

## Artificial intelligence in ophthalmology: Is it just hype with no substance or the real McCoy

At the outset, Happy New Year to all the readers of IJO and congrats to the editorial team for the image makeover and increase in contents of IJO making it more informative and interesting.

These days we are hearing a lot about artificial intelligence (AI), deep learning (DL), machine learning, algorithms, robotics, etc. The hype and hysteria created over it has reached epic proportion. For the average ophthalmologist, unfamiliar with these terms, it may look little overwhelming and scary at first, since many of us find it difficult to keep pace with rapidly changing technology, scary in the sense that we may lose patients to automation and technology, even forcing the technicians to lose their jobs to the machines.

AI is human like intelligence, which the machines and computers acquire once it gets a huge volume of training data and getting better over time by taking in more data, ultimately making successful and smart judgment or predictions.<sup>[1]</sup>

In ophthalmology, AI is seen to have unlimited potential to perform many tasks much better than humans, since it can process data and information much faster than humans. Various clinical applications of AI and DL are screening and diagnosis of diabetic retinopathy, age-related macular degeneration, retinopathy of prematurity, pediatric cataract, glaucoma, keratoconus, oculoplastic reconstruction, and dry eye.<sup>[2,3]</sup>

Interpretation of corneal topography, optical coherence tomography scans, visual fields and fundus photographs, looking for disease progression and predicting best treatment strategy and its success.

Intraocular lens (IOL) power prediction based on adaptive learning, using pattern recognition and sophisticated data interpolation and is free of calculation bias. So, whether the third-generation theoretical formulas, ray tracing, and ultrasound biometer become obsolete like the Schiotz tonometer is anybody's guess.<sup>[4]</sup>

AI has the potential right from screening to management using algorithms, making things simpler, better, and faster.<sup>[5]</sup> So that persons requiring treatment needlessly do not go blind and are managed early in the course of the disease, as well saving on vital resources and man hours.

Diabetic retinopathy has become a public health problem in India. AI and DL in ocular imaging along with telemedicine is being used to screen target population, diagnose, suggest best management protocol, and monitor for disease progression even in remote areas making it very effective tool to combat blindness.<sup>[6]</sup>

AI should be seen as a tool and technique, the next big thing to happen in ophthalmology similar to the invention of ophthalmoscope, IOL, OCT, fundus camera, etc. It is for us to combine the best of our clinical skills and the tools of AI for best management practices. It should not be viewed as

a magic wand for everything and pushing our own clinical skills to the background, leading to the atrophy of our skills. Since healthcare is not only science and tools, it is indeed also art and craft with effective communication skills with real intelligence in the real world. Since AI is evolving, potential technical and clinical challenges remain, medicolegal issues, understanding of algorithm results needs to be addressed. It should be "learn on the go" as we have seen only the tip of the iceberg, may be the best is yet to be discovered. Definitely AI is getting better by the day as it acquires more data and is self-evolving.<sup>[7]</sup>

One concern is imperfect, yet to validated technology, causing patients harm due to misdiagnosis or incorrect prediction. Though, we cannot fault the AI alone, since it is the developer who has to teach the machine better, otherwise it may lead to patient-doctor conflict for a missed diagnosis or for implanting a wrong IOL. So the real benefit will come, when we realize how to use and develop the best of these tools for delivering care that is advanced, accurate, and humane at the same time.<sup>[8]</sup>

The potential of AI can be used for teaching training purposes, student and faculty monitoring, even evaluating answer scripts in medical colleges and institutes. So teachers will have enough time to teach students human values, empathy, ethics, clinical, and communications skills, while AI will be doing the more mechanical part of the work, bringing about a paradigm change in the very functioning of the medical colleges and institutes.

In conclusion, AI and DL are necessary tools to face the challenges of the future in healthcare. One should understand the true potential and see it as an integral part of modern medical practice.

Sir, to end on a lighter note,

Examiner: What is Fincham's test,

Student: Sir, my I phone has a AI tool for detecting the cause of colored halos in the eyes with 98% sensitivity and 92% specificity, Fincham's test is obsolete.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

**Santosh V Patil**

Department of Ophthalmology,  
Gulbarga Institute of Medical Sciences, Gulbarga, Karnataka, India

**Correspondence to:** Dr. Santosh V Patil,  
Department of Ophthalmology,

Gulbarga Institute of Medical Sciences, 203, 2<sup>nd</sup> Floor,  
Lahoti Apartment, Khuba Plot, Gulbarga - 585 102, Karnataka, India.  
E-mail: drsantoshpatil11@gmail.com

### References

- Hogarty DT, Mackey DA, Hewitt AW. Current state and future prospects of artificial intelligence in ophthalmology: A review. *Clin Exp Ophthalmol* 2018;47:128-39.

2. Lu W, Tong Y, Yu Y, Xing Y, Chen C, Shen Y. Applications of artificial intelligence in ophthalmology: General overview. *J Ophthalmol* 2018; 5278196. doi.10.1155/2018/5278196.ecollection2018.
3. Du XL, Li WB, Hu BJ. Application of artificial intelligence in ophthalmology. *Int J Ophthalmol* 2018;11:1555-61.
4. Hill WE. IOL power selection by pattern recognition. *Cataract Refract Surg Today* Nov-Dec 2016. p.1.
5. Li Z, Keel S, Liu C, He M. Can artificial intelligence make screening faster, more accurate and more accessible. *Asia Pac J Ophthalmol (Phila)* 2018;7:436-41.
6. Chen SC, Chiu HW, Chen CC, Woung LC, Lo CM. A novel machine learning algorithm to automatically predict visual outcomes in intra-vitreous ranibizumab-treated patients with diabetic macular oedema. *J Clin Med* 2018;7. doi: 10.3390/jcm7120475.
7. Ting DSW, Pasquale LR, Peng L, Campbell JP, Lee AY, Raman R, *et al.* Artificial intelligence and deep learning in ophthalmology. *Br J Ophthalmol* 2019;103:167-75.
8. Gargeya R, Leng T. Automated identification of diabetic retinopathy using deep learning. *Ophthalmology* 2017;124:962-9.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online	
<b>Quick Response Code:</b>	<b>Website:</b> www.ijo.in
	<b>DOI:</b> 10.4103/ijo.IJO_32_19

**Cite this article as:** Patil SV. Artificial intelligence in ophthalmology: Is it just hype with no substance or the real McCoy. *Indian J Ophthalmol* 2019;67:1251-2.

© 2019 Indian Journal of Ophthalmology | Published by Wolters Kluwer - Medknow