Commentary: How useful is a deep learning smartphone application for screening for amblyogenic risk factors?

As elsewhere artificial intelligence (AI) seems to be replacing human endeavor. Recall the recent docking of the Space-X Dragon module with the International Space Station, Tesla's self-driving cars, or the targeted advertisements encroaching your view while browsing: all examples of AI at work.

AI is often spoken with machine learning (ML) and deep learning (DL): the former uses algorithms applied to huge data sets, to analyze and learn patterns to make informed predictions. In case of errors, human experts step in. DL, in contrast, uses a layered algorithmic structure, appropriately labelled an artificial neural network, which senses the inaccuracy if any and auto-course corrects.

As Ting recently pointed out, the advanced mathematical models along with access to big data, has permitted AI to enlarge its foot print into healthcare.[1] DL has demonstrated its capability in image, speech, and motion recognition, understandably impacting medical specialties like radiology, dermatology, and pathology. In ophthalmology, AI-based equipment has successfully shown its functionality while evaluating fundus images for glaucoma, and macular degeneration and diabetic retinopathy.[2] Li *et al.* developed and evaluated an OCT trained DL technique – OCTD-Net, to detect early DR.[3] They reported meaningful accuracy, sensitivity, and specificity of 0.92, 0.90, and 0.95 for grade 1, though not for 0. Importantly in comparison studies, for predicting glaucomatous optic neuropathy, Jamal *et al.* pitted a DL trained with RNFL-thickness parameters from SD-OCT against two glaucoma specialists: DL performed significantly better on Spearman's correlations with standard automated perimetry: roh of 0.54 Vs 0.48, at $P < 0.001$; and on partial AUC, for predicting GON: 0.529 vs 0.411, $P = 0.016$.[4]

In this context, the authors need to be commended in demonstrating the use of DL for screening for amblyogenic risk factors (ARFs) using an android based smartphone.[5] Yet it needs to stand upto ordinary digital cameras,[6] smartphones,[7] and even the retinoscope all using the Bruckner's reflex.[8] Moreover the study has no comparator group, and has perhaps merely demonstrated the capability of using this approach on 18–23 year-old optometry students: it needs to be whetted on 4–7 year olds, when anti-amblyopia measures can be effective. Interestingly as an exercise, if we draw up a 2 × 2 table, and plug in the sensitivity (88.2%) and specificity (75.6%) values, and imagine screening a thousand children, it yields a false positive rate of around 83%: 228 of 272 who would test positive. The magic of the paper lies in the novel approach using AI to demonstrate functionality: How well it will perform in a realistic environment remains a moot question.

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