Jean-François Gagné, chief executive of Element AI, a Toronto-based AI software developer, agrees with other experts that AI tends to work well embedded in a larger system, such as in thermal cameras and thermometers used to test for fever amid the pandemic.   CHRISTINNE MUSCHI/FILES

POST-PANDEMIC RECOVERY IS AI'S BIG OPPORTUNITY

Artificial intelligence already present in many tools being used to fight COVID-19

JAMES MCLEOD

Back in December, before the world started paying attention to the novel coronavirus, a Toronto-based company called BlueDot Inc. noticed the first hints that something was amiss.

By applying an artificial intelligence algorithm to analyze news reports and airline ticket data, BlueDot noted a significant disease outbreak brewing before even the World Health Organization raised the alarm.

"An AI epidemiologist sent the first warnings of the Wuhan virus," a Wired headline reported in late January, flagging BlueDot's achievement.

BlueDot earned another round of media coverage in March when the rest of the world caught up in understanding the seriousness of the COVID-19 pandemic.

The company's use of artificial intelligence was the sort of application in which the technology can shine: taking in large amounts of data to then find subtle patterns beyond what humans can come up with themselves.

But a couple of months later, the technology press was telling a different story. "Our weird behaviour during the pandemic is messing with AI models," an MIT Technology Review headline declared.

AI systems designed to predict the rhythms of human behaviour based on historical data were no longer working because those rhythms had been turned upside down by the pandemic-induced lockdown.

Despite the hype and excitement among technologists in the past few years, AI has also been largely absent from the conversation about how to fight the coronavirus, with even the most ardent adherents acknowledging the technology has largely faded into the background during the pandemic.

The most significant public health measures have been decidedly low-tech, such as social distancing, cloth masks and track-and-trace epidemiology, but experts say the dip in attention won't last too long. Indeed, the longer the pandemic lasts, the more important artificial intelligence will become, they say, and it will likely play a big part in the economic recovery.

"I would tend to agree with you that the real-world impact has been relatively minimal, and there's different reasons for that," said Jean-François Gagné, chief executive of Element AI, a Toronto-based AI software developer.

"There's just only so much an algorithm can do in figuring out risk and uncertainty when things are so volatile."

Artificial intelligence is a hazily defined term for a collection of technologies, but most of the excitement in the past decade has been around deep learning, which uses computer programming structures loosely modelled on the neural networks in human brains.

It's possible to train an algorithm to identify patterns and make predictions by feeding vast amounts of data into these computerized neural networks.

This technology can be used for tasks such as image recognition. By showing a neural network a million photos, some with cats in the image and some without cats, you can train the system to recognize patterns in the data that look like cats. After a while, you have a computer that can reliably identify cats.

The same process can be applied to many different situations. For example, a neural network could take all the data about your internet browsing history, spot patterns in both your data and other customers' data and then feed it into a recommendation algorithm so that an e-commerce company can show you products you're likely to buy.

Gagné and several other experts who spoke to the Financial Post said the success of AI is largely confined to such specific functions. He said that when you try to do something ambitious, such as running a whole shipping network with machine learning, it gets really difficult.

"What we are all realizing is that describing the world and giving good examples to models is hard," he said. "Most of our forecasting systems out there right now in the industry, broadly speaking, are very simple techniques that have been trained on a few months of data that often are at the daily level, with very few variables that describe the outside world."

In practice, this means that AI tends to work well as the special sauce inside a larger system.

For example, deep learning might improve your phone by analyzing the patterns in all your touchscreen inputs and then personalizing the sensitivity to better recognize a deliberate finger press as opposed to a palm brushing against the corner of the screen.

"The vast majority of the time, (AI) is not transformative. The vast majority of the time, it's a tool for a task that makes you more efficient," said Avi Goldfarb, a professor at the Rotman School of Management at the University of Toronto, and co-author of Prediction Machines, a book about the economics of AI.

"Sometimes that means cost reduction, but often it means serving your customers better because you were before because you can personalize something."

But it's one thing to analyze inputs on a touchscreen, quite another thing when problems become bigger and more complex.

AI might be used for self-driving cars some day, but the algorithm to do so would need to consider a vast array of possibilities in order to navigate a vehicle through city streets, and the stakes are much higher because a mistake could kill somebody.

The big, ambitious ideas for AI, such as self-driving cars or robots that make better stock picks, tend to be the ones where marketing hype and grandiose claims attract investment dollars and customer interest. But those problems are difficult to solve and require enormous amounts of data.

The sci-fi vision of artificial intelligence, while good at attracting attention, misses the mark, because it makes AI seem like something that hasn't yet proven its worth. Similarly, it's easy to think that AI is absent from the pandemic because it's not being used in spectacular ways.

Goldfarb said AI is already present in many of the tools being used to fight COVID-19, but it's embedded in larger technology systems.

Some thermal cameras and thermometers to test for fever have machine learning embedded in their software to give more accurate results, and can even aggregate anonymized data to predict future infection flare-ups.

The machine learning function makes the tools in those systems work a bit better, but it's not flashy enough to get the same marketing hype a robot would.

But, eventually, AI will become just a routine part of software development whenever there's a task that can use data for pattern recognition, said Wally Trenholm, chief executive of Toronto-based Sightline Innovation Inc. and a senior fellow at the Centre for International Governance Innovation.

Trenholm said deep learning will be embedded in everything and become so normal that nobody will even talk about it.

"I look at AI as kind of a multi-purpose technology, kind of like the databases of the 1970s," he said. "If you look at every piece of software right now, it's got a database in it, and probably 40 years from now, every piece of software will have AI in it."

The current pandemic might even accelerate the path to a future of ubiquitous AI.

Goldfarb said one of the side effects of the COVID-19 lockdown and the shift to remote work is that people are creating far more data than they were before.

The meeting that used to happen in an office conference room is now happening over Zoom, and in-person conversations between co-workers have shifted to Slack.

"The last few months have led to a massive digitization of work. A lot of things that used to happen either face to face or in ways that weren't recordable are now digitized," Goldfarb said. "Once information is digitized, you can use machine learning to help."

Already, as the pandemic stretches on past the initial crisis phase and becomes an ongoing challenge, scientists and technologists are finding ways to use data and neural networks to fight the disease.

In July, the University of Toronto highlighted the work of two researchers who are using deep learning to identify molecules from previous drug candidates and therapies that might work well to fight COVID-19.

Instead of taking a slow, methodical approach, they can use data to predict which potential drugs are the most promising, thereby speeding up the typical research process.

"We normally take a linear approach, going step by step, selecting a few candidate drugs or therapies and slowly moving them forward with testing over several years," Jean-Philippe Julien, an associate professor at the University of Toronto, said on the university's website.

"But now, with COVID, we all understand that this approach is not possible. Everyone accepts that we have to move much faster."

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