Machine Schooling

In Douglas Adams' "The Hitchhiker's Guide to the Galaxy," the epoch-spanning artificial intelligence (AI) engine known as Deep Thought wraps its electronic brain around answering the ultimate question of life, the universe, and everything. No one knows what that question is — but I'm imagining healthcare to be at the heart of such a power trio. How we humans apply AI will answer critical needs when it comes to the early identification of disease, clinical decision support, and tailored treatment plans for optimal patient outcomes.

The AI event horizon often triggers visions of fantastical fear or rainbow utopia. Neither dark- nor light-advanced superintelligence yet exists (or is possibly super intelligent enough to stay in hiding). What does exist and is creating meaningful impact in the world is machine learning (ML)—a subfield of AI.

In this form of AI, algorithms learn from data, with or without explicit guidance. Advanced statistical techniques identify patterns in data and then make predictions. Machine learning can be trained to look at medical images, identify abnormalities, and call attention to critical needs with improved accuracy.

The growth curve of ML will only accelerate — and will not be welcoming to those who hesitate. The (relative) immediacy of ML is to be applauded, embraced, and emulated. This is not a futuristic concept (OK, it's that, too). It is a real-world tool that can be put into effect today. The disruptive play here is to ditch the watchful waiting. In one form or another, ML is:

- Transforming the electronic health record into a reliable risk predictor
- Simulating and judging emotional states to deliver lighting changes, music, and even small talk that can reduce anxiety in patients with dementia
- Automating routine processes like clinical documentation, indexing of diagnostic notes/video — all in service of alleviating HCP cognitive overload and burnout
- Differentiating between tumors and healthy anatomy to assist in radiotherapy and surgical planning
- Detecting discrete features — a child's jaw line, ear, and nose placement — to match to and reveal dozens of disorders, and
- Researching billions of data points in public databases to hypothesize new medicines — for example, a common ingredient in toothpaste that might be able to fight malaria-based parasites.

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The Potential of Machine Learning

The potential of this tool is not without pause. Machine learning is something of a black box, with no clear understanding of how it generates its insights. Taken a step further, the algorithm itself doesn't understand its inputs or outputs. This lack of context — and lack of transparency — may leave many healthcare stakeholders asking: "Why did this algorithm fail?" "Which parts of that algorithm made the real difference over the conventional?" "Are there hidden biases in the data?"

Without question, the staggering reach of these intelligent diagnostics (i.e., the potential for them to assess risk, determine correct diagnoses, suggest more effective treatments) brings to mind a deep thought from Caroline Chubb Calderon of HelloHumanity: "What is the point of us?" In response, she posits a role: imagination, insight, and inspiration.

AI algorithms are literal. We set a goal, and the algorithm can only understand what it has been told. On the other hand, every provider-patient encounter is unique. For all the smarts the machine possesses, there is still a place for a clinician's judgment in decision-making.

Another Doug (Rushkoff) observes, "interfaces…express who we are and what we believe to everyone else." What purpose, then, do we choose to embed in these thinking systems about our health?

Although our overall focus is to use ML to augment patient care, what we ask of the machine will be driven by us and our intent. This requires conscious, specific, ethical choice — another (perhaps) disruptive idea when it comes to technology. Simply put, AI is only as good as the humans programming it. If the future is driven by tech, it's up to us to ensure it is an experience defined by our humanity.

It makes me wonder: are caregivers a model for teaching machine learning? Maybe the Hippocratic Oath needs an upgrade:

First, code for good. PV

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