TECHNOLOGY

Deep Learning Is Hitting a Wall

What would it take for artificial intelligence to make real progress?

BY GARY MARCUS March 10, 2022

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Let me start by saying a few things that seem obvious," Geoffrey Hinton, "Godfather" of deep learning, and one of the most celebrated scientists of our time, told a leading AI conference in Toronto in 2016. "If you work as a radiologist you're like the coyote that's already over the edge of the cliff but hasn't looked down." Deep learning is so well-suited to reading images from MRIs and CT scans, he reasoned, that people should "stop training radiologists now" and that it's "just completely obvious within five years deep learning is going to do better."

Fast forward to 2022, and not a single radiologist has been replaced. Rather, the consensus view nowadays is that machine learning for radiology is harder than it looks[1]; at least for now, humans and machines complement each other's strengths.[2]

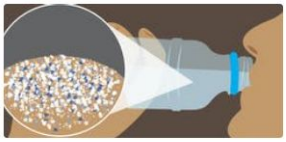
Deep learning is at its best when all we need are rough-ready results.

Few fields have been more filled with hype and bravado than artificial intelligence. It has flitted from fad to fad decade by decade, always promising the moon, and only occasionally delivering. One minute it was expert systems, next it was Bayesian networks, and then Support Vector Machines. In 2011, it was IBM's Watson, once pitched as a revolution in medicine, more recently sold for parts.[3] Nowadays, and in fact ever since 2012, the flavor of choice has been deep learning, the multibillion-dollar technique that drives so much of contemporary AI and which Hinton helped pioneer: He's been cited an astonishing half-million times and won, with Yoshua Bengio and Yann LeCun, the 2018 Turing Award.

Like AI pioneers before him, Hinton frequently heralds the Great Revolution that is coming. Radiology is just part of it. In 2015, shortly after Hinton joined Google, *The Guardian* reported that the company was on the verge of "developing algorithms with the capacity for logic, natural conversation and even flirtation." In November 2020, Hinton told *MIT Technology Review* that "deep learning is going to be able to do everything."[4]

I seriously doubt it. In truth, we are still a long way from machines that can genuinely understand human language, and nowhere near the ordinary day-to-day intelligence of Rosey the Robot, a science-fiction housekeeper that could not only interpret a wide variety of human requests but safely act on them in real time. Sure, Elon Musk recently said that the new humanoid robot he was hoping to build, Optimus, would someday be bigger than the vehicle industry, but as of Tesla's AI Demo Day 2021, in which the robot was announced, Optimus was nothing more than a human in a costume. Google's latest contribution to language is a system (Lamda) that is so flighty that one of its own authors recently acknowledged it is prone to producing "bullshit."[5] Turning the tide, and getting to AI we can really trust, ain't going to be easy.

In time we will see that deep learning was only a tiny part of what we need to build if we're ever going to get trustworthy AI.



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