HealthTap

Will Artificial Intelligence Replace Your Doctor?

No subject in technology has been as widely discussed – and as widely misunderstood – as Artificial Intelligence. The term "AI" was coined in the 1950's by computer scientist John McCarthy who defined it as "the science and engineering of making intelligent machines." It remained an academic curiosity until the late nineties when an IBM chess computer named Deep Blue defeated the world's top-ranked chess player in a dramatic public demonstration.

In the two decades since, an exponential increase in computer power has resulted in human-level performance in computer vision, speech recognition, and natural language processing. AI startups are racing to introduce technologies like self-driving cars, burger-flipping robots, and cashier-less grocery stores. And the coming wave of automation isn't just limited to low-skilled tasks. AI software is being developed to automate jobs performed by professionals such as financial advisors, insurance claims adjusters, and even doctors.

So is AI ready to replace your General Practitioner? One startup company recently claimed just that. Babylon Health, a UK-based tech firm, announced it had developed AI software for clinical diagnosis that equaled – or in some cases vastly exceeded – the accuracy of human doctors. But when a skeptical M.D. decided to test the Babylon software for himself, he discovered that it misdiagnosed certain common conditions with potentially life-threatening consequences, prompting an inquiry by the UK Medicines and Healthcare products Regulatory Agency. For the moment, it seems the answer to the question "Will AI replace your doctor?" is a rather emphatic "No!"

There is an alternative to this man-versus-machine view of Artificial Intelligence. Known as *Augmented Intelligence*, it is the idea that computers should *complement* human intelligence rather than replace it. This was the vision of computer scientist J.C.R. Licklider and his student, Doug Engelbart, who led the Augmentation Research Center at Stanford Research Institute which developed many of the elements of the modern personal computer in the 1960's, including the mouse and the word processor. These technologies were later adopted by Apple and incorporated into the Macintosh computer, which Steve Jobs described as a tool for augmenting the human mind:

"I read a study that measured the efficiency of locomotion for various species on the planet. The condor used the least energy to move a kilometer. Humans came in with a rather unimpressive showing about a third of the way down the list... But then someone at *Scientific American* had the insight to test the efficiency of locomotion for a man on a bicycle, and a man

on a bicycle blew the condor away. That's what a computer is to me... the most remarkable tool that we've ever come up with. It's the equivalent of *a bicycle for our minds*."

A decade after his defeat by Deep Blue, Garry Kasparov attended a "freestyle" chess tournament that permitted teams with any combination of humans and computers to enter. The competition resulted in an upset victory, where the winner turned out to be not a grandmaster or a supercomputer, but a pair of amateurs using ordinary PC chess software. The combination of man plus machine was superior to man or machine alone. Kasparov dubbed this kind of human-computer hybrid a "centaur", after the mythological creature who was half-man and half-horse.

Returning to the question of AI and doctors, could this "centaur" idea be applied to medical diagnosis? A recent study compared the performance of first-year Family Medicine residents on clinical diagnosis cases with and without the use of decision-support software. The results showed that the combination of human and computer results in higher accuracy than either alone. The study found that computers have higher sensitivity whereas human doctors have higher selectivity, suggesting an arrangement where the computer proposes a diagnosis and the doctor confirms it.

At HealthTap, we have developed such a platform for augmenting human doctors with artificial intelligence. Patients use our digital care service for live consultations with a doctor, prior to which they complete a short interview with our chatbot software. The collected information is presented to the doctor alongside the most likely diagnoses predicted by our clinical diagnosis model. By augmenting the doctor with a machine learning algorithm, we can eliminate potential blind spots – for example when dealing with rare conditions – and reduce diagnostic errors due to false positives.

Last month, the American Medical Association published their first-ever policy recommendations for artificial intelligence. AMA board member Dr. Jesse Erhnfeld said, "Combining AI methods and systems with an irreplaceable human clinician can advance the delivery of care in a way that outperforms what either can do alone."

We believe that the role of computers in primary care is to augment doctors with artificial intelligence – not replace them – to bring out the best in humans and machines.

A free consumer version of HealthTap's AI-powered clinical diagnostic service is available at http://www.healthtap.com/