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MACHINE LEARNING

Machine and deep learning sector in Australia

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Australia is gradually emerging as a significant centre of expertise in machine and deep learning - and hosts a growing number of internationally recognised research centres. So, what is the long-term potential for Australia to develop further as a global hub for machine and deep learning? And how best can IT professionals get involved?

Centres of expertise

Australia is fostering a growing reputation as a global centre of knowledge in the field of machine and deep learning. In recent years, a number of research and development centres have been set up across the country, with the goal of further accelerating progress across this burgeoning sector. One of the key centres of excellence is Adelaide-based Australian Institute for Machine Learning (AIML), which describes itself as 'a world-leader in the application of machine learning methodologies.' Boasting more than 100 researchers, the AIML focuses on a range of key themes, including Machine Learning Theory, Robotic Vision, Medical Machine Learning, Trusted Autonomous Systems, Surveillance and Tracking, Photogrammetry and 3D Modelling.

In addition to carrying out an ambitious research programme, the AIML has also recently entered into a partnership with Adelaide-based AiLab in an effort to help build global AI awareness and provide AI education for the wider community. AiLab (short for Artificial Intelligence Laboratory) champions global collaboration to further AI awareness and the ethical development of AI solutions - and works around the world helping organisations, government and the wider community navigate and learn about AI. According to Dr. John Flackett, Co-Founder and Head of AiLab, an extensive background in academia, research and the development of internal AI solutions helps the laboratory team to 'demystify' AI and demonstrate how it continues to transform the world 'through a range of resources and education programs.'

"AiLab's hands-on workshops explore the field of AI and current capabilities, provide insights and the latest AI research, and assist with applying and transitioning into AI driven systems," he says.

In addition to working alongside the AIML, AiLab also collaborates with a range of other national and international experts and organisations, such as the Auckland University of Technology (AUT), with which it will be launching a new AUT-based AiLab that will focus on developing solutions for everyday life and business, improving life for New Zealanders and providing AI education and support.

Digital agriculture

Another industry that stands to benefit widely from the continued influence of AI is the Australian agricultural sector, which currently contributes around $65 Billion value to the Australian economy annually - and which some industry observers argue has the potential to grow to $100 Billion by 2030. According to Dr. Roger Lawes, Farming Systems Scientist and Group Leader for the Integrated Agricultural Systems group at CSIRO Floreat, in Western Australia, digital agriculture, which encompasses 'aspects of precision agriculture, robotics, satellite technology, sensor technology, proximal sensors, advanced analytics and advanced models' can all help the industry to 'achieve these lofty goals.'

Amongst the current and potential applications of AI in this area, Lawes cites satellites that 'can monitor landscapes and enable new enterprises like carbon farming evolve.' Advanced AI-enhanced crop models, combined with satellites and in-ground sensors, can generate reliable estimates of soil water to help planting decisions and help producers to schedule irrigation practices to conserve soil moisture. Lawes also points out that crop monitoring technology can identify crop species, as well as crop yields in mid-season. It can also help companies to plan fertiliser distribution plans, grain marketing, grain handling, banking and insurance - and to understand property values.

"Collectively, the digital age is focusing on understanding decision making from the end users perspective and packaging information from crop models, commodity markets and other sources, to help growers minimise risk and maximise profitability. The user experience, and how someone engages with the technology influences the use and uptake of all digital services," says Lawes.

"CSIRO are tying machine learning to decision science, and have projects assessing fertiliser management practices that combine all of the elements to help resource management. Domain knowledge is vital. You need active engagement between the data science community and the those that understand agriculture to produce viable decision-making tools that matter," he adds.

Long-term potential

Given the economic benefits of embracing emerging technologies, Flackett believes there is a 'powerful incentive' for Australia to invest in AI expertise and solutions. Although he admits that, to date, the overall financial investment for AI in Australia is lower than many other developed countries, he stresses there has been considerable recent investment in the domestic space, robotics and cybersecurity industries - meaning there are 'exciting opportunities to apply AI tools and techniques within these sectors and build strong collaborative approaches to problem solving.'

"Countries that have invested heavily in AI are able to attract machine/deep learning talent by creating centres of learning and wide-scale support for new entrants. Australia offers exceptional lifestyle and affordable cost of living and this is one of the reasons Australian-based AI groups have been able to retain and grow the talent pool," he says.

"Australia also has a very vibrant and well-supported start-up ecosystem, and many of these companies are looking to apply the latest machine learning tools and techniques to improve their product offerings, which provides good job opportunities for machine/deep learning engineers," he adds.

In Flackett's view, AI tools and techniques have become so ubiquitous in everyday life that 'many people don't even realise they are using these systems' - and he argues it is now vitally important that IT professionals are able to 'get up-to-speed' with recent developments in machine and deep learning. He also observes that IT managers are commonly being asked to plan infrastructure that supports large-scale data gathering and management, including data governance relating to privacy and security.

"As developers begin to have access to more pre-built AI frameworks and models, re-skilling becomes paramount as workflows change and adapt to incorporate the latest emerging technologies," he says.

"Generally we're seeing the requirement for all IT professionals to understand what these new technologies are capable of, so they can adequately see the opportunities and not be left behind. For the future I think the most valuable skills will be centred around the in-depth understanding of the underlying data. In addition, most AI-based projects require teams to work across different companies or departments and perform integration of software and hardware - so professionals with strong transferrable and collaborative skills will be in high demand," he adds.