



modis

Tech warfare:

The impact of AI
on COVID-19



A note regarding this report:

Information being released to market about the use of AI in fighting COVID-19 is constantly evolving. The information contained in this report is current at the date of publishing.

Boston 2019. On October 30th, the international pandemic alarm bell was rung by artificial intelligence. It wasn't a human that first alerted authorities, it was the data-mining program: Healthmap. Boston Children's Hospital uses this program to scan the internet for any signs of dangerous outbreaks across the globe. As you know, the outbreak began in Wuhan, China. Healthmap spotted a news report that a new type of pneumonia had left seven people in critical condition.

Moving forward to early 2020, AI had more news for us. The British start-up Exscientia and Japanese pharmaceutical firm Sumitomo Dainippon Pharma create the world's first AI drug. Machine learning was used to create a molecule that will be used in human trials. The treatment is for obsessive-compulsive disorder (OCD), but the tech-medical community is applying the same AI-powered approach to a vaccine for COVID-19.





Vaccines

Normally, it takes around five years for a drug to go to trial, but the AI drug went through in just 12 months. The molecule known as DSP-1181, is the product of the most advanced medical research on the planet. By the end of this decade, there is the potential for all new drugs to be created by AI.

The COVID-19 alarm was raised by AI and it is likely to be silenced by it. These developments affect all of us. The topic now turns toward prediction. In the future, it will be normal for every household to have a computer powered by quantum mechanics. We already have an AI system – named SchNorb – that is probing the quantum behaviour of molecules.

This will help scientists to develop new pharmaceuticals far faster than previous chemist-assisting technology. Prediction is at the epicentre of the fight against the pandemic, and the world is already seeing results. It's unlikely that we'll see a vaccine in less than 18-24 months' time, but AI is being used in the following ways:

- Antibody development
- Existing pharmaceutical compound repurposing
- Vaccine design for both current and future coronavirus outbreaks



Collaboration

AI will close the pandemic loop and it will be a global solution. It's unlikely that the solution will come from one person alone, but from human-machine collaboration. In March 2020, Microsoft established the C3.ai DTI Digital Transformation Institute. Their mission is to improve the understandings, applications, and innovations of AI within all levels of society, industry and commerce.

The institute is attracting world-leading scientists, and is catalysing the advancement of computing research, machine learning, AI, mathematics, and all areas of the digital landscape. The pandemic has created more partnerships across multiple industries than ever before, and this is pioneering the new normal.

Collaboration is king in the post-pandemic world. An estimated 200 million people will lose their jobs in the current crises and connecting with the right networks is vital. New infrastructures are being built every day, and our network of over 18,000 consultants are here to make sure you have access to the connections you need. The core technologies of the 4th industrial revolution such as cloud computing, the Internet-of-Things (IoT), and blockchain, are always searching for new talent. COVID-19 has disrupted the world of work, but Modis is helping people to fight back with opportunities in the tech industry.



Tracking

By May 11th, 2020, 3.3 million people had downloaded the COVID-19 Symptom Tracker app. The app was developed by researchers from King's College London, health science company ZOE, and Massachusetts General Hospital. The app uses data from the COVID Study app to predict infection. It compares traditional testing results with normal symptoms and can help populations where there is less access to testing.

First, a mathematical model was created that could predict with nearly 80% accuracy the likelihood that a person has the virus. The importance of this approach is that it was personalised. The app considers age, sex, and the combination of four main symptoms: severe or persistent cough, loss of smell or taste, skipping meals, and fatigue. This research alone overthrew a common belief that fever is the main predictor of the virus. Instead, we can see that anosmia (loss of taste and smell) has a higher likelihood of predicting a positive case.



Testing

The issue of testing is controversial. In the standard diagnoses of coronavirus, a SARS-CoV-2 virus-specific test is used. The issue is that it can take up to two days to complete. Chest computed tomography (CT) is also a key part of the process. Studies are also showing that AI can have an even more proficient level of diagnostic accuracy than a senior medical professional (Nature Medicine, 2020). This compounds the issue because it links to the inevitable effect of digital automation. The good news is that the triage of modern approaches is also leading to collaboration, which can improve medicinal practices, and lower the costs of carrying out essential tests.





