, ranging from AI for social good to robots. These were all run one after the other so it was possible to attend each talk. There was plenty of time for networking, as there was both a lunch and drinks session included as part of the day. Lunch was held during the poster session so attendees could eat and explore the range of posters displaying work from PhD students and Postdoctoral researchers in ECS relating to machine learning. There was also another opportunity to view posters later in the afternoon during the drinks session, and a specific “speed dating” session was held to facilitate students and postdoctoral researchers making contact with relevant companies and research organisations.

3 Event Background

The Centre for Machine Intelligence (CMI) is hosted at the University of Southampton. This centre was setup in 2017 by the Electronics and Computer Science Department to be a centre of expertise in machine learning artificial intelligence and autonomous systems <https://www.cmi.ecs.soton.ac.uk/about-us> and launched on the 2nd February 2018 <https://www.ecs.soton.ac.uk/news/5548>.



Figure 1: Picture of the CMI Launch - Taken from the [CMI Website](#)

The CMI is a member of the Alan Turing Institute and its activities and aims include supporting centres of excellence, attracting PhD students with funded studentships, supporting new research projects through Knowledge Transfer Partnerships, and supporting AI training. The board are all lecturers in ECS at Southampton; it is headed by Associate Professor Dr Sarvapali (Gopal) Ramchurn, and more information about the centre and board members can be found on their website: <https://www.cmi.ecs.soton.ac.uk/who-we-are>. The CMI periodically puts on events centred around machine learning topics.

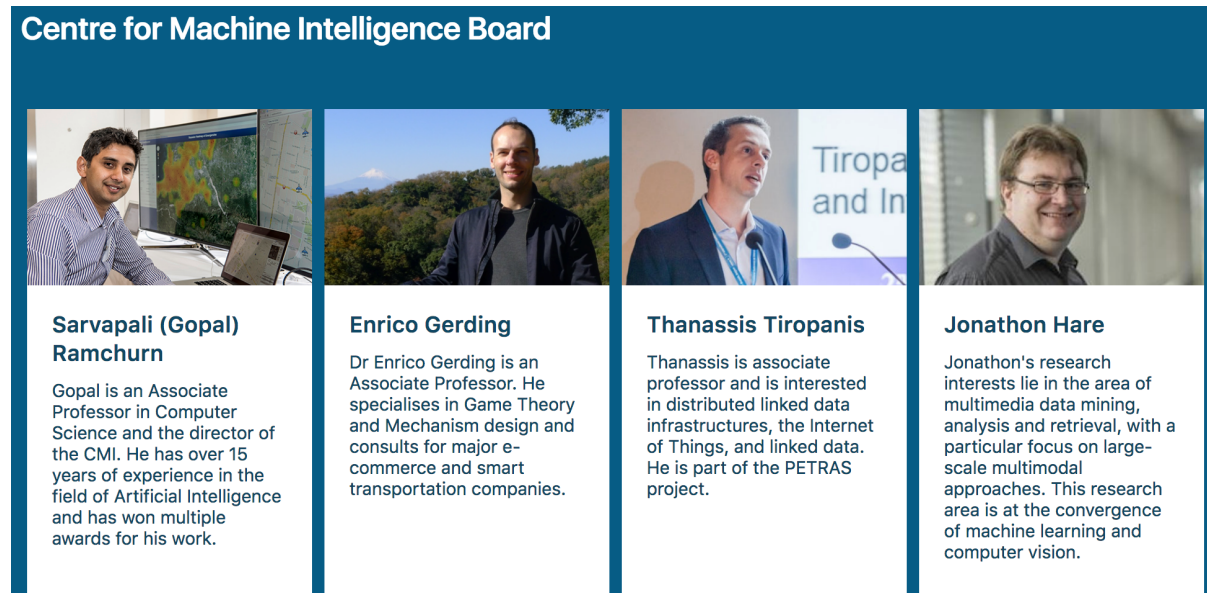


Figure 2: Picture of the CMI Team - Taken from the [CMI Website](#)

4 Talks

The event was started off with an introductory speech by Professor Bashir Al-Hashimi, the Dean of the Faculty of Engineering and Physical Sciences. This talk gave some general information about the CMI (detailed above), set the scene for the showcase and detailed what the CMI is working towards. The [AI Government Sector deal](#) was of course mentioned, with Bashir noting that the CMI wishes to expand on the AI mission, and that the Government cannot help the UK find their place with AI alone. Universities who adapt will benefit from AI, and we should be looking for opportunities for engagement. He made the valid point that “In order for AI to become a mainstream technology, we need to look at embedding AI in engineering and Physical Sciences”.

