

Closing the Gap: Why Autonomous AI Needs Human Partners in Eye Care

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Introduction:

Diabetic retinopathy (DR) is still the leading cause of preventable vision loss globally. A simple annual eye exam can save the sight of millions of people who suffer from diabetes. However, millions of people are not getting these necessary screenings annually, as there simply aren't enough eye doctors to examine them all. Medical technology has advanced in recent years and now, there are fully independent AI screening systems. These AI systems can automatically process fundus photographs in a local clinic and provide a diagnosis within seconds without any delay, whereas in the past, a specialist or physician would have to review the images a few days later. The question that arises in the era of contemporary medicine is whether it is necessary to have a human oversight in this technological shift or not.

Accessibility is the main reason for autonomous AI. Patients do not often see an ophthalmologist in rural areas or low resource health clinics. Autonomous algorithms enable non-specialist clinical staff to obtain a retinal image and instantly provide a proper diagnostic assessment of whether the patient requires an urgent referral to a specialist. Initial research has shown that deep learning algorithms can perform on par with human specialists in detecting the presence of diabetic eye disease. Further clinical studies showed that an autonomous AI system was capable of identifying disease that posed a risk to vision without the need for a doctor to review every image in primary care. Autonomous AI saves time by making sorting healthy eyes from at-risk eyes an automated process, saves money on

healthcare, and allows doctors to spend their limited time on patients who truly need care^{1,2}.

While fast, the elimination of human review poses real clinical and legal challenges:

- **Hidden Comorbidities:** An AI trained specifically for DR may not be able to capture other severe eye diseases that appear in the photo, like glaucoma or age-related macular degeneration.
- **Edge Cases and Rare Patterns:** When an algorithm is used to detect a disease, it is very good at recognising patterns that it has seen trained into its systems, but unusual eye anatomy or rare vascular conditions can cause it to miss a disease (false negative) or cause the software to trigger an unnecessary alarm (false positive).
- **Accountability:** There is also blurred accountability, when an autonomous machine makes a misjudgment, medical and legal liability are not clearly defined. Who is liable if a patient becomes blind because of an error in the AI, the primary care clinic, the software developer or the attending physician?³

The future for diabetic retinopathy screening is not "machines only" or "humans only" but "AI-assisted human oversight. Here, the autonomous AI takes care of the grunt work on the frontlines. It can rapidly detect normal, healthy eyes and alert you to eyes that need urgent attention. Human specialists intervene when images fall into a gray zone, and they are assigned to more complicated cases for final treatment decisions. Rather than view AI as

a threat to eye doctors, health systems can leverage it as an essential tool to maintain medical safety and provide access to millions of patients who could benefit the most.

References:

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