



Letter to the Editor

Edited by Stephen P. Stone, MD

In response to, “How I learned to stop worrying and love machine learning”



I read with great interest the recent contribution, “How I Learned to Stop Worrying and Love Machine Learning,”¹ in which the authors describe common fears surrounding the use of convolutional neural networks (ie, machine learning) for the diagnosis of skin cancers from clinical and dermatoscopic images. As a matter of fact, the potential of artificial intelligence (AI) in dermatology was first introduced over 30 years ago with expert systems, a computational method based on a set of reasoning rules, to aid in the differential diagnosis of facial tumors.² So, why is AI perceived as a threat now?

Response #1: I don’t understand machine learning

The basic underpinning of any form of AI is the algorithm. In its simplest form, an algorithm is a set of instructions provided to the computer to perform a task. For instance, having your thermostat turn on when the temperature drops below a designated threshold is an algorithm.

Computational approaches have advanced significantly in the past decade, leading to the frequently cited convolutional neural network (CNN) and deep CNNs, which can manage large data sets and manipulate image features in a series of operational layers. The degree of automation and the fact that we cannot examine exactly “how” an AI system comes to a conclusion is deeply unsettling to some. After all, we went through years of medical training, read textbooks, memorized boards fodder, and curated our clinical experience to develop our expertise in dermatology.

Response #2: Machines will replace me

These technologic advances also happen to coincide with a period during which dermatology is arguably undergoing an identity crisis, where outside forces, such as midlevels³ and private equities⁴ are viewed as encroachers upon our specialty. Landmark studies using CNNs on clinical⁵ or dermatoscopic⁶

images of melanoma have shown these AI systems outperform even the most expert dermatologists or dermatoscopists. Adding fuel to the fire are media outlets that capture attention with headlines such as, “AI Beats Doctors at Cancer Diagnoses.”⁷

The truth is, we are nowhere near developing a diagnostic super-machine, much less one that is ready for clinical practice. For one thing, a network’s performance is partly dependent on the quantity and quality of the training data it is given. Training often requires thousands of labeled images per classification. In the study by Esteva,⁵ the network was pretrained on 1.28 million images and then trained on an additional 129,450 clinical images, spanning over 2,000 disease classes. In addition, the acquisition and storage of digital images is far from standardized,⁸ and proper image segmentation (eg, determining lesion borders) and image preprocessing remain significant technical challenges⁹ before the algorithm can even begin.

Response #3: I am liable for machine errors

The notion that we do not or will not play a critical role in any type of computer-assisted diagnosis or clinical decision-making is a fallacy. The real question is: how can we objectively and critically assess these algorithms in doing what we have asked them to do and at what cost? In a sense, it is no different than what we already do in appraising traditional medical research. We acknowledge study limitations, assess risks and benefits, and, in the end, use the information to support and guide us in our daily practice. As Mattessich and authors¹ suggest, it is best to view AI as another tool in our armamentarium rather than a voice of authority. Because in the end, AI will never be perfect. But then again, neither are we.

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