Professor Gopal Ramchurn spoke next, giving an overview of Machine Intelligence at the University of Southampton (UoS). This talk highlighted the different types of AI that are being worked on at UoS. The Weak AI approach, using intelligent, adaptive algorithms for specific problems (this comes with concerns about morality and ethics); and beneficial AI – looking at how we can use AI to tackle social and ethical challenges. There were three sessions of three presentations apiece that followed these introductions.

4.1 Session A: Humans, Machines and Society

This session focused on creating unity between humans, machines and society. Dr Long Tran-Thanh began by speaking about using AI for Social Good, explaining how this can be achieved and giving examples of the different projects that are being worked on with this goal. AI for

social good can cover a number of different areas: health, green AI, and security to name a few. A number of different types of AI applications were touched on:

- AI for housing - AI can be used to create an intelligent housing system, with machine learning being used to allocate houses.
- AI for Health - AI can be used to aid with health problems, for example providing people with intelligent wearable devices; and using AI to detect different diseases such as tuberculosis.
- AI for Suicide Prevention (Network of observers who can detect early signs of suicide, use Machine Learning and AI to improve this training)
- Green AI (Using AI to adjust incorrect readings from air pollution monitors, AI and ML to fight against fishing and poaching)
- AI for Security (Smart & secure traffic control – traffic control can be easily hijacked but AI could help. Deceiving Cyber Adversaries using AI (use AI against cyber attackers, send fake information so they don't attack real people).

Professor Elena Simperl spoke next on behalf of the [Alan Turing Institute](#) (ATI), the national institute for data science and artificial intelligence. The goal of the ATI is to create a critical mass of world class AI and Data Science research, and to build a network. There is a strong training component in the ATI and there will be Fellowships, activities and funded and unfunded projects (with a call for Turing Fellows and Pilots coming soon). They have lots of research interest groups, data study groups, week long events to solve challenges, and local activities. The local team is Elena Simperl, Peter Smith and Susan Davies.

Professor Tim Norman finished off this session with a talk on AI for Intelligence Analysis. Dealing with qualitative information is very complex both to provide explanations and make sense of problems. We need humans and agents to work together for this, which is where augmented intelligence comes in. Examples of areas where this approach can be used are questions such as do MMR vaccinations cause Autism? Even a positive correlation on a graph could be totally devoid of actual useful information: it could be a coincidence or there could be another different factor causing the correlation. We need the best of human and machine intelligence to solve these problems.

4.2 Session B: Machines that Learn and See

This session focused on learning and visualisations using machine learning. In 2012 we saw a deep learning revolution and this was exacerbated in 2015. These presentations illustrated some of the progress that has been made in potential applications, and also considers novel approaches for the future. Professor Mahesan Niranjan discussed his work on Learning from Outliers. This presentation concentrated on a new method of extracting useful information from datasets. Niranjan notes how classic machine learning is typically about data driven modelling, but that actually one can learn a lot from the outliers of the data, as well as the data points that fall into a pattern. This is an interesting new approach and was used on two different chemistry problems, one relating to modelling cellular protein concentrations, and the other in solubility of synthetic chemical molecules.

Dr Kate Farrahi spoke next on Machine Learning for IoT Healthcare. IoT devices collect an immense amount of data about us and our surroundings. Kate has looked at how machine learning can be applied to see how the next generation of IoT devices might care about healthcare. There are of course issues with this, the obvious one being data privacy, but also in the inconsistency of some of the data collected (for example if data collection relies on one's mobile



Figure 3: Our Co-I Professor Mahesan Niranjan speaking on Inference from Outliers

phone being switched on or close by). However, this data should be put to use to try and improve healthcare in the future. An example of using data to make predictions and improvements to healthcare using machine learning is a project using deep learning to predict Parkinson's disease early from patterns in typing data. This session finished with Dr Jonathon Hare presenting his work on computers that learn to see. It is well known that computers can't see as well as humans, however progress has been made in this area and Jon presented work on automatic analysis of aerial image data, illustrating where certain items could be easily identified and the types of images that still posed a serious challenge for a machine.

