AI-powered Glaucoma Screening System Developed by Singapore Scientists

- Aineena Hani
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The complexity and rise of data in healthcare mean that artificial intelligence (AI) will increasingly be applied within the field. Several types of AI tools are already being used by patients and providers of care, as well as life sciences companies. Diagnoses and treatment recommendations, patient engagement and adherence and administrative activities are the most common types of applications. Although there are many cases where AI can perform healthcare tasks as well as or better than humans, implementation issues will prevent large-scale automation of healthcare professional jobs for a long time.

AI is becoming more sophisticated at doing what humans do, but more efficiently, quickly, and cheaply. Both AI and robotics have enormous potential in healthcare. AI and robotics are increasingly becoming a part of the healthcare ecosystem, just as they are in daily life.

Scientists from Singapore's Nanyang Technological University (NTU) and clinicians from Tan Tock Seng Hospital (TTSH) have used artificial intelligence to create a new method of screening for glaucoma. According to a joint news

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release from NTU and TTSH, the disease is the leading cause of irreversible blindness worldwide, affecting 76 million people by 2020.

The AI-enabled method developed by NTU and TTSH employs algorithms to distinguish normal optic nerves from those with glaucoma. This is accomplished by analysing "stereo fundus images," which are multi-angle two-dimensional (2D) retinal images that are combined to form a three-dimensional (3D) image.

The AI method had a 97% accuracy in diagnosing glaucoma when tested on stereo fundus images from TTSH patients undergoing expert examination, according to the institutions. The new screening method developed by NTU and TTSH employs a set of algorithms to analyse stereo fundus images captured as pairs by two cameras from different perspectives.

Using two images ensures that if one image is of poor quality, the other image can "usually compensate" and the system can maintain its accuracy, according to the researchers. As per the researchers, the automated glaucoma diagnosis method could be used in less developed areas where patients do not have access to ophthalmologists.

"A portable AI-powered tool, which we envision our screening model to eventually take the form of, could also help to tackle the problem of poor access to primary healthcare and errors in differential diagnoses," said a doctor who heads the glaucoma service at the National Healthcare Group Eye Institute at TTSH.

The team is now testing their algorithms on a larger dataset of patient fundus images taken at TTSH. They are also "looking at how the software can be ported to a mobile phone application so that, when used in conjunction with a fundus camera or lens adaptor for mobile phones, it could be a feasible glaucoma screening tool in the field," NTU and TTSH said.

OpenGov Asia reported, even as Singapore and much of the world is turning the corner on the pandemic, it is driving the adoption of transformative technologies in healthcare. In the last year, it was the intense and unrelenting pressures of the pandemic that ultimately proved to be the most potent agent of change for digital transformation in healthcare.

The necessary elements of this transformation—the required infrastructure—are rapidly coming to maturity. It starts with the increasing availability of health data from connected devices. It is unleashed by the increasing sophistication of technologies like Artificial Intelligence (AI), hybrid cloud and automation.

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