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The next AI super power: Why Australia's regional positioning and global outlook are important to the future of industry

Dian Tjondronegoro

REGIONAL OUTLOOK

Griffith Asia Institute

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Regional Outlook

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1. Introduction

This year marks the 50th anniversary of the first human to land on the moon, a feat that was achieved by the US with a desperate motivation to beat the Russians' space advances. In today's digital age, artificial intelligence (AI) has become the battleground of supremacy between the US and China. Amid the trade war triggered by both political and economic manoeuvres against each other, the rivalry culminated with the arrest of the daughter of Huawei's chief officer and the daughter of its founder in December 2018.

For many, this event raised concerns over privacy and security of data collected from the use of technology, namely, smart phones and the 'Internet of Things' (IoT) (aka everything connected) and the risk of AI to rapidly analyse large amount of data for misuse. However, there is very little understanding of what happened and what could be the consequences in the long term from this event, particularly from the perspective of Australia's strong ties with both US and China, and its regional positioning within Asia Pacific. The digital landscape will soon redefine the next world order.

Hence anticipating and learning from the latest developments will enable Australians to better prepare for the future, in term of navigating the economic developments, political alliances, and the next business strategy.

2. Will AI rule the world?

The story on how *Google's AlphaGo* beat a human pro player without handicaps on a 19 by 19 board game in October 2015[1] turns everyone's attention to AI as the next thing that will replace human's intellectual ability to think and conduct tasks. Due to rapid growth of AI-enabled automations, people become more worried about losing jobs and that AI/robots would rule the world and eliminate humans—as portrayed by the classic movie *The Terminator*. With the power of super-computing and big data storage, the potential of computers to develop intelligence and processing large amount of information beyond human can be fully realised sooner. Even the creative ability of humans that was never meant to be surpassed by machines has been replicated by AI. The most recent example is how AI enabled *FaceApp* can simulate ageing effects on the user's photos while maintaining a natural and realistic appearance of the original photo.

It is technically possible for AI to surpass human's ability in many aspects of accomplishing life tasks from day-to-day to the most complex tasks. Facebook has just launched a multi-million competition for technology to spot deepfake videos[2], which are AI generated superimposition of human face on existing videos to generate fake videos that are difficult to distinguish[3]. However, whether AI would eventually rule over humanity is another matter altogether. Kai-Fu Lee's book on AI superpowers[4] posited that humans choose to do a job because it gives them a meaning for life via satisfaction and happiness from how other people appreciate them for what they contribute in day-to-day living. Humans would probably never let AI rule the world, even if the technology were advanced in the next decades. Humans are still the best at providing genuine caring and meaningful empathy during interactions with other people, which machines can never replace—even if AI could one day precisely compute emotions. The future of work and professions would shift due to AI advancements, but there will always be a requirement for applications of humanistic characteristics.

Douglas Engelbart helped to coin the notion of "augmented intelligence",[5] whereby human-computer interaction will shift the role of computer from being a mere automation tool into an enabler for future knowledge workers to solve complex problems. Today this concept is even more prevalent as scientists are developing AI applications for supporting human's ability to perform tasks and improve quality of life. Just as AI is already helping us to have an active and healthy lifestyle, it will continue to help us do our jobs better, by managing the supply-chain of a service provision or product manufacturing dynamically based on real time data and predictive analysis.

The rise of smart apps in the last decade and the notion of "there is an app for everything" has helped to pave the way for everyday use of AI technology without even realising it. People now take for granted those smart features that used to be so innovative when they were first introduced. For example, *Uber* app's ability to connect the most suitable driver and ride-sharing passengers for a point A-to-point B trip has transformed the transport industry. Nowadays, people expect that such features are pervasive in a *Calendar* app to set reminders for the best time to leave for each meeting based on estimated travel time of the preferred transport modalities and current traffic conditions. With the power of the Internet, people can now expect that most smart apps are fully integrated and connected through the Internet with information, services, people and social media. Even a seemingly mundane task like planning for a gathering can be supported by AI to recommend the best time, location and types of activities based on the preferences and personalities of the people involved.

