Learning Innovation and Ethics In The Artificial Intelligence Age

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Introduction to Artificial Intelligence (AI)

What is AI? AI, in simple terms, is basically mathematics translated into source code. In other words, it is a set of algorithms[1] building on various ideas and concepts, and trying to learn from human intelligence to make decision. It is building capable smart machines to perform tasks that usually require human intelligence. Since it does not require expensive computer hardware and IT infrastructure, it has become the most popular digital technology enabling digital transformation.

AI started with a discussion in the 1940s between two inventors of computers on how brain works and if computers could mimic it. In 1950s, a computer and cognitive science coined the term "Artificial Intelligence", and AI research as an academic discipline started in Dartmouth College[2]. When internet started in 1991, sharing of data began on website and this conditioned the growth of AI. In 2011, IBM's Watson[3] won the human players of the TV game Jeopardy!, which is a language-based

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[1] AI refers to pieces of software with the ability to lean and reason like humans, and able to translate real-life problems into mathematical models called algorithms.

[2] Dartmouth Conference in 1956 gave birth to the name "Artificial Intelligence".

[3] Watson is the work of IBM to develop "cognitive computing" through machine learning to work out what information it needs, and what it is expected to do, based on a collection of dataset and constantly updated valuable information such as the latest scientific studies, news articles, statistics and encyclopaedias.

and creative thinking game. That same year, Apple launched Siri[๔], a virtual assistant that provides personal "individualised experience". Over the decades, there were many research done to train networks with multiple layers of units, and only in 2012, there was a significant breakthrough with "deep neural network" on solving many problems including advancement in speech and image recognition. The past decade has been immensely important for AI innovation, and we continuously see AI embedded in our day-to-day existence.

Machine learning and deep learning are the two major branches of AI. Deep learning engages artificial neural networks to process digital information, and these artificial neural networks have to be trained by big data or large training databases. Governments and companies use big data to solve real-world problems, predict trends and consumer behaviours, and in all areas possible. Currently, the knowledge of AI is still limited by the amount of information humanity has. With the evolution of AI, technology has the potential to transform everything and revolutionize the world. Hence, the need for innovation in learning and development is urgent and important. Government and organizations would need to explore new ways to develop talents.

Country-based Learning Innovation in the Age of Artificial Intelligence

In terms of country-based AI strategies, China has the largest government-backed AI initiatives with the goal to become the world leader in AI by 2030[๕]. In recent years, China has passed many policies to promote AI. China has a huge and vibrant market that is receptive to AI technologies and AI products, and is conducive to the adoption and improvement of AI. The huge volume of market brings large economies of scale and offers an opportunity to gather big databases. China has incorporated STEM (Science, Technology, Engineering and Mathematics) courses in

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[๔] The Siri voice recognition is supported by big data, which basically refers to the collection and analysis of data by businesses and governments in the digital age.

[๕] AI Policy – China.

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the main curriculum and school exams. With the strong support from government, China tops the world in AI patents, papers and funding, and is currently at the global frontier of AI in terms of technological development and market applications[๖].

In response to China's growing AI capabilities and rising strategic rivalry, the 45th US President Donald Trump signed an executive order in February 2019 to direct US government to prioritize and support national development of AI[๗]. It seems that the rise of China constitutes a national security threat[๘], and this motivates the US government to seriously consider the nation's economic and infrastructure situation, and its role in technology. In comparison with China, US has an advantage in designing AI technique of deep learning, as it has the highest number of AI talents and AI companies like Google[๙], Facebook[๑๐] and Amazon[๑๑]. Both US and China realize that government should promote and guide innovation.
Another highly active country in AI implementation is Singapore. Recognising the lack of critical mass of a big country, Singapore government is determined to carve out a niche for itself in the global AI ecosystem and be the driver of the process. AI is one of the main ways Singapore plan to grow its digital economy[๑๒]. Singapore's vision is

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[๖] China AI Development Report in 2018.

[๗] Maintaining American Leadership in AI.

[๘] AI Ambitions: Challenges to Innovation as the US and China drive Global Tech.

