Using artificial intelligence to help combat COVID-19

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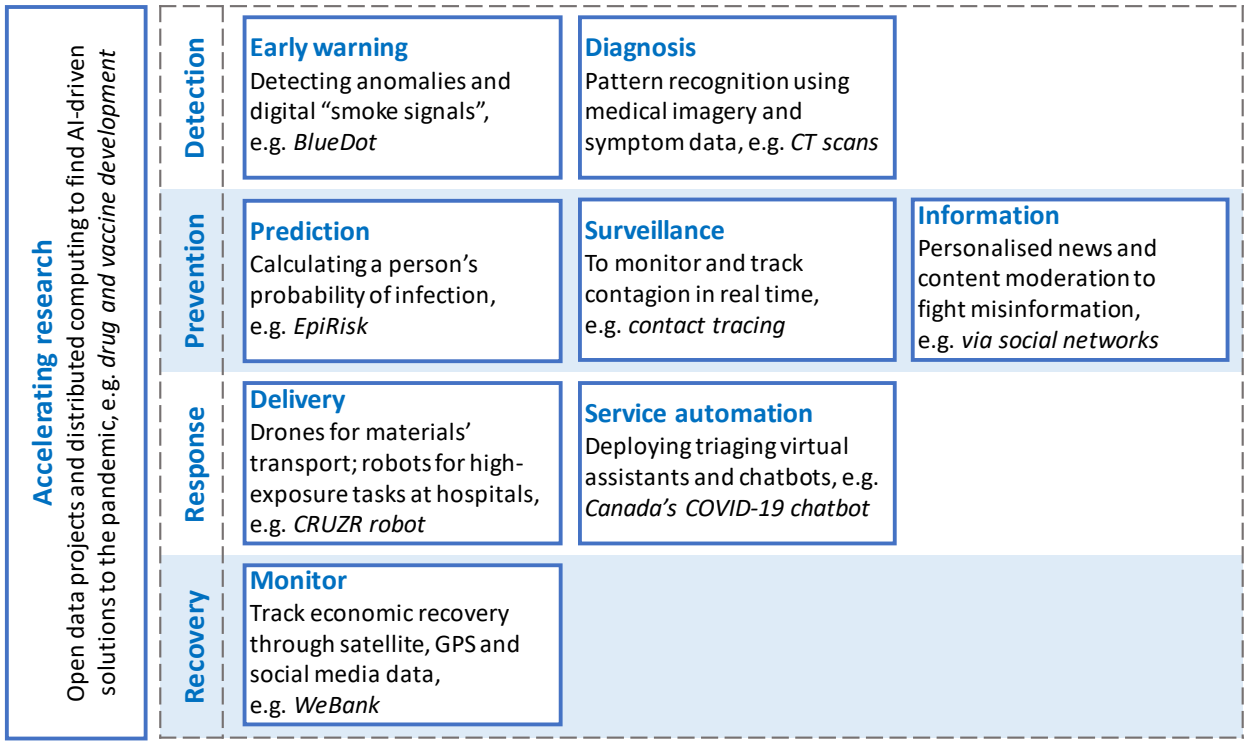
Key messages

- Today, AI technologies and tools play a key role in every aspect of the COVID-19 crisis response:
  - understanding the virus and accelerating medical research on drugs and treatments
  - detecting and diagnosing the virus, and predicting its evolution
  - assisting in preventing or slowing the virus' spread through surveillance and contact tracing
  - responding to the health crisis through personalised information and learning
  - monitoring the recovery and improving early warning tools.
- To help facilitate the use of AI throughout the crisis, policy makers should encourage the sharing of medical, molecular, and scientific datasets and models on collaborative platforms to help AI researchers build effective tools for the medical community, and should ensure that researchers have access to the necessary computing capacity.
- To realise the full promise of AI to combat COVID-19, policy makers must ensure that AI systems are trustworthy and aligned with the OECD AI Principles: they should respect human rights and privacy; be transparent, explainable, robust, secure and safe; and actors involved in their development and use should remain accountable.

