AI and Data Governance issues in responding to COVID-19: A Briefing

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1. How AI and data technologies are aiding pandemic prevention and control

AI and data-driven technologies have the potential to support pandemic prevention and control at many stages, including **improving response and recovery for COVID-19**:

- They can help with **early detection of disease** and its spread as well as informing prioritization of mitigation strategies by modelling their effectiveness under different assumptions:
  - BlueDot, an AI system, designed and supervised by human epidemiologists, provided one of the first warnings of a disease outbreak in Wuhan by analyzing patterns in hundreds of thousands of ordinary language sources and detecting a cluster of unusual pneumonia cases near a seafood market in the Hubei province on December 31st 2019.[1]
  - BlueDot also used airline ticketing data to anticipate the spread of the disease across East Asia
  - Researchers from the same team previously used data-driven approaches to anticipate the international spread of the Ebola and Zika viruses and the model for Ebola spread correctly anticipated the potential efficacy of air travel restrictions and airport-based screening
- They can **aid with virus containment**:
  - AI can help contextualize public health messaging to increase patients' engagement and adherence
  - Several countries have implemented data-based 'contact tracing', which is likely an effective way to control the spread of COVID-19.[2] For example, South Korea is combining data from CCTV, cellphones, and credit cards to track everyone testing positive;[3] Singapore has an online dashboard displaying information on all confirmed cases;[4] Israel plans to redeploy counterterrorism technologies to identify potential carriers.[5]
- They can aid the **medical response to pandemics**:
  - AI can improve the accuracy and efficiency of resource allocation and diagnosis in a range of disease contexts.
  - AI approaches are being explored for prioritizing healthcare resources in response to COVID-19, including optimizing the allocation of ventilators, hospital beds, and medical staff;[6] predicting which patients are most likely to become critical;[7] and forecasting infection spread.[8]
  - Several research papers suggest that AI may facilitate COVID-19 diagnosis from X-rays and CT scans.[9,10]
  - AI also holds promise for vaccine and drug development.[11,12]
- They also have numerous **non-medical applications**:
  - AI can be used to combat misinformation about COVID-19 on-line.
  - Singapore, Taiwan, and Hong Kong, are building systems and tools for ongoing monitoring of key information, including healthcare and location data, to ensure better preparation for similar situations in future.

This is far from a comprehensive list, but gives a sense of the diversity of ways AI and data technologies might be used.

2. Key governance issues raised by these technologies

As well as having direct benefits, the increased use of AI and data technologies could **increase social understanding** of their benefits and **public trust** in them. However, the speed at which new technologies are being considered and implemented raises a number of concerns.

- There is a risk of **over-relying on AI** systems without sufficiently understanding and accounting for their limitations. Most modern AI systems are based on, or incorporate, Machine Learning (ML), which involves using (often large amounts of) data to optimize the parameters of a mathematical model to solve a problem. This faces the same limitations as modelling more generally, with seemingly small errors in models able to have large consequences. [13]
  - It is believed that the mathematical models leading to the policy of "contiguous culling" to tackle the UK's 2001 foot and mouth outbreak, which had many devastating agricultural, economic and social consequences, were based on flawed parameters and data.[14] This kind of error might be exacerbated in uncritical applications of ML systems since they are harder to subject to detailed expert scrutiny.

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- *The government was heavily criticized for ignoring well-established public health expertise in favour of models built on simplified assumptions*.[15,16] Experts warned of the need for greater openness and transparency about these models and assumptions, especially prior to the shift in COVID-19 response strategy on March 17th[17]

- ML systems are also **limited by the data they are trained on**, which may be partial and context dependent. Since viruses have differential impacts across demographic groups; if data is lacking on some parts of the population, risk analysis and medical advice may be inaccurate for those groups.
  - For instance, relying on smartphone data to trace contacts may disadvantage people who do not use smartphones, who are disproportionately likely to come from vulnerable groups such as the elderly.
  - This problem is exacerbated by differences in testing and recording COVID-19 cases across health authorities. *The government should be working to produce international (or at least national) standards for this*.
- AI systems may **unjustly impact some of those they are meant to help**. For instance, many systems manifest the implicit value judgements of their designers about the ethical worth of a course of action.[18]
  - Reasonable people disagree about the acceptability of prioritizing care based on patient's likelihood of recovery. However, AI systems designed to optimize the allocation of resources must implicitly assume this; if they are not constrained from removing all care from patients least likely to recover then they will do so.
  - *The government should make these value judgements as explicit and transparent as possible*, so that they are open to public scrutiny and legitimation through appropriate institutions.
- AI's can also come to **reflect wider social biases and prejudices** in ways that even their designers did not intend
  - AI systems depend on data infrastructure - the collection, storing, preparing, and processing of data for their training and use. This infrastructure is often influenced by social biases and blind spots that can result in inaccurate perceptions or recommendations that reinforce existing inequalities. [19,20]
  - Hence, transparency, on its own, may not guarantee fairness, and *the government needs to actively assess the differential impact of AI systems on individuals and groups to understand their full social impacts*.
- The use of AI and data in the response to COVID-19 may **compromise data privacy and civil liberties**, with activists, ethicists, journalists and others raising the alarm in the UK,[21] USA[22] and EU.[23]
  - AI systems rely on collecting and processing large amounts of data, including private or personal data such as electronic health records or smartphone data. This data may facilitate further privacy infringements.
  - In South Korea, smartphone tracking has been used to share details of people infected with COVID-19's movements alongside personal information, which has caused people to be publicly identified and shamed[24]
  - Some countries may be using the current outbreak as an excuse to legitimize tools of oppression.[25] Many *countries rely on private companies to collect data and build systems, some of which (such as Palantir) have poor records in data ethics and privacy* while past disease outbreaks have resulted in well-documented cases of mismanaged and illegal data sharing.[26]
- Underpinning these concerns is uncertainty about the long-term impacts of AI systems, how we can ensure that robust surveillance systems and data analytics tools developed are only used to manage the COVID-19 outbreak, and whether **governments will be tempted to use them for other purposes**?[27,28]
  - Even if tools are well managed and constrained, the numerous interconnections between AI systems and the data they use mean that once people's private data has been accessed by one system, this can have substantial impacts on future systems, and how they interact with these people and their societies, for a very long time.
  - *Using open source code and ensuring a public right of explain ability for how people's data is being used* are key to addressing this uncertainty.