[๙] Big data is at the heart of Google's business model. Google accounts for the most internet search use (Marr, 2016:246). As Google has built efficient ways to connect users with data that they need so that the world's information is available anytime anywhere. This is similar to an interface between computers and human.

[๑๐] Facebook is the world's biggest social network (Marr, 2016:69). Facebook has transformed the way we share personal information about our lives, and changes the way we network and communicate with each other.

[๑๑] Amazon is the largest online retailer in US and a globally recognised brand (Marr, 2016:290).

[๑๒] AI Policy – Singapore.

to "develop, cultivate, deploy, and scale AI solutions". Singapore aims to train 25,000 professionals in basic coding and implementation. Besides taking a human centric approach in the application of AI technologies and making sure that workers are skilled in the use of new technologies, Singapore also aims to stay open and connected to ensure good governance of new technologies.

The National Artificial Intelligence (AI) Strategy has an important plan to use AI technologies to transform Singapore's economy and recreate new areas of growth. There are five areas of AI applications to deliver strong social and/or economic impact for Singapore. The adoption of AI technologies will be enhanced in these five identified areas: transport and logistics, smart cities and estates, healthcare, education, safety and security[๑๓]. Singapore recognises the global shortage of quality workforce in the STEM industries, the government integrates STEM education teaching and learning activities and experiences in school curriculum. They look to build and nurture a STEM-educated workforce.

AI is poised to transform our society in profound way. Education, healthcare, transportation, energy, and even national security will be reshaped by AI. In education, it will be the pivot point where the future of a country will revolve. If we want to embrace the full range of changes that AI technologies will introduce, we need to invest our resources in training and development for the youth and prepare everyone in our country for this digital age.

Case Study 1: Developing Countries

Learning innovation needed in developing countries would be to train their population on new technologies to take advantage for local use. For instance, Rwanda, in Africa, has invested and modernised its healthcare and technology infrastructure since 1990s, more than ninety-five percent of its population is covered by 4G cellular

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[๑๓] National Artificial Intelligence Strategy: The Next Key Frontier of Singapore's Smart Nation Journey.

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networks[14]. Drones have been used to send medical supplies to remote area with poor infrastructure in Rwanda. Rwanda has all kinds of challenges, but its government uses AI technologies strategically to solve its domestic problem to maximise potential benefits. Education is the government's priority, Rwanda has replaced French with English as the official language of instruction in schools.

AI technologies in areas of health, agriculture and education can bring enormous benefits to the lives of poor countries if these frontier technologies (innovative or new technologies) are managed properly. Social norms could limit the access to technologies for discriminated or disadvantaged groups in developing countries. While developing countries have diversified their economy to create more jobs by transforming their relatively lower productivity agricultural sector to higher productivity manufacturing and services, economic progress would still need an improvement in literacy and digital skills.

Technological changes impact inequalities in every country through its impact on profits, jobs, and wages. Due to the level of development and its economic structure in developing countries, the rapid development of AI will outgrow the society's readiness to adapt and respond. With technological advancement, the automation of jobs will reduce employment and displace jobs. Without right and timely social and economic policies from government, social inequalities will arise. Most importantly, the cultivation of innovative talents depends largely on education and is crucial to a country's progress.

Case Study 2: The Association of Southeast Asian Nations (ASEAN)

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[14] Paul Kagame, the current President of Rwanda, tries to replicate Singapore's system and policies as he has an ambition to make Rwanda the "Singapore of Africa". The country's Vision 2020 seeks to transform Rwanda into a middle-income country by 2020 and recently adopted National Strategy for Transformation and Vision 2050 with aim of turning Rwanda into upper middle-income country by 2035 and high-income country by 2050.

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Five years ago, ASEAN Education Ministers gathered to discuss about integrating technology in education and Information and Communication Technologies (ICT) education in national curriculum to develop digital and transferable skills among students[๑๕]. Moving forward, learning innovation in the fast-moving digital age would require an understanding and appreciation of the latest frontier technologies like AI, and how they can be integrated effectively into educational and organizational settings. Trainings in planning, implementation, and management of AI technologies, coupled with technology-enhanced learnings are necessary for Higher Education.