Using artificial intelligence to detect, respond and recover from COVID-19

Before the world was even aware of the threat posed by the coronavirus (COVID-19), artificial intelligence (AI) systems had detected the outbreak of an unknown type of pneumonia in the People's Republic of China (hereafter "China"). As the outbreak has now become a global pandemic, AI tools and technologies can be employed to support efforts of policy makers, the medical community, and society at large to manage every stage of the crisis and its aftermath: detection, prevention, response, recovery and to accelerate research (Figure 1).

Figure 1. Examples of AI applications at different stages of the COVID-19 crisis



Accelerating research using AI to understand and treat COVID-19

AI tools and techniques can help policymakers and the medical community understand the COVID-19 virus and accelerate research on treatments by rapidly analysing large volumes of research data. AI text and data mining tools can uncover the virus' history, transmission, and diagnostics, management measures, and lessons from previous epidemics.

- Deep learning models can help **predict old and new drugs or treatments** that might treat COVID-19. Several institutions are using AI to identify treatments and develop prototype vaccines. DeepMind and several other organisations have used deep learning to predict the structure of proteins associated with SARS-CoV-2, the virus that causes COVID-19.
- **Dedicated platforms or fora** allow the consolidation and sharing of multidisciplinary expertise on AI, including internationally. The US government for example has initiated a dialogue with international government science leaders that includes using AI to accelerate analysis of coronavirus literature made available using the Kaggle platform.

- **Access to datasets** in epidemiology, bioinformatics and molecular modelling is being provided, e.g. through the COVID-19 Open Research Dataset Challenge by the US government and partner organisations that makes available over 29 000 academic research articles for coronavirus and COVID-19.
- **Computing power** for AI is also being made available by technology companies such as IBM, Amazon, Google and Microsoft; individuals donating computer processing power (e.g. Folding@home); and by public-private efforts like the COVID-19 High Performance Computing Consortium and AI for Health.
- **Innovative approaches** including prizes, open-source collaborations, and hackathons, are helping accelerate research on AI-driven solutions to the pandemic. For example, the United Kingdom's "CoronaHack – AI vs. Covid-19" seeks ideas from businesses, data scientists and biomedical researchers on using AI to control and manage the pandemic.

Using AI to help detect, diagnose and prevent the spread of the coronavirus

AI can also be employed to help detect, diagnose and prevent the spread of the virus. Algorithms that identify patterns and anomalies are already working to detect and predict the spread of COVID-19, while image recognition systems are speeding up medical diagnosis. For example:

- AI-powered **early warning systems** can help detect epidemiological patterns by mining mainstream news, online content and other information channels in multiple languages to provide early warnings, which can complement syndromic surveillance and other healthcare networks and data flows (e.g. WHO Early Warning System, Bluedot).
- AI tools can help **identify virus transmission chains and monitor broader economic impacts**. In several cases, AI technologies have demonstrated their potential to infer epidemiological data more rapidly than traditional reporting of health data. Institutions such as Johns Hopkins University and the OECD (oecd.ai) have also made available interactive dashboards that track the virus' spread through live news and real-time data on confirmed coronavirus cases, recoveries, and deaths.
- **Rapid diagnosis** is key to limit contagion and understand the disease spread. Applied to images and symptom data, AI could help to rapidly diagnose COVID-19 cases. Attention must be given to collecting data representative of the whole population to ensure scalability and accuracy.

Limiting contagion is a priority in all countries and AI applications are helping prevent the virus' spread.

- A number of countries are using population **surveillance** to monitor COVID-19 cases (for example, in Korea algorithms use geolocation data, surveillance-camera footage and credit card records to trace coronavirus patients). China assigns a risk level (colour code – red, yellow or green) to each person indicating contagion risk using cell phone software. While machine learning models use travel, payment, and communications data to predict the location of the next outbreak, and inform border checks, search engines and social media are also helping to track the disease in real-time.
- Many countries, including Austria, China, Israel, Poland, Singapore and Korea have set up **contact tracing** systems to identify possible infection routes. In Israel, for example, geolocation data was used to identify people coming into close contact with known virus carriers, and send them text messages directing them to isolate themselves immediately.
- Semi-autonomous **robots and drones** are being deployed to respond to immediate needs in hospitals such as delivering food and medications, cleaning and sterilisation, aiding doctors and nurses, and performing deliveries of equipment.