3. Specific concerns and recommendations regarding the NHS contact tracing app

- The UK is developing a contact-tracing app.[29] **It is possible to build such an App in way that protects people from COVID-19 without losing control of their personal data**; however, there is no evidence the government is doing this.
  - Decentralized Privacy-Preserving Proximity Tracing (DP^3T) was developed by a team of experts across Europe, and has made a lot of headway in developing solutions that respect privacy without compromising contact-tracing. *They have produced reference implementations that the governments could be using*, with software development kits for Android and iOS and a white paper[30]

- *The government needs to tell the public where they can scrutinise the code for their app* as there is no good reason to keep this secret. This has already been done by the government of Singapore. Matt Hancock has promised he will be "publishing the source code" – Where? When? Will this be just for the app, or the code on the server as well?
- *It is also important that this app only harvests data that is required for its core purpose*. If it is just a contact-tracing app, then experts agree that this can be in secure ways without sharing data, e.g. using bluetooth.
- *The government should take advantage of global efforts in this space*, such as DP^3T or Singapore's open source contact-tracing app (although this doesn't yet meet the requirements of DP^3T).

- The government is seeking to frame discussions about their app in terms of the need to sacrifice liberty to protect lives. However, **it is possible to implement technical solutions to contract tracing that do not require this sacrifice to be made**.

4. Broader Governance Proposals

In recent years, various principles, frameworks, and guidelines have been published for AI ethics.[31,32] These provide a **useful checklist that governments can use to consider potential risks when considering deploying new technologies**. However, ethical principles have their limitations in practice and may be too vague and high-level for this context[33]

A number of organizations have recently attempted to produce more concrete and specific **guidelines for how to balance the tension between the benefits and risks of surveillance technologies in pandemic prevention and control**, emphasizing the need for interventions to be evidence-based and proportionate.

- A rapid policy briefing from the **Nuffield Council on Bioethics** states that "interventions that interfere with personal liberties need to be carefully and transparently justified" and that the more intrusive an intervention, the stronger the justification and clearer the evidence required.[34]
- The importance of public communication and transparency, to build trust and hold governments accountable for their use of technology, is also crucial. **European Digital Rights** suggest that "all technical measures to manage coronavirus must be transparent and must remain under public control".[35]
- The **Electronic Frontier Foundation** similarly say that "any use of government big data must be quickly and clearly explained to the public, including what information is being gathered, its retention period, the tools used to process it, how they guide public health decisions....".[36]
- **Amnesty International** released a joint statement, signed by numerous civil society organizations, on the conditions governments must respect in order to ensure increased digital surveillance respects human rights.[37]
- Ensuring that additional surveillance measures are 'time-bound' by the circumstances that justify them, and will expire once life returns to normal, is also a key point across all these ethical guidance.

While such guidelines and statements deserve emphasis, they are not themselves sufficient to ensure the risks of using AI and data to fight pandemics do not undermine their potential benefits.

- To be enforceable, **guidelines need to be reflected in law and policy**. The European Parliament has recognized that "preventing AI use from contributing to the establishment of new forms of automated social control... must be addressed in ongoing legislative initiatives on AI at EU level." This could delay the implementation of these systems.
- The challenge also goes beyond data privacy, including many **technical problems with the use of AI systems that need to be resolved**, from biased data sets to networked interconnectivity.

What is needed are **adaptive AI governance institutions**, such as independent oversight bodies for quality control and risk assessment, convening experts in AI and public health with ethics, policy and risk assessment professionals. These would be responsible for rapidly and continually reviewing the evidence behind technological interventions, considering possible risks, and producing publicly available reports to ensure solutions are deployed responsibly. **If the government can quickly push through emergency legislation to expand its powers in times of crisis, it can quickly establish mechanisms such as these to ensure these powers are used responsibly, proportionately, and in ways that increase public trust in AI and data**.

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