What if we could fight coronavirus with artificial intelligence?

Analytics have changed the way disease outbreaks are tracked and managed, thereby saving lives. The international community is currently focused on the 2019-2020 novel coronavirus (COVID-19) outbreak, first identified in Wuhan, China. As it spreads, raising fears of a worldwide pandemic, international organisations and scientists are using artificial intelligence (AI) to track the epidemic in real-time, to effectively predict where the virus might appear next and develop an effective response.

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On 31 December 2019, the World Health Organization (WHO) received the first report of a suspected novel coronavirus (COVID-19) in Wuhan. Amid concerns that the global response is fractured and uncoordinated, the WHO declared the outbreak a public health emergency of international concern (PHEIC) under the International Health Regulations (IHR) on 30 January 2020. Warnings about the novel coronavirus spreading beyond China were raised by AI systems more than a week before official information about the epidemic was released by international organisations. A health monitoring start-up correctly predicted the spread of COVID-19, using natural-language processing and machine learning. Decisions during such an outbreak need to be made on an urgent basis, often in the context of scientific uncertainty, fear, distrust, and social and institutional disruption. How can AI technologies be used to manage this type of global health emergency, without undermining protection of fundamental values and human rights?

Potential impacts and developments

In the case of COVID-19, AI has been used mostly to help detect whether people have novel coronavirus through the detection of visual signs of COVID-19 on images from lung CT scans; to monitor, in real time, changes in body temperature through the use of wearable sensors; and to provide an open-source data platform to track the spread of the disease. AI could process vast amounts of unstructured text data to predict the number of potential new cases by area and which types of populations will be most at risk, as well as evaluate and optimise strategies for controlling the spread of the epidemic. Other AI applications can deliver medical supplies by drone, disinfect patient rooms and scan approved drug databases (for other illnesses) that might also work against COVID-19. AI technologies have been harnessed to come up with new molecules that could serve as potential medications or even accelerate the time taken to predict the virus's RNA secondary structure. A series of risk assessment algorithms for COVID-19 for use in healthcare settings have been developed, including an algorithm for the main actions that need to be followed for managing contacts of probable or confirmed COVID-19 cases, as developed by the European Centre for Disease Prevention and Control.

Certain AI applications can also detect fake news about the disease by applying machine-learning techniques for mining social media information, tracking down words that are sensational or alarming, and identifying which online sources are deemed authoritative for fighting what has been called an infodemic. Facebook, Google, Twitter and TikTok have partnered with the WHO to review and expose false information about COVID-19.

In public health emergency response management, derogating from an individual's rights of privacy, non-discrimination and freedom of movement in the name of the urgency of the situation can sometimes take the form of restrictive measures that include domestic containment strategies without due process, or medical examination without informed consent. In the case of COVID-19, AI applications such as the use of facial recognition to track people not wearing masks in public, or AI-based fever detection systems, as well as the processing of data collected on digital platforms and mobile networks to track a person's recent movements, have contributed to draconian enforcement of restraining measures for the confinement of the outbreak for

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unspecified durations. Chinese search giant Baidu has developed a system using infrared and facial recognition technology that scans and takes photographs of more than 200 people per minute at the Qinghe railway station in Beijing. In Moscow, authorities are using automated facial recognition technology to scan surveillance camera footage in an attempt to identify recent arrivals from China, placed under quarantine for fear of COVID-19 infection and not expected to enter the station. Finally, Chinese authorities are deploying drones to patrol public places, conduct thermal imaging, or to track people violating quarantine rules.

Anticipatory policy-making

As a governance system, the WHO has limited enforcement tools, whereas its surveillance system is fully dependent on states' willingness to meet their good-faith reporting requirements. However, reporting compliance remains low, raising questions about the ability of low and middle-income countries (LMICs) to meet IHR obligations in the absence of adequate resourcing and financial support and about the effectiveness of the main legal framework of 'essential' capacities required by nations to prevent, detect and rapidly respond to public health threats. However, AI technologies have the potential to challenge the state's monopoly of information control and operationalise the WHO's right to receive reports from non-state sources, particularly if and when those reports contradict reports provided by the state.

The development of vaccines and drugs in response to public health emergencies also presents particular legal and ethical challenges. The European Commission and the European Medicines Agency have put procedures in place to speed up the assessment and authorisation of vaccines for use during a public health emergency, either via the pandemic preparedness vaccine marketing authorisation or the emergency procedure. The EMA recently activated its plan for managing emerging health threats, whereas the Commission and the Innovative Medicines Initiative (IMI) launched fast-track calls for proposals for the development of therapeutics and diagnostics to combat COVID-19 infections. Using the paragraph 6 system, provided by the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), countries are allowed to import cheaper generics made under compulsory licensing if they are unable to manufacture the medicines themselves. Adopting measures to counteract the potentially adverse health impact of IP protection and sharing preliminary research results with all actors in the response is a crucial component of any integrated global alert and response system for epidemics that aims at making the benefits of research available to the local population without undue delay. AI's capacity to quickly search large databases and process vast amounts of medical data can essentially accelerate the development of a drug that can fight COVID-19 but also raises questions about the criteria used for the selection of the relevant data sets and possible algorithmic bias. Most public health systems lack the capacity to collect the data needed to train algorithms that would be reflective of the needs of local populations, take local practice patterns into account and ensure equity and fairness.

As public health emergencies can be deeply socially divisive, stretch public-health capacities and limit rights to privacy and informational self-determination, it is important for policy-makers to rationally consider the ethics of their crisis-management policies. Although the Siracusa Principles may allow for the provision of limitation, or derogation, from the International Covenant on Civil and Political Rights (ICCPR), confining the outbreak of a lethal disease in emergency contexts should be ethically justifiable, necessary and proportionate. In all cases, least liberty-infringing alternatives should be used to achieve the public health goal. The WHO guidance for managing ethical issues in infectious disease outbreaks and the guidance on ethical issues in research in global health emergencies could help to ensure appropriate ethical oversight and collaboration, to help combat social stigmatisation of those affected, or perceived to be affected, by the disease.

However, given the absence of a comprehensive human rights framework that would underpin effective outbreak surveillance at the international level, the management of the risks associated with infectious diseases is likely to remain an ongoing challenge for global health governance. The massive use of AI tracking and surveillance tools in the context of this outbreak, combined with the current fragmentation in the ethical governance of AI, could pave the way for a wider and more permanent use of these surveillance technologies, leading to a situation known as 'mission creep'. Coordinated action on inclusive risk assessment and strict interpretation of public health legal exemptions, such as that envisaged in Article 9 of the General Data Protection Regulation, will therefore be key to ensuring the responsible use of this disruptive technology during public health emergencies. Accordingly, preventing AI use from contributing to the establishment of new forms of automated social control, which could persist long after the epidemic subsides, must be addressed in ongoing legislative initiatives on AI at EU level.

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