How AI can assist the response to the crisis, and the recovery to follow

Conversational and interactive AI systems help respond to the health crisis through personalised information, advice and treatment, and learning.

- To fight **misinformation** – the COVID-19 "infodemic" – social networks and search engines are using personalised AI information and tools and relying on algorithms to find and remove problematic material on their platforms.
- **Virtual assistants and chatbots** have been deployed to support healthcare organisations, for example in Canada, France, Finland, Italy, the United States and by the American Red Cross. These tools help to triage people depending on the presence of symptoms. The United States' Center for Disease Control and Prevention and Microsoft have developed a coronavirus self-checker service to help users self-assess COVID-19 and suggest a course of action.
- Identifying, finding and contacting **vulnerable, high-risk, individuals**. For example, Medical Home Network, a Chicago-based non-profit, has implemented an AI platform to identify Medicaid patients most at risk from COVID-19 based on risk of respiratory complications and social isolation.
- AI may eventually play a role in accelerating training and education of healthcare personnel.

Finally, AI tools can help monitor the economic crisis and the recovery – for example, via satellite, social networking and other data (e.g. Google's Community Mobility Reports) – and can learn from the crisis and build early warning for future outbreaks.

Key recommendations

Governments and other stakeholders are encouraged to:

- Encourage multi-disciplinary and multi-stakeholder co-operation and data exchange both nationally and internationally by the AI community, medical community, developers and policy makers to formulate the problem, identify relevant data and open datasets, share tools and train models.
- Recognise that AI is not a silver bullet. AI systems based on machine learning work by identifying patterns in data, and require large amounts of data to find these patterns. The outputs are only as good as the training data, and in some cases, diagnostic claims have been called into question and some chatbots have given different responses to questions on symptoms.
- Ensure that AI systems are deployed responsibly and respect the OECD AI Principles. This is particularly true for temporary measures of population control and monitoring, as some AI systems raise concerns about purpose specification and the danger that personal data could be re-used in ways that infringe privacy and other rights.
- Develop and build upon AI-powered monitoring tools that enable research without sacrificing privacy.
- Learn from this wave of the pandemic to prepare for its likely reemergence. One measure is to commit to research on AI technologies that can learn from limited data, such as from patients with idiosyncratic conditions.

Further reading

Follow the latest COVID-19 developments in your country with real-time AI-powered news and data at www.oecd.ai/covid.

OECD (2020), "Ensuring data privacy as we battle COVID-19", OECD, Paris, https://read.oecd-ilibrary.org/view/?ref=128_128758-vfx2g82fn3&title=Ensuring-data-privacy-as-we-battle-COVID-19.

OECD (2020), *OECD AI Observatory*, website, OECD, Paris, https://www.oecd.ai/.

OECD (2020), "OECD monitor of science and innovation policy responses to the Covid-19 crisis", *STIP Compass*, edition 4/7/2020, OECD, Paris, https://stip.oecd.org/Covid.html.

OECD (2020), "Tracking and tracing COVID: Protecting privacy and data while using apps and biometrics", OECD, Paris, https://read.oecd-ilibrary.org/view/?ref=129_129655-7db0lu7dto&title=Tracking-and-Tracing-COVID-Protecting-privacy-and-data-while-using.

OECD (2019), *Artificial Intelligence in Society*, OECD Publishing, Paris, https://doi.org/10.1787/eedfee77-en.

OECD (2019), *Recommendation of the Council on Artificial Intelligence*, OECD, Paris, https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449.

OECD (2013), *Recommendation concerning Guidelines Governing the Protection of Privacy and Transborder Flows of Personal Data*, OECD, Paris, https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0188.

The OECD is compiling data, information, analysis and recommendations regarding the health, economic, financial and societal challenges posed by the impact of coronavirus (COVID-19). Please visit our dedicated page for a full suite of coronavirus-related information.