Detecting glaucoma early

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Glaucoma is a group of eye diseases wherein increased pressure within the eye can, if left untreated, lead to damage to the optic nerve and vision loss. Its detection relies on measuring intraocular pressure, visual examination of the interior of the eye, and testing of the entire field of vision with specialist instrumentation.

Glaucoma develops slowly over time and causes no pain. However, as

the pressure from the eye and its blood vessels insidiously damages the optic nerve, peripheral vision suffers initially and then central vision. If left untreated complete blindness ensues. Glaucoma is the most common cause of irreversible blindness with around 80 million people having the condition and more than 10 million of those going on to suffer complete vision loss.

The vast majority of those who have the worst possible outcome live in the developing world where the majority of sufferers will be wholly unaware of their condition until it is too late. Thus inexpensive and efficient approaches that reduce the workload on ophthalmologists would be a boon in those parts of the world.

New work published in the World Review of Science, Technology and Sustainable Development takes a novel approach to the detection of glaucoma. S. Ajitha and M.V. Judy of the Department of Computer Applications at Cochin University of Science and Technology, in Kerala, India, explain how glaucoma is a 'gruesome thief' that might be routed out if detected early. The team has now developed an algorithmic detective that can identify characteristics of glaucoma present in images of a patient's 'fundus.' The fundus is the interior surface of the eyeball opposite the lens, which lies behind the cornea at the front of the eye.

The algorithm is trained with fundal images from patients known to have early-stage glaucoma. Subtle characteristics of early-stage glaucoma that would be invisible even to the trained ophthalmologist will be made obvious when the algorithm is presented with an image from a patient. The team has demonstrated sensitivity, specificity, and accuracy beyond that seen with other algorithmic approaches and suggests that the approach can offer 100 percent accuracy in automatically detecting glaucoma early and so allow the ophthalmologist to offer treatment before any damage is done to the optic nerves.

More information: S. Ajitha et al. A novel hybrid approach to blaze out a new path for glaucoma detection, monitoring and sustainable results in fundus images, *World Review of Science, Technology and Sustainable Development* (2021). DOI: 10.1504/WRSTSD.2021.114677