As all things are increasingly becoming connected via the *IoT*, an integrated cyber-physical system marks the era of Industry 4.0, also known as the data-driven fourth industrial

revolution[6]. AI and computer algorithms can monitor and control real objects in the world, enabling autonomous systems for many applications, including smart manufacturing, self-driving drones for transporting small goods, and robots for social interactions. The future of work in the era of industry 4.0 will be determined by the entrepreneurs and creative economy. The largest three regions—the US, Europe and China—will need to manage the shift in global trade and accelerate technological innovation in order to stay competitive in the new century.

Responding to Germany's leadership towards developing a policy around Industry 4.0, China has developed its own planning for "Made-in-China 2025"[7]. Their plan has extended the core-concept of integration in Industry 4.0 beyond cyber-physical systems to include integration with industry types and economic sectors, as a new level of organisation and control over the entire value chain of products lifecycle. In essence, China wants to capitalise and build on its global leadership in manufacturing operations and its second largest economic power in the world, in order to establish the nation's leadership in the new world order for the digital age. Given China's undisputed rapid progress in their socio-economic shift in the last few decades—from poverty to wealth and global trade—their accumulated experiences can be referenced by both emerging economies and developed nations to advance technological entrepreneurship that touch on every fibre of human life and the economy.

Given AI's power in rapidly analysing big data, the new governance in the global economy of the Industry 4.0 era will need to focus on digital asset protection. AI will shape the future of international agreements and laws for managing the new economy and global trade. Five technology giants in the West (Amazon, Apple, Facebook, Google, and Microsoft) and in Asia (Baidu, Alibaba, Tencent, Xiaomi, and Huawei) will continue to dominate the technology industry. Each of these global tech giants has the capital power to stay in control of the digital economy, driving the industrial revolution and technological disruptions that shape the behaviour of the global society. As such, the geopolitical and regulatory landscape will need to ensure trade, cybersecurity, national sovereignty and economic access are resolved together, tackling the rise of monopoly capitalism[8]. There is an urgent need for all governments around the world to develop policies and strategies that help protect their citizens' rights for data privacy and its approved usage.

3. AI, big data, IoT and the rise of responsible computing

To fully appreciate why AI can have such a massive impact in our life and in shaping the future of our society and economy, it is important to learn more about its technologies. AI can be simply defined as computer's ability to:

1) process data into useful information,
2) analyse extracted information to support decision making and augment human's knowledge,
3) develop cognition and perception abilities, including seeing and listening, which would enable it to ultimately
4) become autonomous and act according to logic, context, rules and laws.

It is then no wonder that AI is often mentioned in the same breath with big data and the *IoT*. AI is a computer's central core processing unit that enables it to think and act. Just like how a human's brain grows its intelligence and ability to make decisions, AI needs to be trained (by big data), connected to the source of knowledge (produced by the IoT), and governed by laws and rules (becoming responsibly autonomous).

AI and big data

The two most widely-used methods to train a machine's intelligence are:

1) programmatically teaching it the established rules and structures based on human's experts, and
2) letting it learn by itself based on deep learning algorithms without human's intervention.

Such autonomous systems that can self-learn and continuously improve its knowledge and ability to make decisions is no longer a sci-fi feat. The application of deep learning algorithms[9] has triggered successive and rapid development of AI implementations, from helping a computer to perform cognitive tasks (seeing, listening, talking, driving, interpreting human emotions, etc) to prescribing medicines for patients. Deep learning enables machines to automatically extract useful features from any data and identify patterns that can be used to do classifications and make decisions. Since 2016, researchers have rapidly developed successful innovative applications of deep learning and demonstrated its capacity to deliver beyond human intelligence in certain tasks, such as detecting objects from millions of images within a few hours, while at the same time showing how it can continuously learn new concepts and object classes automatically based on data.

