ENGINEERS
AUSTRALIA

100
CELEBRATING
OUR CENTENARY

Developing Standards for Artificial Intelligence

Response to the Standards Australia discussion paper

July 2019

Table of Contents

1. Introduction

Engineers Australia is the peak member-based professional association for engineers. Established in 1919, Engineers Australia is in its centenary year and is constituted by Royal Charter to advance the science and practice of engineering for the benefit of the community.

Engineers Australia maintains national professional standards, benchmarked against international norms. We do this through accreditation of undergraduate university engineering programs, and management of Australia's largest voluntary register for engineers, the National Engineering Register (NER).

The organisation is heavily involved in the development of Australian Standards. Engineers Australia is on the governing Council of Standards Australia and is a Nominating Organisation with about 200 members assigned to about 300 Standards Development Committees and their subcommittees and working groups.

We have around 100,000 members and this submission draws on the expertise of those involved with the Engineers Australia Information, Telecommunication and Electronic Engineering (ITEE) College.

1.1 Contact details

To discuss the issues raised in this submission further, please contact Grant Watt, Operations Manager for the Learned Society team in Engineers Australia's Professional Standards and Practice division, on 02 6270 6584 or GWatt@engineersaustralia.org.au.

2. Responses to Questions

Question 1: Where do you see the greatest examples, needs and opportunities for the adoption of AI?

The recent advances in Artificial Intelligence (AI) have significantly expanded the areas and scope of application of AI to engineering and other disciplines. Engineers can now create mathematical models that simulate or emulate the behaviour and performance of complex and large systems. Successful AI projects in mining and plant systems have improved the performance and efficiency. e.g. Crushing plant, large sea going boats, better control systems, etc.

There are successful AI projects that emulate or simulate the thought processes of experts for single classes or limited knowledge areas (e.g. doctors [for a single medical condition], customer response persons [for a limited range of conditions], mentors for finance, health or life style, etc).

AI can deliver more effective assistance in image analysis that can alert users on what areas to focus or investigate. Image recognition has also been successfully used to automate sorting of products such as rock sizes, separating recyclables, etc.

The following use one or more of the above concepts;

- Mining - exploration, resource modelling, resource reconciliations, condition-based maintenance, commodity trading, autonomous haulage, logistics management
- Medicine - pathology, image analysis, individually targeted treatment regimes, "stay at home" aged care assistance
- Finance - fraudulent transaction detection, credit application reviews, short-term money market trading, risk and audit management services
- Food - yield prediction, crop selection, soil analysis, real-time farm management systems.

Question 2: How could Australians use or apply AI no w and in the future? (for example, at home and at work)

Australians have developed or are developing AI systems that provide daily tailored advice for health, corporate document recording systems (that exclude low value information and classify important information) and improving the performance of engineering system (see examples at Question 1).

For example, Canberra based "Seeing Machines™" is achieving new heights in Autonomous Car Systems; it's a world leader in human machine interaction and AI. This is a technology that enables machines to see, understand and assist people who are using them.

Other examples of AI are:

- Energy trading - dynamically adjust the time and amount of energy generated, used and exported from the home to minimise energy bills
- Work automation - eliminate manual data collation and entry tasks, and minimise the time taken to resolve data gap or quality issues. Free up people's time for more value adding work
- Smart devices - automatic health monitoring, power saving.

Question 3: How can Australia best lead on AI and what do you consider Australia′s competitive advantage to be?

Australia has one significant advantage: the "tyranny of distance" and associated low population densities. For example, Western Australia is a world leader in remote access technology (NASA are seeking WA assistance for space operations on other planets). The availability of affordable and reasonable telecommunications enables AI advice and support systems to be cost effectively deployed in rural and remote areas. This has led to the expansion of AI projects in WA that can be exported.

Australia has experts who specialise in Computer Vision Algorithms, Optics and processing technologies that enable new forms of intelligent machines. These machines can be deployed for Road Transport Management, Light Rail and Rail Management, Agriculture and Logistics industry and have already seen numerous examples of autonomous systems being successfully being trialled in these areas.

Question 4: What extent, if at all, should standards play in providing a practical solution for the implementation of AI? What do you think the anticipated benefits and costs will be?

The most significant factor that has caused AI projects to fail is a lack of understanding on how to implement and manage an AI development project (including a lack of essential skills). This is the most important issue where an Australian Standard could deliver a benefit in the short term.

Standards should promote interoperability and quality. Ideally, the adoption of standards should minimise time to market, maximise return on investment (to suppliers and consumers), and ensure sustainability.

Question 5: If standards are relevant, what should they focus on?

It is recommended that a combination Australian (See Q 03) and international contributions be implemented in Australia. A significant gap in current AI projects and research are the issues of "fairness", "bias (inherent, latent and associative)", "morality and ethics" and explainability. Current AI projects have failed because of insufficient attention to these topics. Australia can be a leader in these areas by promoting "Australian views and explainability". Government policy will also have an important role in both protecting the community and providing incentives to pay more attention to these areas.

Government policy, regulation and legislation will be driven by best industry practice and standards. We have seen examples of developments in AI outpacing Privacy laws in Australia. It is important to have a consistent understanding of what AI means across all sectors for Government agencies to define policy and legislation

accordingly. The primary role of standards is to define well understood definitions of technology, principles, values and trust in the AI context.

Question 6: What do you think the focus of these standards should be?

It is recommended that AI standards should cover Technical, Management and Governance criteria. Refer to examples and responses to Questions 3, 4 and 5.

Question 7: Does your organisation currently apply any de facto 'standards' particular to your industry or sector?

A few companies and consultancy organisations have developed guidelines for implementing AI projects based on experience and a study of failed AI projects.

Question 8: What are the consequences of no action in regards to AI standardisation?

Advice from Engineers Australia members is that current federal and state/territory Government policies are discouraging the development of AI projects because of the perceived risks associated with AI and the much-publicised high failure rate and possible negative impact on society. The development of a suit of AI standards would provide a minimum quality standard that could be used by Governments to adopt a more favourable approach to AI projects.

Commercialisation may override inclusivity and sustainability. For example, advice from the ITEE College indicates that using AI to automatically select preferred candidates is already causing problems, particularly for minority groups. AI being used to offer insurance has the potential to create a 'haves and have nots' economy, based purely on profiling rather than individual circumstances.

Question 9: Do you have any further comments?

The Engineers Australia ITEE College Board has created an ITEE AI Committee to address the above issues and to promote the knowledge and development of AI in continuing professional development (CPD) events.

At the request of large and small engineering organisations, the ITEE College Board has developed a "Define Your Discipline" document for the Information Engineering Discipline that describes the Academic knowledge requirements (Stage 1 Competencies) and Practical Application (Stage 2 Competencies) of mathematics, science and technologies for engineers creating AI systems that will benefit the community.