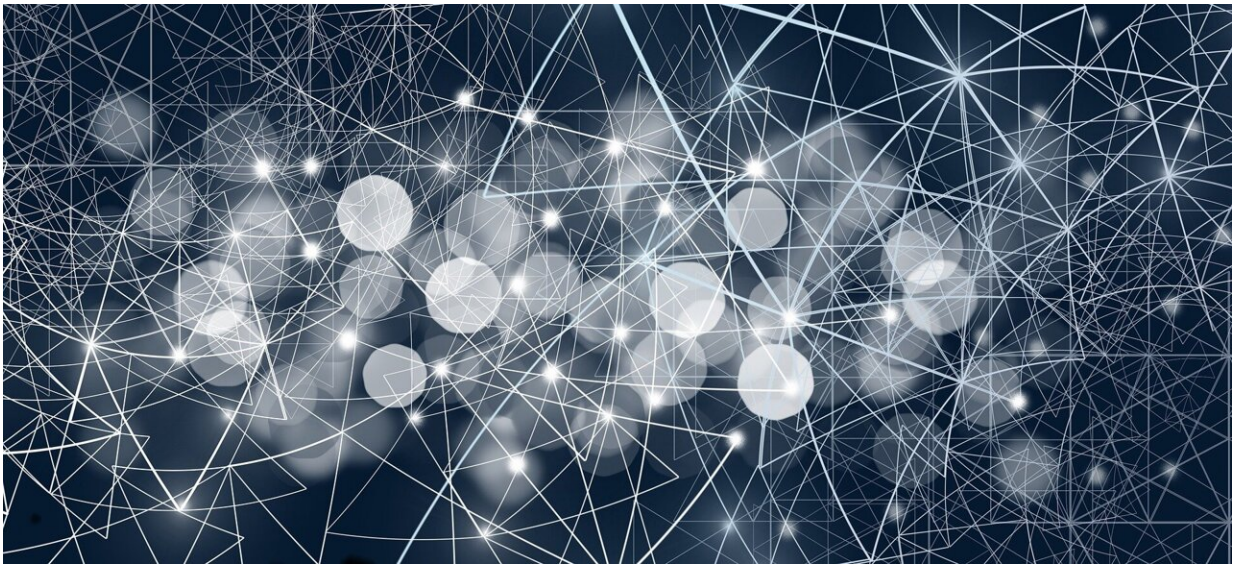


# Researchers develop an AI-powered surveillance system for future pandemics

March 1 2022, by Wendy Philpott

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Credit: Pixabay/CC0 Public Domain

Nobody wants to think about the next pandemic. But we need to be prepared, and a critical step in prevention is early detection and intervention.

That's why GoodLabs Studio, a company with strong ties to the University of Waterloo, is advancing the power of machine learning and artificial intelligence (AI) to alert health-care authorities with real-time, data-driven insights for decision-making to prevent a future pandemic.

In early 2021, Canada's Department of National Defense (DND) invited proposals for innovations that strengthen the response to future pandemics. GoodLabs, co-founded by Thomas Lo jumped on the opportunity and have since won two successive grants from DND to develop the Syndrome Anomaly Detection System (SADS).

SADS performs widespread disease monitoring to detect patterns of atypical disease across communities so that healthcare and policy leaders can act quickly.

"We've learned from COVID-19 just how fast-moving pandemics are, and therefore how valuable reliable data in real-time is for understanding risk," says Dr. Jean-Paul Lam of the Department of Economics, special advisor and team lead for AI outbreak detection on the project.

## **How SADS works**

It begins with a mobile app in a doctor's office or health care clinic. The SADS app uses natural language processing to anonymously capture symptoms described during the patient-doctor conversation. That data is then aggregated and categorized using deep language machine learning for the purpose of detecting increases in atypical symptoms within the population and evaluating risk of spread.

Of course, it's vital that the data collection and analysis do not compromise any patient's privacy. To maintain confidentiality, the team has deployed [natural language processing](#) (NLP) AI technology within the app rather than uploading the conversation data to the cloud. The patient's personal information is protected, and only the pertinent details—symptoms, age, gender, location—are collected and aggregated.

The SADS back-end platform uses machine learning analytics to code the symptoms according to the International Classification of Diseases

(ICD-10) and rank how typical or atypical they are. By tracking the atypical symptoms over time, SADS builds a statistical visualization representing how a novel disease might be spreading in a community. The system generates an alert with the key information about a potential outbreak and shares it in real-time with health and government authorities.

When the team ran a simulation of the COVID-19 outbreak in 2020 in several Canadian cities, they found that Toronto, for example, already had a detectable outbreak a full week before the city declared a lockdown. The simulation suggests that if SADS had been available at the time, a more proactive response would have been possible.

With the potential to aggregate [health data](#) generated around the world, SADS could be used locally, nationally and globally—certainly, that is the vision.

"We fundamentally believe there is an unbounded opportunity for positive impact," says Lo. "We aim to deploy the Syndrome Anomaly Detection System in hospital triages, clinics, telehealth and eHealth forums—a system that can provide authorized government and health entities early warning of the next pandemic and its spread pattern."

**More information:** [www.goodlabs.studio/](http://www.goodlabs.studio/)

Provided by University of Waterloo

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