Deep learning in AI requires many samples to develop its logic, knowledge, perception and cognitive capabilities. If we think about how medical doctors are trained based on accumulated and selective cases of previous experiences, AI also requires them to establish capacity to make decisions based on the current situation that has to be carefully perceived and analysed. The more data AI can leverage, the more accurate and useful it can become, which is why the term big data is coined to signify both the requirement and the capacity of today's computers to produce and process data and information at high volume, velocity, variety and veracity. Therefore, big data is like the oil to an AI engine. Without it, AI would not be able to run properly. On the other hand, without AI, big data would continue to be underutilised and ultimately discarded as it is humanly impossible to

extract meaningful information from a massive amount of unstructured data continuously in a short period of time.

Big data and the IoT

Big data is a terminology coined by scientists and engineers to describe the sheer volume of information created every second by today's users—personally and in the work or social contexts—collectively worldwide. In the past decade, data were mostly stored in local physical storage, and when they were full, a new one needed to be purchased. Hence, data management, back-up and cataloguing were rather manual and inconvenient. Nowadays, most data are stored in the cloud (i.e. the Internet services, such as *Apple iCloud* and *Google Drive*), supporting seamless back up and continuity in terms of data retention and availability. In other words, people and things would keep generating data, without the pressure of managing it, as storage becomes cheap and easy to scale up. If they need more data, the cloud storage is continually extensible, making data storage in the cloud infinite.

The IoT is the Internet-enabled interconnected network of computing devices embedded in everyday objects, so that they can communicate via data with or without human interventions. When everything in the world is connected, we will witness a sharp increase of data volume generated by users' daily life experiences, businesses (i.e. transactional records), and social interactions. Using the cloud storage, big data generated by IoT can be scaled and managed effortlessly, along with the ever-increasing number of new devices and data types. However, these raw data cannot translate itself into useful knowledge, which is where AI would play a crucial role in. As millions of connected things are generating the big data, it will support AI's deep learning. IoT-generated big data is crucial to computationally reveal useful patterns, trends and associations, in order to learn and interpret behaviour and interactions between human, machines, and the environment.

Why the IoT needs blockchain technology

Given that computing devices will be embedded in all things, having traceable records of transactions and updates across many devices and stakeholders is very important.

Moreover, these devices will generate information that needs to be integrated, synchronised and maintained as a collective whole. One inconsistent or missing beat of data could make the whole ecosystem inconsistent and lose its integrity. Blockchain can help to maintain data integrity in the IoT, and ultimately ensure consistent and correct information feeds into the AI-enabled systems. Embedded and small devices do not usually feature the same level of security control as the desktop devices. Therefore, blockchain is even more important to maintain the information integrity, ensuring that data flow is continuously authentic, coming from official sources and going to the authorised targets after a valid processing.

Information integrity is especially important at the international scale. For example, in a multi-national manufacturing and supply chain organisation, data from customers around the world will help AI to design the most efficient manufacturing and distribution plan and ensure the factory machinery is used and maintained optimally. Blockchain can help to trace the integrity of information from one component to the other, ensuring managers can trace the use of accurate and untampered data at different stages of decision making. As an example, in the context of smart irrigation, data integrity of water usage meter reading is critical to ensure correct analysis of AI-enabled equitable water distribution in rural regions.

Cybersecurity will matter even more!

When AI is used to analyse data generated from millions of interconnected devices to take actions and make decisions, the quality and integrity of the data must be of the highest standard. To prevent data theft and tampering, cybersecurity in the IoT era is a more prominent and challenging issue. The primary challenge is ensuring that safety and privacy features of each device are sufficient, and the people and organisation are enforcing behaviour and code of practice that promotes the Internet security.

Most individuals, businesses and services have started to rely on a vast amount of information to make better decisions and anticipate new challenges. People nowadays start to give away their privacy in return for convenience and tailored services based on their preference and contextual requirements. As such, many service providers are now providing incentives to obtain this information when people are not willing to give it away, as they are valuable for improving the quality of service and experience. This tendency will change the future governance and law of private and shareable information. In large populations and developing countries, such as India, Indonesia and Vietnam, most of its population cannot afford desktop or laptop computers but are already using multiple small devices like smart phones, tablets and smart homes devices. As such, the technology for enforcing cybersecurity is still limited, placing more responsibility on the people to self-manage safety, privacy and integrity of the information. Hence, user-centred cybersecurity is even more important to protect the citizens in developing countries.

