How artificial intelligence is key to tackling coronavirus and future health crises

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Health

Key topics

Artificial Intelligence, COVID-19

What we have learned about artificial intelligence (AI) and big data during the coronavirus (COVID-19) pandemic can be used for everything that comes next

This year we have witnessed an unprecedented global effort from both government and business to fight the COVID-19 pandemic. Even in wartime, when rationing was mandatory and industry was repurposed, initiatives were typically limited to individual countries. Today, global resources are scarce and deciding who and what gets priority has become a daily challenge.

The international crisis has reinforced the value of AI and big data in helping these decisions get made. Healthcare is a sector that has typically taken a cautious approach to adopting technology, but in mere months anonymised patient data, telehealth and other digital systems became a critical tool in combating the spread of the disease.

It is naïve to think there won’t be another pandemic. Fortunately, we’ve learnt a lot of valuable lessons about how to use AI and data to tackle future healthcare crises, and more.

Number-crunching

Even before COVID-19, many parts of the world’s healthcare systems were stretched to their limits due to a lack of resources. If you have ever called your local doctor’s office first thing in the morning to find all of the day’s appointments already full, you have experienced this first hand. Short of a massive increase in infrastructure and funding, healthcare services need to make better use of what they have available.

Many digital systems have been designed to solve these problems. Virtual triage systems categorise patients based on their symptoms in order to send them directly to where they can get the best help. If the most a doctor can do for a particular patient is direct them to a chemist for some paracetamol, it is better for everyone if the patient is sent directly there. Other telemedicine systems analyse data from at-home monitoring devices, allocating clinicians to patients who need their attention.

In addition to making efficient use of resources, these systems are a rich source of data. AI systems can use anonymised patient data to identify trends, outbreaks and other medical events in real time, meaning potential crises can be quickly addressed. If two dozen people living within a mile of one another report gastroenteritis symptoms when making medical appointments, local authorities might be alerted that a nearby restaurant could be selling contaminated food.

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For something like COVID-19, this kind of data is invaluable. If big data systems knew what to look out for, with very little warning they could be placed on high alert to look for potential outbreak locations. As numbers increased, industry could have been directed to focus on manufacturing the most critical supplies earlier. Perhaps, in an ideal world, everyone in the country could have been provided with a self-testing kit every week to both monitor their health and reveal how the virus is spreading.

Many of the systems that would be required to do this were built in the first half of 2020. Patients, as well as medical professionals, quickly embraced telehealth and other digital platforms. Data such as case numbers and contact tracing is now collected, shared and analysed to help authorities make informed decisions.

How we maintain these systems will be critical to the next pandemic. Fortunately, it is cheap and easy to have software sit idle. Even better would be if systems could always be operating in the background of the healthcare sector, looking for trends and ready to flag a potential issue the moment it appears.

> Making good, timely and informed decisions under pressure is the most important part of managing crises

The benefits of data analysis systems are not just limited to healthcare; similar systems could be used to address some of the other major challenges the world faces. Data is the driving force behind efforts to combat both climate change and COVID-19.

The next wave

The missing piece of the puzzle in both is coordination – both at local and global levels. The success we've seen during the pandemic should be a template for future climate science projects.

Work on this is already well underway. Imperial London, for example, has already found some success in applying data-driven research to climate events. The Engineering and Physical Sciences Research Council's Centre for Doctoral Training in the Mathematics of Planet Earth (MPE) looks at how models can be used in long-term climate prediction and extreme weather events. Between MPE, and Imperial's Data Science Institute and Infectious Disease Epidemiology department, there exists a great opportunity for collaboration on strategies to combat future healthcare, and other, events.

There are many social and political barriers to this, such as data privacy and transparency between governments, but the potential benefits are massive. Making good, timely and informed decisions under pressure is the most important part of managing crises, and better use of data will become even more important in the future.

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Alex holds an advisory position linked to the Business Analytics MSc and is an occasional guest lecturer for Executive Education. He also works as a quantitative analyst for the financial industry. He was previously a Data Scientist and Senior Teaching Fellow at Imperial College Business School.

Any opinions expressed in this article are his own and do not reflect the views of his current or past employers.

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Alfonso is an experienced Fractional CTO, offering consulting services to cutting edge startups and scale-ups. He is currently one of the Module Leaders in the Business Analytics MSc course at Imperial College Business School.

After completing a BSc in Aerospace Engineering in the US, Alfonso came to the UK where he completed and MSc and a PhD in Computational Fluid Dynamics at the University of Leeds. What followed was a long a varied sequence of technology related roles in companies such as Sony, Avanade, Amazon.

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