Editorial

MAKING THE CASE FOR A BROAD VIEW OF ARTIFICIAL INTELLIGENCE

Since this is the inaugural issue of a publication devoted to artificial intelligence (AI), robotics and workplace automation, it seemed appropriate to address the relationships among and growing intersections of these technologies. It is also relevant to discuss how organisations are increasingly dealing with them as one unified domain.

Some observers define AI narrowly, but I have always placed a broad umbrella over the subject. Though some might argue that they are just statistical analysis, I include in the field the various forms of statistical learning (traditional supervised machine learning (ML), unsupervised learning, neural networks, deep learning (DL), reinforcement learning, etc.). They are perhaps the fastest growing and most popular AI category at the moment. I would incorporate logic-based systems such as rule engines, which were the hottest form of AI at the end of the last century. Contrary to some observers' beliefs, they are still in evidence today at many companies.[1] I would further include semantics-based AI, which powers some (but not all) natural language processing applications (NLPs). And finally there are robotics — both physical robots and process automation.

In short, everything that is addressed in this journal is to me a form of AI. My reasoning for putting it all in the same bucket is that all of these tools perform tasks that could previously only be performed by sentient humans. Another argument for lumping them together is that they are increasingly intertwined in specific applications or use cases.

The intersections and combinations are many and growing. For example, I regularly encounter systems — anti-money laundering in banking, to name one — that combine rules and machine learning. Robotic process automation (RPA) systems have typically made decisions using rules, but many organisations are sending API calls from them to ML algorithms for more complex and data-based decisions. This particular combination is sometimes called 'intelligent process automation',[2] but that is perhaps unfair to rules, which are also a form of intelligence.

Physical robots have typically been driven by programmed logic, but they too are becoming more intelligent. Some production robots have machine vision and image recognition capabilities based on DL models. And 'robot learning', still largely a research field, takes place when a robot learns about a task or an environment through supervised or reinforcement learning.

I suspect we have only begun to see the ways in which these technologies come together in specific applications. Each underlying technology has its strengths and weaknesses, so combinations can only make AI better. Rule engines have the virtues of requiring little data and providing a high level of transparency in the decisions they make but are poorly suited to highly complex decisions. ML — particularly complex forms of it like DL — require massive amounts of data and are often opaque in their decision processes, but they can be highly accurate in their predictions and classifications. It is becoming clear, as AI leaders such as Gary Marcus argue, that one AI technology will not be sufficient to solve all our problems.[3]

SUPPORTING THESE TECHNOLOGIES IN ONE ORGANISATIONAL UNIT

As a result of these overlaps in concept and practice, some organisations are beginning to support all of these AI-related technologies in one organisational unit. It is increasingly common, for example, to find an AI or data science 'centre of excellence' (CoE)

that supports advanced analytics, AI and automation technologies such as RPA. Since all of these technologies require data, it is also not uncommon for them to be combined with the chief data officer role — sometimes called a chief data and analytics officer.

Bank of Montreal is one such company that combines multiple AI technologies in one 'AI centre of excellence' support organisation.[4,5] It is an enterprise CoE that works with business units and functions of the bank in all these areas. The breadth of technologies allows the CoE to manage a diverse portfolio of projects, some of which involve combinations of AI technologies. And different technologies also have different return on investment profiles; RPA typically provides rapid returns on relatively low investment, whereas a complex ML project may require both more data to be gathered and more integration with existing systems and processes — both of which might increase the expense of the project.

Of course, there are other possible organisational structures that may be beneficial for some organisations. For example, since RPA is often used to automate aspects of a business process, some organisations incorporate the technology into a process improvement or management group. The retirement financial services firm Voya has done so and has a methodology for improving a process and then automating it.

Some companies may have reasons to separate one of these capabilities into its own unit. The global advertising agency network Dentsu, for example, is heavily focused on improving the productivity of its knowledge workers through automation. It established an automation centre of excellence, appointed a chief automation officer and is training employees to develop their own automated tasks and processes. Another team, based in Japan, is focused on implementing AI throughout the business.[6]

In general, however, I predict that organisations that create different organisations to support different AI technologies will eventually find that their structures lead to excessive overlap, less effective projects and confusion among their employees. The increasing combination of AI tools seems inevitable, and it will increasingly necessitate collaborations among proponents and experts in different AI techniques and methods.

So I congratulate the creators of this journal on their farsightedness, or at least their recognition of where the world is going today. I predict that in these pages we will see very interesting and useful articles about the application of individual technologies, as well as combinations of them that we cannot even anticipate now.

Thomas H. Davenport
Editorial Board Member
***Journal of AI, Robotics and Workplace Automation*,**
July 2021

References

1. Deloitte (2017), 'Bullish on the Business Value of Cognitive', available at https://www2.deloitte.com/content/dam/Deloitte/us/Documents/deloitte-analytics/us-da-2017-deloitte-state-of-cognitive-survey.pdf (accessed 6th August, 2021).
2. Berruti, F., Nixon, G., Giambattista, T. and Whiteman, R. (March 2017), 'Intelligent Process Automation: The Engine at the Core of the Next-Generation Operating Model', McKinsey & Company, available at https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/intelligent-process-automation-the-engine-at-the-core-of-the-next-generation-operating-model (accessed 6th August, 2021).
3. See, for example, Marcus, G. and Davis, E. (2019), *Rebooting AI: Building Artificial Intelligence We Can Trust*, Pantheon, New York.
4. Bank of Montreal's Center of Excellence is described in Davenport, T. H. and Zhang, R. (July 2021), 'Achieving Return on AI Projects', MIT Sloan Management Review, available at https://sloanreview.mit.edu/article/achieving-return-on-ai-projects/ (accessed 6th August, 2021).
5. Davenport, T. H. (August 2020), 'Bots for the People, by the People at Bank of Montreal', *Forbes*, available at https://www.forbes.com/sites/tomdavenport/2020/08/03/bots-for-the-people-by-the-people-at-bank-of-montreal/?sh=4fe91bc51065
6. Davenport, T. H. (January 2021), 'An RPA Robot for Every Employee at Dentsu?', *Forbes*, available at, https://www.forbes.com/sites/tomdavenport/2021/01/21/an-rpa-robot-for-every-employee-at-dentsu/?sh=6c1a567451c8 (accessed 6th August, 2021).