Responsible computing

Is it possible to maintain code of ethics, privacy and fairness while embracing AI, big data, and the IoT?

Privacy and processing of personal data is recognised as part of individual's freedom and fundamental rights as well as society's democracy. Europe's General Data Protection Regulation (GDPR) is still the most advanced world regulation on personal data protection[10]. Even US's recently passed new digital privacy law commencing in 2020 has a more limited scope compared to GPDR, despite being considered more comprehensive in terms of the law. GPDR is the first legislation that will lead to a "security by design" as the key acceptance criteria of AI-based autonomous systems. Given the scope and amount of data required by AI to become effective, GPDR is most likely going to stifle AI-driven innovations.

Beyond privacy, ethical issues are the hardest to manage due to the potential conflict between user and social ethical principles for an autonomous system's decisions. For example, there is yet a general consensus on which ethical principles need to be embedded in the control software of autonomous vehicles. The key challenge is to balance between the freedom of individuals to make responsible decisions and the freedom and safety of others. In driving contexts, individuals have the freedom to make decisions. However, in the context of driverless vehicles, it remains a question whether AI should support individuals to exercise their freedom of choice based on moral attitudes, or enforce the law by autonomously intervening the decisions and take control of the vehicle for the sake others' safety. In the event of road accidents, it remains a question whether AI should be ethically required to provide all data and information for law enforcement officers to make a fair decision, or AI should still maintain user's privacy and allow the individuals to consent on disclosing specific information when required.

4. What can Australia learn from China's rapid AI innovations?

The Queensland government has followed New South Wales and Victoria to trial AI facial recognition applications at sports stadiums to monitor patrons real time.[11] This has sparked an enquiry by the state's privacy commissioner, which would be the most sensible response given that Australia generally seems to prefer a strictly regulated GDPR. It should be highlighted that San Francisco has become the first major US city to ban facial recognition technology since May 2019, citing the concerns with civil liberties. In contrast, China has embraced and widely adopted facial recognition and speech recognition technologies for enforcing public security and managing society, as part of their "made in China 2025" initiative to be a world leader in robotics and advanced information technology[12]. The heavy investment of Chinese corporations and strong support from the government makes China perfect for AI development. China has a shortage of qualified people to support its ageing population, which can be filled by AI. Moreover, China's top-down political system and totalitarian governance will enable rapid widespread adoption of innovative technologies, which often means overriding existing solutions. China does not offer its citizens the same legal protection or democracy for transparent government or corporations. All these factors put China at the forefront of AI technology, which the world needs to pay attention to.

Rapid adoption of deep learning has shifted the focus of the development of AI capability from intellectual engineering to data-driven engineering. It is no longer about who can deliver the next breakthrough algorithms—which only happens every two decades or so—it is now about who will be able to feed the most data to the machines to develop intelligence. Given how China's government is embracing AI to enable citizen surveillance, while the rest of the world is more concerned with the loss of privacy and ethical use of surveillance data, China is more likely to be the next AI superpower. Hence, it is important for Australia to learn how China is rapidly adopting AI to create innovative applications that will soon spread across the world, as people are looking for novelties to improve day to day living. For example, China's adoption of dockless bike sharing as a signature aspect of urban life in less than one year since its concept would not be possible in Australia. By comparison with the docked version that has designated bike storage locations, dockless bike sharing requires people to reveal more personal data to enable more accurate spatial and temporal tracking of each bike and its user, so that the AI-enabled app can identify nearby available bikes. This concept does not align with GDPR's privacy-by-design practice of responsible computing, and the western decentralised system requires various government agencies to sign off independent approvals. However, given its novelty and popularity, many cities in Australia have started to implement it as an urban mobility option.

What can we learn about Huawei and the US-China trade war?

Huawei is a private company founded in China by a former officer of the Chinese People's Liberation Army in 1987. It has since grown into one of the world's largest technology giants, and is the only Chinese company to feature in in the annual ranking of the world's Most Valuable Brands 2018 compiled by Forbes.[13] Huawei owns the second largest global smartphone market, rapidly develops its infrastructure and market for the next generation 5G telecommunication that is crucial to usher in the next generation Internet era. Just as Europe and Asia started to adopt Huawei's 5G technologies,[14] the US has sanctioned a ban on Huawei's technologies citing a concern over its close ties with the Chinese totalitarian government, which could pose a threat to users' data privacy.