4.3 Session C: Responsible Robots that Walk Fly and Dive

This session was focused on responsible robotic projects. It was started off by Professor Jim Scanlan who was presenting on the Aerial robotics and Cascade Project, detailing how the aircrafts can be taught how to fly responsibly. Professor Christian Enemark presented on the topic of Armed Drones, AI Ethics, and Moral Responsibility. This talk considered the use cases of armed drones such as their use in war and law enforcement. Noting that is a push for machines to operate outside of human control, especially as speed can be critical in certain situations; but questioning the viability of that as humans remaining in the control seat lends a level of humane morality and responsibility to any machine. Although the opposing argument to this is that autonomous robots could reduce casualties because they can follow war rules better than soldiers. Currently defence corporations like BAE make use of drones which are quite autonomous, but humans still make the final decisions. This session was concluded by Professor Gopal Ramchurn on a similar line of thought, discussing Responsible AI for Swarms. AI should be responsible, in other words it should be controllable, understandable, moral and ethical. However, who actually makes the optimal decisions in different circumstances? Who is more precise? Humans or AI. Humans struggle to react quickly to certain issues and levels of uncertainty. If a drone falls out of the sky can a machine react quicker than a human? Gopal poses questions around using AI and ML to help humans with these types of tasks such that a

human element can remain within operating autonomous robots, but in a helpful fashion.

5 Expert Panel



Figure 4: The Expert Panel from the CMI Showcase - Taken from the [CMI Website](#)

The expert panel was made up of Dame Wendy Hall, Southampton’s Regius Professor of Computer Science. Liam Maxwell, National Technology Advisor to the UK Government, Deborah Fish, from the Defence Science and Technology Laboratory (DSTL) AI Lab, Stephen Hennigan, from The Office for AI, and Professor Tim Norman, Head of Southampton’s Agents, Interaction and Complexity Research Group. Dame Wendy Hall stated that “The AI technology that is having an impact today was started 20 to 30 years ago at universities. We must now be thinking decades ahead and funding innovative lines of research to make new leaps forward”.¹

6 Posters & Speed Dating

Over 40 student posters and demos were demonstrated at this event, which included a 3D-printed drone, and deep learning computer vision algorithms. An hour and a half was dedicated to “speed dating” at this showcase. Representations from companies and research organisations each took a few minutes to present themselves, noting what projects and areas of technology they were working on and the types of people they were interested in meeting, and indeed whether they were looking to employ people in the near future. Students and Postdoctoral researchers could then seek them out to make contact or discuss potential collaborations or job opportunities. This was a very useful session, and we made use of it to promote AI3SD to interested parties.

¹Direct Quote taken from the CMI Website https://www.ecs.soton.ac.uk/news/6401#_ga=2.143305333.1765760966.1549380268-371048302.1491167923

7 Participants

There were 200 participants at this event, many from the University of Southampton and the rest from Government, Industry and other Academic/Research Organisations. The participant list was printed in the booklets handed out at the event.

8 Conclusions

The CMI is working on a range of fascinating research. It is clear that there are many areas in which AI and Machine Learning can be very useful. However, much more work is needed to progress as realistically some of these technologies are still in their infancies compared to where they could potentially reach in ten, twenty or even fifty years. It is vital that AI research is conducted in a moral and responsible fashion and depending on the system we shouldn't necessarily be looking to remove humans from the equation, rather we should be looking to develop systems that can work with human intelligence to provide augmented intelligence systems.

9 Related Events

The Centre for Machine Intelligence often puts on events and they run a seminar series within the Electronics and Computer Science Department. Their events page can be found here: <https://www.cmi.ecs.soton.ac.uk/events>.