Title

Artificial Intelligence and Automation

Background

Artificial Intelligence

The term artificial intelligence (AI) was coined in the 1950s and has been described as, in its most basic form, a "system that makes autonomous decisions" (Webb 2019). In other words, AI is computers or machines seemingly acting and responding on a human scale of intelligence.

A more sophisticated understanding of AI, however, breaks AI into two domains. The first is artificial narrow intelligence (ANI), which is essentially what we have reached in our present day with supercomputing that draws on a big data set to perform a single or limited task such as translating speech in real time or playing chess with a human being. From a teaching and learning perspective, Alpha Go Zero (2019) is a compelling example of ANI where neural networks and autonomous machine learning enabled a computer program to defeat a world champion at the ancient Chinese game of Go.

The other domain is artificial general intelligence (AGI), which—if or when it materializes—would be able to think, learn and problem solve on the scale of a human being. AGI is what we see in science fiction movies where the machine has attained a form of human-level consciousness or sentience. Globally there are nine large technology companies dominating a race to create true AGI: Google, Amazon, Microsoft, Apple, IBM and Facebook within the United States and Baidu, Alibaba and Tencent in China (Webb 2019).

As the field of AI evolves, there will be profound opportunities (eg, new health innovations, productivity gains and solutions to complex problems) and deep challenges (eg, greater wealth inequities, algorithmic bias and human displacement) that will have the potential to radically reshape societies (Susskind and Susskind 2015).

Automation

Automation is another technological trend with great velocity in our current era of more powerful machines. It is estimated that 47 per cent of jobs are at risk of automation in the United States over the next decade (Frey and Osborne 2013) and that "45 percent of the activities people are paid to perform and about 60 percent of all occupations could see 30 percent or more of their constituent activities automated" (Chui et al 2016). McKinsey suggests five factors are involved in the automation of any form of work: technical feasibility; costs to automate; the relative scarcity, skills and cost of workers who might otherwise do the activity; benefits (eg, superior performance) of automation beyond labour–cost substitution; and regulatory and social acceptance considerations (Chui et al 2016).

The Oxford–Martin project (Frey and Osborne 2013; 2016) identifies three key areas where machines are not able to automate a task: perception and manipulation tasks, creative intelligence and social intelligence. These three bottlenecks to automation are increasingly important for education systems to consider, as we explore more ways to foster play, creativity, social/emotional intelligence, critical thinking and fine motor manipulation in K–12 schools.

The Alberta Teachers' Association

COOR-141-1, 2018 08

Research Briefs

Key strategic considerations

- The rise of artificial narrow intelligence in our daily lives, and the evolving potential of an artificial general intelligence, should be closely monitored with specific pedagogical implications for K–12 education systems.

- Through understanding the nature of learning as a highly relational act, education is one of two sectors (the other being health care) that to date have had a relatively low technical potential for automation. It is a societal expectation in Alberta that children and youth will gather to learn with human interactions from professional teachers. Education systems will increasingly be seen as critical spaces for governments and policy makers to prepare for the effects of automation and accelerated technological developments.

Sources and further reading

Alpha Go Zero. 2019. "Learning from Scratch." Google DeepMind. https://deepmind.com/blog/alphago-zero-learning-scratch/ (accessed April 25, 2019).

Chui, M, J Manyika and M Miremadi. 2016. "Where Machines Could Replace Humans—and Where They Can't (Yet)." McKinsey Report. www.mckinsey.com/business-functions/digital-mckinsey/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet?reload (accessed April 25, 2019).

Frey C B and M Osborne. 2013. "The Future of Employment: How Susceptible are Jobs to Computerisation." University of Oxford. www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf (accessed April 25, 2019).

Frey C B, M Osborne and C Holmes. 2016. "Technology at Work v2.0: The Future Is Not What It Used to Be." University of Oxford. www.oxfordmartin.ox.ac.uk/downloads/reports/Citi_GPS_Technology_Work_2.pdf (accessed April 25, 2019).

Susskind, R E and D Susskind. 2015. *The Future of the Professions: How Technology Will Transform the Work of Human Experts.* New York: Oxford University Press.

Networks

Future Today Institute
https://futuretodayinstitute.com/2019-tech-trends/

The Oxford Martin Programme on Technology and Employment
www.oxfordmartin.ox.ac.uk/research/programmes/tech-employment

2018/19

The Alberta Teachers' Association

COOR-141-1, 2018 08