Given how AI can rapidly churn out big data to analyse information, unsolicited access to data could pose a major threat to people's safety and general wellbeing, much beyond the danger of data privacy. Since the US' ban, Australia has generally adopted a position to also exclude Huawei's technologies from the roll-out of 5G network. The decision to follow the US could negatively impact Australia's bilateral relationship with the Chinese government, which could potentially have a negative impact on Australia's overall economy.[15] For example, one of the aftermaths from the US-China trade war, is the decline in Chinese (RMB) currency, which in effect brought the Australian (AUD) currency to its lowest level in the last 30 years.[16] This demonstrates the significant importance of Australia's future adoption of China's AI innovations, both in terms of the perceived potential risk towards data privacy - due to Chinese government's control over data access, and the perceived economic alliance that could work against the alliance with the US.

5. Australia's unique role in leading the AI-driven industrial revolution

Amid the current trend of global economic downturn and financial uncertainties, accelerated by the US-China trade war and Brexit, Australia must explore entrepreneurship and innovation as a way to diversify its economy. The CSIRO has predicted a $315 billion potential market in Asia Pacific for digital innovation.[17] As AI is at the centre of the digital economy, our stance on responsible computing would ultimately determine whether we can compete with the rest of the world in terms of realising the full potential of autonomous systems to innovate businesses and services. The key function of AI is to improve efficiency and release people from mundane tasks to do what humans are best at. For example, AI-enabled healthcare could theoretically provide much better diagnosis due to the machines' capacity to analyse millions of relevant data and evidence, therefore future healthcare professionals can focus on providing a more integrated care based on human characteristics, such as encouragement, empathy and other psychological support.

Australia's strength and influence in the world economy is underpinned by its open and globally integrated economy, making it a trusted partner for trade and investment.[18] Australia hosts the operations of nine of the top ten Fortune Global 500 and eight of the top ten Forbes Global 2000 companies. Our top five trading partners are China, Japan, USA, Korea and India. These figures indicate that Australia has both global and regional (Asia) influence to shape the future of AI-transformed businesses. Notwithstanding Australia's commitment to play a leading role in the forefront of AI technical research and development, we should play a pivotal role in leading the future of AI business transformation in terms of leadership, governance, and strategy. Australia must help navigate the future of AI-enabled business transformation, so that it can continue to be a trusted partner in the global economy.

Responsible leadership for embracing AI-enabled digital transformation

AI adoption would transform the entire business, disrupting the value chains, organisational structures, operational processes and revenue models. Business and start-up leaders can observe and learn about the importance and advantages of embracing disruptive technologies from the early adopters, but most importantly, they must work on the people, organisation, leadership, governance, policy and strategy to make digital transformation happen. Successful digital transformation will lead to empowered employees, engaged customers, transformed products and optimised operations. This requires leadership at the critical intersection between the viability (business), feasibility (technology), and desirability (human factor).

Australia is uniquely positioned as a trusted partner to enable responsible leadership of digital transformation in top global businesses, while providing a regional perspective and expertise to work with the top five export markets in Asia. Learning from the sequence of events that led to the ban on Huawei's 5G technologies out of concerns on data privacy and espionage, Australia should have its own strategy for China's AI empowered businesses, instead of reacting to the decisions made by the US or Europe. The principle of responsible leadership is to make sustainable business decisions that take into account the interests of all stakeholders—including clients, employees, shareholders, the environment, societies and the future generations. Given that the Australian National

Broadband Network (NBN) project has been perceived as a complicated, tedious and unsustainable business strategy to deliver such an ambitious goal, reinvigorated responsible leadership principles must be adopted for the next digital transformation centred around AI—big data and the IoT.

