AI-powered glaucoma screening test delivers rapid results

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A new rapid screening test for glaucoma could help advance early detection of the disease, a leading cause of irreversible blindness.

Developed by a research team of engineers and ophthalmologists led by RMIT University in Melbourne, Australia, the test uses infrared sensors to monitor eye movement and can produce accurate results within seconds.

About 80 million people worldwide have glaucoma, with more than 111 million expected to be living with the disease by 2040.

The loss of sight is usually gradual and 50% of people with glaucoma do not know they have it.

Currently, glaucoma is diagnosed through a 30-minute eye pressure test delivered by an ophthalmologist.

The new AI-powered test takes just 10 seconds to show if there is a risk of glaucoma, making it ideal for use in a national screening program.

Lead researcher Professor Dinesh Kumar, RMIT, said early detection, diagnosis and treatment could help prevent blindness, so making screening faster and more accessible was critical.

"This research will allow a non-contact, easy-to-use and low-cost test that can performed routinely at general clinics," he said.

"It could also promote a community-wide screening program, reaching people who might not otherwise seek treatment until it's too late."

How it works

The pioneering technology differentiates between glaucoma and healthy eyes by analyzing changes in pupil size.

In the study, published in *IEEE Access*, pupils were measured 60 times per second using a low-cost commercial eye tracker.

Under ambient light conditions, patients looked at a computer screen while custom software measured and analyzed specific changes in their pupil size.

The software then compared the results against existing samples of glaucoma and healthy eyes to determine the risk of glaucoma.

Dr. Quoc Cuong Ngo, RMIT, said the new tech was faster and better than any similar AI-based approach.

"Our software can measure how the pupil adjusts to ambient light and capture minuscule changes in the shape and size of the pupil," he said.

"Existing AI glaucoma tests require the patient to be perfectly still for up to 10 minutes. Our tech does the job in 10 seconds, without compromising on accuracy."

Next steps

The team is now looking to adapt the technology to work with smartphone cameras instead of the eye tracker used in the study.

With further research, the software could also be extended to detect other neurological conditions.

More information: Quoc Cuong Ngo et al, Pupillary Complexity for the Screening of Glaucoma, *IEEE Access* (2021). DOI: 10.1109/ACCESS.2021.3122079