



THE UNIVERSITY  
*of* ADELAIDE



**Australian Institute for Machine Learning:**  
Catching the wave of the next industrial revolution

# *Artificial Intelligence is driving a Fourth Industrial Revolution: World Economic Forum*

Artificial Intelligence (AI) combines a number of technologies including hardware and software, machine learning, natural language processing and computational power to make machines 'intelligent'.

AI will transform the global economy within the next decade, adding 40% to global GDP by 2030.

South Australia has a unique opportunity to leverage the University of Adelaide's world-leading expertise in machine learning to thrive through this economic transformation.

## **A new Australian Institute for Machine Learning will ensure that South Australia benefits from this revolution.**

The State Government of South Australia and the University of Adelaide are co-investing in an Australian Institute for Machine Learning to:

1. Upskill South Australian workers in Artificial Intelligence and its application to the workplace.
2. Build new AI-enabled defence capabilities.
3. Support cost-effective adoption of Artificial Intelligence by South Australian government agencies.
4. Directly support local South Australian businesses to develop new products based on Artificial Intelligence.

# The Story of Machine Learning at the University of Adelaide

The first computer learning program for playing checkers was written by Arthur Samuel in the US in the 1950s. Since then, the ability of computers to learn, to teach themselves to identify patterns in information, has dramatically transformed, with new programming structures and faster computing speeds and driven by business and academic synergies.

Today, Machine Learning underpins the business models of the largest corporations and has the potential to deliver massive social, economic and environmental benefits for those who choose to capture its power for good.

*Current global centres of expertise in Machine Learning have either been built around academic research strength or through major government and business investment.*

The University of Adelaide has world-leading expertise in Machine Learning and Artificial Intelligence. The focus of this research strength, which started in the 1990s, has been the Australian Centre for Visual Technologies. Following recent growth, and on the basis of South Australian Government support, this group will form the core of the newly formed Australian Institute for Machine Learning.

Despite substantially greater investment in the US, China and Europe, the SA-based research group has grown to be one of the best Artificial Intelligence Machine Learning research groups, with a critical mass of 60 high-quality research staff and growing.

## The University of Adelaide Artificial Intelligence & Machine Learning team are global leaders

- Best in the world on many benchmarks:
  - > pedestrian detection (crucial for driverless cars),
  - > 3D from 2D (used in Augmented Reality etc.),
  - > semantic segmentation (driverless cars),
  - > Tracking ReID (video surveillance),
  - > overhead image classification (agriculture, defence),
  - > faces in the wild (defence);
- In top four in global competitions and research:
  - > led the team to win the hotly contested international Facebook's Visual Question Answering 2.0 Challenge 2017– currently VQA is the cutting edge of AI .
  - > topped the CityScapes leaderboard again in 2017 - a Scene Parsing benchmark designed to test driverless car technology.
  - > came second in the ImageNet Scene Parsing Challenge in 2016, beating Oxford, Samsung, Shanghai Jiao Tong, KAIST, The Chinese Academy of Sciences, Penn. State, and many more
  - > was 4th in world for Computer Vision & Pattern Recognition papers in 2016.

## This group is a remarkable South Australian success story with a strong track record of high-tech development for industry

- spinning out two start-ups and supporting local SA companies Maptek, Sydac, Signostics and LBT Innovations (SA Science Excellence Award in 2017 for industry collaboration) and
- partnering with international companies such as Microsoft, Facebook, BHP Billiton, Google, Bayer, Samsung, BAE Systems and Canon.







# Machine Learning: the key to a 21st Century Innovation State

AI has the potential to increase productivity by ~40 per cent, and is projected to contribute up to US\$15.7 trillion to the global economy in 2030, more than the current output of China and India combined. The impact on productivity will be competitively transformative – businesses that fail to adapt and adopt will quickly find themselves uncompetitive.

*“65% of current students will have jobs that haven’t been invented yet”  
US Dept. of Labor*

AI is already changing the global economy, the question is whether companies and states will participate in the resulting opportunities. AI-enabled jobs are higher paid, and largely insensitive to geographic isolation. Competitiveness in this sector is not achieved by driving salaries lower, but is rather based on quality of life considerations. Australia is peculiarly well placed to capitalise, but needs to do so quickly, as other countries are investing heavily.

*“Australia stands to gain another \$2.2 trillion by 2030”  
Alphabet*

Currently, Australian companies lag behind leading global peers in embracing AI-based automation. Only 9 per cent of Australia’s listed companies are making sustained investments in AI, compared with more than 20 per cent in the United States and nearly 14 per cent in leading automation nations globally.

*“80% of Australian small and medium businesses are delaying the adoption of technology that could deliver long-term benefits”  
Infosys survey*

Low investment in AI-based automation technology limits our productivity growth and will ultimately reduce our national income. If Australia accelerated AI uptake, it could gain up to another \$1 trillion over the next 15 years. South Australia can lead this transformation and capture a disproportionate share of the benefits.

The United States, Canada and UK have all adopted a national strategy to fast-track the development of an AI-enabled economy. China has launched a major new strategy in July 2017 to become the global leader in artificial intelligence. If Adelaide is to transform into a fast-growing, prosperous, 21st Century city, and South Australia is to keep pace with the technology-advancement that other countries have committed to, we must be nimble, inventive and exceptionally capable in the adoption of Artificial Intelligence.

# A Four Point Strategy

Investment by the State Government of South Australia and University of Adelaide in the AIML will help to harness the expertise and provide the impetus to successfully transition South Australia to an AI-enabled, 21st Century economy through the following four programs.

## 1. Artificial Intelligence Skills Development

Developing a workforce with the appropriate skills, critical for South Australia to grow an AI industry sector.

## 2. Program 2 - Defence Industry Engagement

South Australia has a long history of success in defence research, underpinned by strong education and industry alliances. AIML will forge partnerships with the defence industry, which will be vital in the successful delivery and sustainment of the country's enhanced defence capabilities.


## 3. Program 3 – Government Efficiency Engagement

AIML will work with State Government on the adoption of AI into Government processes to improve productivity and efficiency and service delivery to South Australian citizens.

## 4. Program 4 – SME Engagement and Global R&D

AIML is seeking South Australian businesses that wish to integrate and adopt machine learning and AI to drive transformational productivity growth and improve their local and global competitiveness. It will also aim to attract international partners to collaborate on AI related R&D projects in South Australia.





The Australian Institute for Machine Learning will place South Australia on the global map of world's best centres of excellence in machine learning – the requirement of future global competitiveness.

Establishing the Institute will build on and realise the full potential of the investments in Smart Cities initiatives, the South Australian Health and Medical Institute (SAHMRI), defence industries, as well as priorities such as the new Royal Adelaide Hospital and the renewable energy sector.

It will give workers, companies and government a global competitive advantage in being able to adapt to a world powered by Artificial Intelligence. It will help government agencies to transform and become globally-leading in the adoption of machine learning to improve the efficiency and effectiveness of public services.

It will attract the world's best and brightest to come and work and study in South Australia. World-class education in artificial intelligence and machine learning is going to be in high demand globally, and Adelaide has a chance to be seen as one of the top 'go to' destinations.

The AIML will allow local businesses to access world-best technology in image detection and world-class capabilities in machine learning. Any business can potentially take advantage of AI – and if they can use world-best AI to help their own business, it is likely that these new products will have global appeal.



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