Predicting

The complexity of testing and tracking the virus comes second to predicting its behaviour. Ryan Tibshirani, a professor of machine learning at Carnegie Mellon University, explains why forecasting the virus' behaviour beyond four weeks is best avoided. This is for statistical and political reasons. Because global policies change daily, it's impossible for one forecasting hub to incorporate the necessary data. This is a central limitation, and why international cooperation is essential. However, the tech landscape already has a solution: social media.

Johannes Eichtaedt, an assistant professor of psychology at Stanford University has a decade of experience analyzing trends in social media. He has analyzed over 2 million recent COVID-hashtag tweets in combination with other traditional census data. Preliminary findings show a direct link between education, information-seeking, and the well-being of that demographic. This correlation comes as a surprise to no one. But what we see here is the transparent interconnection between academia and public sector data. Far from trivial, this data is impacting global policy.

When you look at the drastic difference in the spread of the virus in different demographics, you can see why so many AI hubs are focused on assimilating social media data and presenting it to the public sector as a progressive asset. Finland is renowned for having one of the lowest numbers of cases. Only around 4,000 in total. The death-rate is among the lowest in Europe – 320, as of May 30th – and this is opening the door to Big Data consultants. The Nordic country was the first to classify social media influencers as essential workers in the economy, and the tech community knows that this pattern will prevail throughout the world.



Innovation

Any specialist, knowledge-worker, or hard-driven professional knows about the difference in neurological response between facing a challenge voluntarily, or involuntarily. Medical research has proven that if it is involuntary, cortisol (the stress hormone) levels are raised. If it is voluntary, the levels of cortisol are lower, and the brain uses a different adaptive system. The COVID-19 pandemic influences both systems. The pilot study in Italy on March 12th is a prime example of this. When faced with the pandemic, Italian physicians worked with BenevolentAI, an AI and computational medicine technology company based in the UK.

On February 4th, researchers from both teams published their findings regarding the use of a drug called baricitinib. The drug was originally designed to treat rheumatoid arthritis. Many questions surround the potential use of the drug as a coronavirus treatment, but accelerated clinical trials are now being carried out in Italy, Canada, and other countries. The chief executive of BenevolentAI, Baroness Joanna Shields, spoke with Peter Richardson, their vice president of pharmacology, and asked if they could explore its possible uses.

\$292 million has been invested from the Singapore sovereign wealth fund Temasek, Goldman Sachs, and other interested parties. They've spent years creating technology that can mine vast amounts of academic research, and AI is at the heart of the process. More than 100 coronavirus-focused experiments are being carried out in the US alone, and drugs like baricitinib are undergoing rigorous testing. Investment in AI has increased exponentially. Startups involved in AI drug development received \$1.4 billion in 2019, increasing on \$921.5 million from 2018. Investment is still soaring, and 2020 is set to break new records.





The future

If a programme is worked on by more than one developer, there are always minute changes. Improvements, changes, and even 'typos' change how it functions. This mirrors how a virus adapts, and AI is also being used in the study of genomics: the study of the genetic material within an organism. As we speak, over 16,000 viral samples of the virus are being analyzed. Only with the power of AI and machine learning can we analyze the vast amounts of data in the genome sequence, fast enough to keep up with COVID-19's 'typos' – as it passes from one host to another – and its mutations continue.

In short, the solution is data-driven. Instead of human-based hypothesizing about which genes are involved in a virus' behaviours, the entire genome is mapped. SOPHiA GENETICS, the Swiss health-tech company, created an AI-based programme that analyzes COVID-19 in this way. The list of organisations – both public and private sector – cooperating and working towards a solution increases daily.

The 4th industrial revolution is driving the need to work with the right people. The new normal is here, and it's up to you how it's shaped. If you would like to find out which opportunities are at the forefront of the digital age, our team is ready to introduce you.



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