A basic skill needed in this digital age is being literate so that one can learn the different types of AI and able to communicate the process and outcomes effectively. One major mistake of Higher Education system is the termination of learning relationship after graduation, that is, the failure to provide lifelong learning to upgrade skills and capabilities to meet changing industry needs. Hence, a rethinking and revamp in education system is urgently needed as it plays an important role in the future of our society.

For the next five years, the goal of ASEAN is to become both a digital economy and a digital society. To meet this goal, every country will need a widespread and high-quality digital infrastructure, relevant digital services which support economic and social development, and an ASEAN population with the skills to use these digital services and a workforce with the skills needed to develop and implement them[๑๖]. One of the challenges in transforming[๑๗] education is the teacher's technical mastery of ICT skills in integrating ICT into

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[๑๕] From Final Review of ASEAN ICT Masterplan 2020 that discusses the role and implementation of ICT in all economic sectors that drive growth and development.

[๑๖] From ASEAN Digital Masterplan 2025. The vision is to have all societies in ASEAN to use digital services to enhance their daily life, make business more productive, and create a sustainable economy.

[๑๗] From CNA. The rise of the digital economy and how education may be transformed.

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student learning, is insufficient in most ASEAN countries, despite much investment in ICT infrastructure.

Organizational-based Learning Innovation in the Age of Artificial Intelligence

Our daily decision-making process is built on information and experiences. We use logic and reasoning to think through problems. In the age of AI, the challenge is that no human can solve a problem the way a machine does as proven in reinforcement learning. Reinforcement learning is a type of machine learning technique where a computer agent learns to perform a task through repeated trial and error interactions using feedback from its own actions and experiences. Machines have become highly developed and insight can be gained through extensive analysis of structured data using machine learning. For instance, Google has successfully designed its next generation of machine learning chips that humans take months to design a chip, whereas AI completes in less than six hours[๑๘]. Similar systems also win against human in board game Go[๑๙].

The technology of AI can be applied to many different sectors and industries in a country. New product development and information technology are already using AI technologies, like machine learning (teaches computer to think and acts like humans do) and natural language processing (teaches computer to understand and analyse human language), to structure and automate processes to optimize results. For instance, the google search, google translation, and the spam filters on email. In the healthcare industry, AI is commonly being used to optimise and personalise healthcare treatment recommendations. AI can even be used for different treatments in patients

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[๑๘] Google Brain Scientist publishes in Nature on using AI's deep reinforcement learning technique to design the next generation of Tensor Processing Units, Google's specialised AI processors.

[๑๙] Google Deepmind publishes in Nature on using AI's deep learning method to create a computer program that plays board game Go, and it won against human players in games.

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and for surgical procedures in the operation theatre. Human surgeons may be replaced by robotic surgeons with hundred percent precision in surgery.

Right now, only big organisations can afford powerful and sophisticated computing hardware for such complex and highly accurate machine algorithms. These big organizations tend to have collected a lot of data and transactions done with customers. As for smaller companies, implementation would need an awareness and understanding of what is possible and an understanding on how they work. A contentious issue is how it has affected human employment as many jobs have now been automated and human labour have been replaced with machines. Every different case that either assist or replace human in the process must have a consequence that we have to analyse further.

Case Study 3: Facebook

Facebook has adopted AI as the key differentiation for its online business. It develops a system of human level intelligence and derives knowledge from collected unstructured data. According to Facebook's record, half of its users do not speak English, so the AI research team built an AI-based automatic translation system[๒๐] to help non-English speakers to read translated post in their News Feed.

Based on a high-resolution photo of a crowd, Facebook uses facial recognition technology to tag names to many faces. In addition, based on personal profile collected, Facebook targets advertisement to relevant people.