Governance for maintaining responsible use of AI

Considering Australia's geographical position (to Asia), and our strong alliance with China, the US and Europe, we can play a significant role towards championing for the ethical use of data in AI innovations, which would depend on many local contexts. Australia is a hub of multi-cultural societies, therefore can provide a suitable environment for co-designing policies and trialling new systems, without necessarily expanding into a large-scale market. In terms of culture, belief, and language sensitivity, Australia's demographics and regional location would enable us to learn whether an innovative AI-enabled business or service would be acceptable by the users from different cultural backgrounds.

The role of government's law and regulation is most crucial to control responsible use of AI and its related technologies. The Queensland government is already committing into an AI hub to be located in Fortitude Valley, Brisbane. This hub could play a significant role—working in conjunction with research centres and universities—in establishing Australia's position as the industrial transformation hub for an AI driven industrial revolution. Within the Gold Coast Health and Knowledge Precinct IntelliHQ[19] is exploring the use of big data and AI for improving precision healthcare. Interdisciplinary expertise can investigate the full spectrum of AI's impact in disrupting business and future of work.

Business strategy in the era of AI

Global consulting companies are promoting strategies that Australia should adopt for digital transformation. McKinsey[20] suggested strategies for leaders to build AI-powered business responsibly—focussing on preparing, motivating, and equipping the workforce. First, educating people about the importance of AI and how workers will fit into the new culture. Second is anticipating and addressing the organisation's specific barriers to change from the beginning. Third is budgeting equally for the AI technology and the integration and adoption process. Fourth is balancing the timeline and efforts for feasibility, time investment and value to pursue AI initiatives. Deloitte suggested three key success factors for digital transformation:

1) The power and standing to drive change top down with executive and supervisory board visibility;
2) Sufficient time frame – usually 2-5 years - to perform the transformation while focusing on digital leadership as a principal role;
3) The right vision and personality traits to connect digital transformation with tangible business goals with an acute awareness of profit and loss control.[21]

However, these steps are not meant to be adopted in a text-book style, as there are many issues and factors that need to be incorporated. The law, policies, as well as rules and regulations designed by Australian government has a crucial role for leaders to implement successful business strategies in the era of AI.

Australia's globally renowned political and economic alliance would enable many AI innovations for multi-nation corporations with sustainable value-chain across the Asia-Pacific regions and beyond. Australia needs to respond in kind with the rest of the world to accelerate the progress to transform businesses with AI capabilities. By establishing and cultivating AI driven industrial transformation hub, Australia should invest in facilitating international researchers and entrepreneurs to design, develop, launch and trial innovative products in collaborations with our world-class experts. The government should provide incentives and simpler process to encourage investments for research and developments.

In the long term, Australians can become the world leader to embrace the AI innovations that are more contextually suitable in Asia-Pacific regions and beyond. Australia is already a keen adopter of responsible computing and our role of promoting GDPR as a key guideline of data privacy for AI innovations will best position our researchers and entrepreneurs to implement a more responsible and sustainable future of businesses and services that promote the use of AI but still embrace the value of humanities and enable people to still do what humans are best at.

5. Conclusion

This report has explored the potential of AI to take over the world and reshape the next global super power. The related technologies, including big data, the IoT and blockchain are fundamental for fully realising the massive impact of AI in the social and economy of the future. Australia can definitely learn from the rapid AI-enabled business innovations in China, and play a more pivotal role in responsible leadership for developing the most suitable and contextually aware business strategy and governance in the AI era.

GAI is well positioned to embrace AI business transformation as part of the current and future research directions. In agribusiness, AI can enable real-time monitoring of data and records to promote traceable and sustainable meat production. Based on data collected across the value chain processes, AI can be used to analyse and recommend strategies for improving efficiency and reducing wastage. Similarly, in healthcare, AI can assist expert and complex decisions while synergising knowledge across organisations. Knowledge management in organisation is crucial to administer how distributed AI intelligence architecture can replicate experts-apprentice collaboration in solving complex problems.

The intersection of cross-disciplinary expertise in the technology, business, social and economic aspects of AI transformation is at the most crucial stage. The future of society and humanity will increasingly depend on how successful we are in adopting AI into business and other areas of life. Australia has a key role to play and the time to take action and leadership is now.

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