AI could help doctors make the best use of ICU beds during the COVID-19 pandemic

December 6 2021

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New technology could help doctors make the most of limited resources during the COVID-19 pandemic by identifying patients who require intensive care unit (ICU) treatment.

The system, developed by researchers at the University of Waterloo and DarwinAI, an alumni-founded startup company, uses artificial

intelligence (AI) to predict the necessity of ICU admission based on more than 200 clinical data points, including vital signs, blood test results and medical history.

"That is a very important step in the clinical decision support process for triaging patients and developing treatment plans," said Alexander Wong, a professor of systems design engineering and Canada Research Chair in AI and Medical Imaging at Waterloo.

The new AI software was trained using data from almost 400 cases at Hospital Sirio-Libanes in Sao Paulo, Brazil, in which doctors had decided if COVID patients should be admitted for intensive care.

Based on lessons learned from that known data, the neural network developed by researchers can predict the need for ICU admission in new COVID cases with greater than 95-per-cent accuracy. It also identifies the key factors that drive its predictions to help give clinicians confidence in them.

Rather than replacing doctors, the technology is meant to arm them with a new tool to make faster, more informed decisions and ensure the patients most in need of intensive care receive it.

"The goal is to help clinicians make faster, more consistent decisions based on past patient cases and outcomes," said Wong, a director of the Vision and Image Processing (VIP) Lab at Waterloo. "It's all about augmenting their expertise to optimize the use of medical resources and individualize patient care."

Researchers have made the technology freely available so engineers and scientists around the world can work to help improve it.

They are now incorporating it into a larger clinical decision support

system, developed in their ongoing COVID-Netopen-source initiative, that also helps doctors detect COVID and determine its severity using AI analysis of medical images.

Wong collaborated on the ICU admission work with DarwinAI researchers Audrey Chung and Mahmoud Famouri and Andrew Hryniowski, an engineering Ph.D. student in the VIP Lab.

A paper on the research, COVID-Net Clinical ICU: Enhanced Prediction of ICU Admission for COVID-19 Patients via Explainability and Trust Quantification, is scheduled for presentation on December 10 during a workshop at the 2021 Conference on Neural Information Processing Systems, the largest AI conference in the world.

More information: COVID-Net Clinical ICU: Enhanced Prediction of ICU Admission for COVID-19 Patients via Explainability and Trust Quantification, arXiv:2109.06711 [cs.LG] arxiv.org/abs/2109.06711

Provided by University of Waterloo

Citation: AI could help doctors make the best use of ICU beds during the COVID-19 pandemic (2021, December 6) retrieved 10 May 2024 from https://techxplore.com/news/2021-12-ai-doctors-icu-beds-covid-.html