In fact, Facebook has faced numerous privacy issues. Users' identities, including their personal lives, are being compromised without their permission. The revenue model of the company is collection of users' data and selling users'

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[๒๐] Facebook AI has developed the first multilingual machine translation (MMT) model to directly translate between any pair among 100 languages without relying on English data as an intermediate.

information. Moreover, Facebook changes its policies frequently. From users to advertisers, everyone living in it needs to comply.

Case Study 4: Development Bank of Singapore (DBS)

DSB uses AI to improve its services and operations. They focus in using AI to optimize business processes across the bank, from Human Resources to Investment Trading. It can predict the turnover rate of its salespeople and achieve eighty-five percent accuracy using machine learning to digest inputs, such as holiday period, medical leaves taken, and employees response time in answering email[๒๑]. It launches initiatives to help employees embraces technological changes and train them with relevant digital capabilities, thus empowering them to live with a digital mindset.

One of their projects is the creation of a "Robo-advisor"[๒๒] to recommend clients on wealth management and investment opportunities. This advisor gives advice to bank relationship managers and their clients based on client's existing portfolio, research reports, company news, market, and economic indicators. For individuals who wish to invest in a robo platform, DBS offers personal digital advisory investment services driven by an algorithm based on chosen financial goals and risk appetite.

There are many potential business values from AI technologies. As for trading, AI can be used to detect fraud, for chatbots in customer service and algorithm-based lending models. This efficiency in process can reduce headcounts by ninety percent as compared to traditional bank, as seen in the DBS digital bank in India.

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[๒๑] From The Straits Times. The AI system in DBS Human Resource department was developed through data gathering and the development of algorithm was completed by their data scientists and data analysts.

[๒๒] DBS Robo-advisors are digital platforms that provide automated investment services. There are more than 10 robo-advisors platform today in Singapore offering diverse investment options.

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However, there are criticisms that such digital automation lacks personal (human) touch and does not bring better customer experiences[๒๓].

The Ethical Awareness in using Artificial Intelligence

We are at the crucial point in the evolution of digital technology. The widespread adoption of AI technologies presents ethical challenges that deserve our attention and action. AI is neutral, it can either be used for good or bad. However, we need to be aware of the potential ways that AI can be misused. The AI applications continue to proliferate today, and AI decisions could also be involved in life-or-death circumstances, for instance, self-driving vehicles. In event of crash and injury involving fully autonomous vehicles, who is to blame and how are blame and causal responsibility shared across human and machine drivers?

Other than social responsibilities, another challenge for implementing AI solutions in various sectors is the privacy issue. AI relies on lots of data, good data. In any one minute on internet[๒๔], there are millions of searches on google, millions of email communications, and millions of videos being watched on YouTube. Social media applications, like Facebook, with millions of users' login in just one minute, has accumulated a goldmine of data. The collection and usage of users' private data from personal website to social media has posed considerable risks for non-intended purposes. Especially now with Covid 19 Pandemic, many people work from home and businesses have moved online. Users are often unaware of how their collected data will be processed, used and even sold.

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[๒๓] From CNA. Forget Digital Banks – many still prefer the trip to the branch.

[๒๔] From Statista. Covid-19 has changed our lives in many unexpected ways and in many areas of life as Internet has transformed our lives tremendously. E-commerce and transactions are booming. Most activities have moved online since and a lot of things can happen in an internet minute.

Another privacy risk is that facial recognition system can capture facial features and analyses individual patterns and the concern about how accurately it can be identified with the exact person. Such information is usually stored in a database and can be used in a search process to find a match. The market for this technology is growing exponentially, especially in surveillance and marketing. However, due to a lack of regulation, the issue of accuracy and accountability may present a challenge in the justice system in event of misidentification that leads to wrongful convictions. Using facial recognition technology as a powerful tool in surveillance can cause harm with privacy and security issues, and law makers need to seriously legislate and monitor the use.

Case Study 5: Facebook – Cambridge Analytica data scandal

Cambridge Analytica is an UK-based political consulting firm that specializes in leveraging data mining techniques for the expansion of potential voter bases. From 2013 to 2016, Cambridge Analytica did a behavioural targeting for all Americans based on their social media usage, reportedly from about 87 million Facebook profiles, including extracting information from Facebook's likes, and building a personality model for every Americans. They then micro-target political messages based on these models for Brexit propaganda and Trump's campaign. In all cases, they successfully manipulated human's thoughts and emotions in order to achieve their goal without ethical compass or consideration for what was best for its audiences.

