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Covid-19 and AI: Unexpected challenges and lessons

Benjamin Guedj

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On May 21st, 2021, we held the webinar "Covid-19 and AI: unexpected challenges and lessons". This short note presents its highlights.

Organisers

Organised by the French Embassy to the UK and its Department of Higher Education, Research and Innovation (**Dr. Minh-Hà Pham**, Councillor for Science and Technology; **Dr. Rachel Millet**, Scientific attachée; **Elise Martin** and **Anna Metcalfe**, interns), in partnership with the Franco-British Data Society (FBDS; **Michael Butcher**, president; **Anne Bioche**, secretary) and the Inria London programme (**Dr. Benjamin Guedj**, scientific director), a joint venture between Inria (**Dr. Cécile Vigouroux**, head of International relations; **Laura Norcy**, International partnerships officer) and University College London (UK).

Context and links. The webinar was the second event of the Amba-Series on Science and Policy, led by the French Embassy to the UK and its Department of Higher Education, Research and Innovation. The recording can be found here: <https://www.youtube.com/watch?v=rVNPTdduI40> and this note is hosted on the official webpage for the webinar: <https://uk.ambafrance.org/Webinar-Covid-19-AI-Unexpected-challenges-and-lessons>

We assembled a diverse panel of speakers from France and the UK, to cover aspects of AI research contributions and institutional responses to the pandemic.

- **Prof. Geraint Rees**, Professor of Cognitive Neurology at University College London (UCL), Dean of the faculty of Life Sciences and Pro-Vice-Provost for Artificial Intelligence – as such, Geraint oversees the global AI strategy for UCL and how UCL engaged with the public debate on AI during the pandemic.
- **Dr. Emilie Chouzenoux**, Researcher at Inria in applied mathematics and an European Research Council grantee. Emilie has been involved in a successful collaboration with French hospitals in Paris to assess the severity of Covid-19 cases.
- **Dr. Hugues Berry**, Research Director at Inria in computational biology and adjunct to the vice-CEO for science, for the themes "digital health and biology". Hugues has been the co-director of the Covid 19 task force at Inria which oversaw the many projects the institute has put forward since the beginning of the pandemic.

- **Prof. Mihaela van der Schaar** is the John Humphrey Plummer Professor of Machine Learning, Artificial Intelligence and Medicine at the University of Cambridge, a fellow of the Alan Turing Institute and a Chancellor’s Professor at UCLA. Mihaela is the founder and director of the Cambridge centre for AI in Medicine.
- **Dominic Cushman**, AI Imaging Lead at NHSX. Dominic has led the NHS AI Lab through the early days of the pandemic including setting up the National COVID-19 Chest Imaging Database and the subsequent Imaging for AI programme which he now leads, along with its strategic policy.
- **Dr. Benjamin Guedj**, Researcher at Inria and Principal Researcher at UCL, *chairman*.

The 90 minutes webinar was divided in three parts: each speaker first presented their views on how AI has been used to fight the pandemic. We then started a general panel discussion, followed by Q&A with the audience (over a hundred attendees).

Highlights. The Covid-19 pandemic has profoundly disrupted hundreds millions of lives in the past 18 months or so, and we certainly are not over with it yet. The panel discussed the many faces of Artificial Intelligence (AI), which has been put to test immensely in the period to adapt our societies. To name but a few examples, the very fact that we hold meetings and webinars online, are able to communicate and connect across time and space in a way that was not so widespread before the pandemic (that is underpinned, of course, by load balancing algorithms, non stationary noise detectors to filter out the sound of dogs barking or domestic noise, etc.), our groceries being delivered by routes that are planned through AI. The scale of these changes truly is unprecedented in such a short amount of time.

AI has also been used more directly in connection to the actual medical response to the pandemic, including (but not limited to) gene sequencing, clinical trials, vaccine development. The panel discussed specific examples, such as predicting the severity of Covid-19 cases using artificial intelligence methods (*e.g.*, image segmentation for identifying lung lesions possibly linked to severe Covid-19 forms) for multimodal datasets (leveraging CT scans, medical imaging, clinical and biological data for about a thousand patients, over the course of a few weeks). Other examples include forecasting attendance to medical or vaccine appointments, or machine-learning based warning systems for hospitals through NHSX (to facilitate diverting staff, beds, or equipment such as oxygen and ventilators, to adjust in real time to the dynamics of the pandemic).

What has been revealed by the pandemic, and how it caught most of the world by surprise in early 2020, is how healthcare systems in Europe and in the world were relatively poorly connected and little equipped with electronic health record systems, which made collecting and sharing data¹ across countries challenging. As the response to the pandemic must be global, the need for global health data collection² and processing is even more pressing. The corollary is the necessity to train new generations of scientists who can combine a deep understanding of both healthcare and AI – urging higher education bodies to take part in the long-term effort against the pandemic, and the inevitable next ones.

¹Raising multiple issues, as interoperability, lack of data reporting standards, data privacy, weakly supervised (if any) data, legal mechanisms to outsource data for collaborative research globally, to name but a few.

²A lot of data, telling a little bit about a very large number of citizens, was already collected before the pandemic, although some of the most relevant features to fight the virus (concerning only a rather limited number of individuals) were only collected after March 2020.

Catalysing research ecosystems (including universities, research institutes, and the private sector) is key, as was shown by the example of Inria in France, which diverted many of its resources (and involving about 300 researchers) as early as March 2020 to create task forces of researchers and engineers: one of the flagship project being the test and trace app, released on June 2nd, 2020. The collaborative nature of all the contributions discussed by the panel was striking.

The use of AI algorithms to empower policy makers also represents a significant contribution discussed by the panel: addressing "what if" scenarios, as for when to enforce or lift lockdowns and model its (many) consequences, on the propagation of the virus but also in terms of economic impact, school closures, across a large number of countries. Science and scientists have been put in the spotlight – this prominent position in the public debate and along policy makers and global leaders might very well be unprecedented in recent history³. Certainly an opportunity not to be missed, to make science more accessible to citizens.

Last but not least, the panel also discussed the need for interpretable and trustworthy predictions, and more broadly for reproducible science – a central problem in machine learning and AI, even more pressing when applied to healthcare. Enabling humans to understand decisions suggested by machines, but also decisions made by humans. Ultimately, establishing machine learning and AI as forces for good, allowing to design fair algorithms to make fair decisions, even when based on unfair data.

While the panel discussed evidence that AI has been deployed, extremely quickly and on a spectacular global scale, to both fight the pandemic and help adapt our societies to emerging constraints, this probably is only the beginning of a global, hopefully coordinated (with a centralised leadership) network of actions, which will transform healthcare as we know it. Science is the only exit strategy: while citizens have played an enormous role in terms of helping out with compliance with national lockdowns and general guidelines, and international travel restrictions, the way out of this pandemic is vaccine development, clinical trials to discover or disprove treatments, gene sequencing to trace variants of the family tree of mutations. All of these are produced by scientists working with policymakers in an unprecedented effort in terms of speed, cooperation and togetherness, produced by a common external threat. Many other external threats are present (an obvious example being climate change, and its devastating consequences) and the panel concluded on the hope that the past 18 months or so somehow set a precedent for scientists and policymakers working together with citizens. It is about collaboration across disciplines, boundaries and countries, and across policy and science.

Get in touch! If you have questions or remarks on the webinar or future events, please [drop us a line there!](#)

³Also putting in the public eye than debate is consubstantial to scientific progress – as exemplified by a few controversial discussions in global media.