How Does AI Support Teleophthalmology Screening?

Rasit Dinc

Rasit Dinc Digital Health & AI Research

Published: February 15, 2020 | Telemedicine and Digital Health

DOI: 10.5281/zenodo.17998777

Abstract

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Teleophthalmology has emerged as a critical tool in extending the reach of eye care, particularly for the screening of widespread conditions like diabetic retinopathy (DR). As the number of patients with diabetes continues to rise globally, so does the burden on healthcare systems to provide timely and effective eye screening. The integration of artificial intelligence (AI) into teleophthalmology is proving to be a transformative development, offering solutions to challenges of scale, accuracy, and accessibility. This article explores how AI is revolutionizing teleophthalmology screening, leading to more efficient and effective patient care.

One of the most significant contributions of AI in teleophthalmology is the enhancement of diagnostic accuracy and efficiency. AI algorithms, particularly those based on deep learning, can analyze retinal images with a level of precision that is comparable, and in some cases superior, to human graders. A key advancement in this area is the development of AI-human hybrid workflows. In such a system, the AI performs an initial assessment of the retinal images, flagging cases that require further attention from a specialist. A 2023 study by Dow et al. demonstrated that a 2-step AI-human hybrid workflow achieved a sensitivity of 95.5% and a specificity of 98.2% for detecting more-than-mild diabetic retinopathy (MTMDR). This approach not only improves diagnostic accuracy but also significantly increases the positive predictive value, reducing the number of unnecessary referrals and allowing specialists to focus their expertise on the most critical cases [1].

Teleophthalmology programs often face the challenge of managing a large volume of images, which can lead to backlogs and delays in diagnosis. AI provides a powerful solution to this problem by automating the analysis of

retinal images, enabling the rapid processing of thousands of images without fatigue or cognitive bias. For instance, at the Honoré Cave Clinic in Montauban, Dr. Vincent Gualino and his team utilize the OphtAI solution to analyze 300 to 400 fundus images weekly. The AI provides a comprehensive report, including the severity of the condition and a map of lesions, within minutes. This automation streamlines the screening process and allows for the early detection of abnormalities that might be missed by the human eye, as AI can identify subtle, early signs of disease [2].

The impact of AI is further amplified by advancements in retinal imaging technology. Newer fundus cameras are more affordable, user-friendly, and capable of automated operation. The advent of smartphone-based retinal imaging is also expanding the reach of teleophthalmology to underserved areas. These technologies, combined with powerful AI algorithms, are making large-scale screening programs more feasible and effective. FDA-approved AI systems like IDx-DR and EyeArt have demonstrated high sensitivity and specificity in detecting DR. Furthermore, the capabilities of AI are extending beyond a single disease. Platforms like SELENA+ are being developed to detect multiple conditions, including DR, age-related macular degeneration (AMD), and glaucoma, from a single retinal image, heralding a new era of comprehensive eye screening [3].

In conclusion, artificial intelligence is a game-changer for teleophthalmology screening. By enhancing diagnostic accuracy, enabling the management of large-scale screening programs, and integrating with advanced imaging technologies, AI is helping to address some of the most pressing challenges in eye care. The future of teleophthalmology lies in the synergistic partnership between human expertise and artificial intelligence, a collaboration that promises to make eye care more accessible, efficient, and effective for patients worldwide.

References

[1] Dow, E. R., Khan, N. C., Chen, K. M., et al. (2023). AI-Human Hybrid Workflow Enhances Teleophthalmology for the Detection of Diabetic Retinopathy. *Ophthalmology Science*, 3(4), 100330. https://pmc.ncbi.nlm.nih.gov/articles/PMC10336195/

[2] OphtAI. (2025, October 21). *AI in teleophthalmology: towards optimised eye screening*. https://www.ophtai.com/en/ai-in-teleophthalmology/

[3] Chokshi, T., Cruz, M. J., Ross, J., & Yiu, G. (2024). Advances in teleophthalmology and artificial intelligence for diabetic retinopathy screening: a narrative review. *Annals of Eye Science, 9*. https://aes.amegroups.org/article/view/7725/html