Facebook is a massive tech-conglomerate known fondly for its social media platform. It acquired at least ninety other companies, including Messenger, Instagram and WhatsApp. The Facebook-Cambridge Analytica data scandal[๒๕] that involved the 2016 Presidential Candidate Donald Trump exposed Facebook's ethical conduct in handling user data in respect to third parties. Personal data harvested and optimised

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[๒๕] Wikipedia. Facebook–Cambridge Analytica data scandal.

by Cambridge Analytica are available for all digital marketers and advertisers. Facebook needs advertisement to sustain its business, advertiser needs Facebook to sell their products, and users rely on Facebook to socialise and network. In this co-dependent world, this is an awakening call for all to reckon the extent of personal data that is held about everyone online.

However, one must be prepared to make trade-offs to access information online and to connect to our digital world daily. For the future of humanity, the personal data used in an ethical manner implies a common goal to improve personal life. To apply behavioural science tactics in a moral way, we need to have a goal to bring positive social change. In brief, it is important to have enough understanding of the data and behavioural science tactics, the ethical and right application is everyone's responsibility.

Case Study 6: The future of Robot Priest Mindar

In Japan, robot priest is used for blessing and performing rituals in Buddhist temples. For instance, "Mindar"[๒๖] robot priest has been created for a Kyoto 400-year-old Buddhist temple in Japan to enhance interest in Buddhist teachings. The chief of this temple believes that if an image of the Buddha speaks, then the Buddhist teachings will be easier to understand. It can help to perform rituals and funerals when priest is not around. Another advantage of having this robot is the belief that the teachings can be stored permanently in the robot.

Interestingly, robot creators are planning to give machine learning capabilities for this robot to address devotees' spiritual and ethical issues. They design Mindar to look like Kannon (Avalokitesvara Bodhisattva) and it can continuously recite Heart Sutra. The Japanese, who believe in Lotus Sutra, have accepted the manifestation of Bodhisattva Kannon in machine form, as this resonates with the

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[๒๖] Mindar is a robot (Samuel, 2020).

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humans of a given time and place. This digitisation process has slowly changed how people experience faith and rituals.

As robots continue to change our religious experience, AI technologies may become an object of worship one day. So it is important for us to think what role the robot can play and what kind of relationship we want to have with robot. The ethical use of AI must be in line with maintaining and increasing happiness, reducing and stopping suffering of all. But how to achieve this? I strongly advocate those who are involved in AI technologies like designers and programmers to recognise the importance of ethical standards and maintain the basic common value system. They should strive towards this goal by continuously undertake ethical training.

Conclusion

As discussed above, AI technologies have the ability to improve education by supporting teachers and learners in the classroom with more personalised experiences and provide potential applications for education. While AI can make education more

personalised and accessible, the next question is whether the teachers today is ready to develop the leaders for tomorrow. And the most important and urgent task now is how we use education to prepare our next generation of leaders so that the country can retain its strategic advantage in critical fields and remain relevant in the emerging digital environment.

The AI technology is in the process of transforming everything. AI reshapes country and organizations on how innovation management is organized. It can increase productivity and increase profits for companies. Individual or business may use AI to collect data and hence intruding into people's privacy. Government can even create weapons, robot police or robot soldier. There is a danger where it can lead to. Countries need to work together on AI ethical security risk prevention to include the protection of personal rights and social security.

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The goal of AI has indeed raised many questions and many debates. This moment is critical in human history as AI is mostly made by technologists and investors. There is a clear struggle between individual greed and collective responsibilities. If technology is so powerful that can control human or destroy humanity, then we have to be very careful what and where we want the future of AI to be. And the most important aspect in working out the direction is to figure out our intention as we move forward. This is the karmic aspect, the cause and consequences, that we have to be careful with.

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