Can Computers Think?

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March 19, 2023

There has always been a fascination with creating living, intelligent entities. In the past, stories such as Frankenstein (1818), Her (2013), and Ex Machina (2015) portray this desire.

However, not so long ago, Mary Shelley's Frankenstein was merely a story. Today, we ought to add the noun science to fiction.

The uprise of large language models, most recently ChatGPT, blurs the dividing line between human and machine intelligence. Remarkable, creative, and intellectually challenging feats that humans have monopolized since the dawn of time might now be in danger. One frightening example is a novel academic paper with correct citations composed by a computer.[10]

When an apple fell on Newton's head, or so the story goes, he thought deeply and used his intelligence to explain the event. Now, that we've established at least some resemblance of intelligence in computers, do they also need to think to come to conclusions?

Of course not, a computer doesn't think, some might say. Based on a set of operations and a given input it computes an output. Yet, abstractly speaking, aren't brains doing the same? Leaving connectionist and classical differences aside, the computational theory of mind argues precisely that.[8]

One interesting aspect of this discussion is that we seem only troubled by the loss of mental superiority. No one ever complained that forklifts are stronger than most humans! Quite the contrary, humans gratefully passed on physical labor to machines. But then one can always argue that humans have never been the strongest animal in wildlife.

Intelligence is quintessential to us. Now to claim that artificial and biological (i.e. natural) intelligence is indistinguishable challenges this belief. Such ideas shake the foundation of our anthropocentric worldview. Even worse is the prospect that they could transcend our capabilities, and still, modern airplanes don't flap their wings.[1]

Therefore, it seems to be of utmost interest to research if these theories are true.

In 1950, Alan M. Turing published his famous paper "Computing Machinery and Intelligence", the cornerstone for today's discussions on machine intelligence. Instead of answering the vague question "Can Machines Think" he proposed an Imitiation Game to prove machine intelligence and infer 'thinking'.[11]

A good portion of the paper Turing devotes to the preliminary dismantlement of any objections to the accuracy of his test by contemporaries and future scientists. If only he knew that in the following decades' many criticisms and improved versions would follow nevertheless.[4]

One contrasting improvement is the Lovelace test. Coined after the British mathematician Ada Lovelace who claimed in 1843 that "the Analytical Engine has no pretensions to originate anything. It can do whatever we know how to order it to perform". Instead of a conversation with humans, the Lovelace tests measure intelligence based on the creative capabilities of a machine.[9]

One problem remains. None of these tests show holistic intelligence but rather the resemblance of it in various subdomains.[3] This is Archilles' heel of any Turing-based test. Some consider them harmful to AI research because of this narrow field of view.[5]

Alternatively, we could axiomatically assume machine intelligence and conduct machine-IQ tests. Even though it has been done (See [7]), human-IQ tests aren't suitable for comparison since the results are based on human populations.[3] Hence, a universal test that measures human, animal, and machine intelligence alike has to be developed.[6]

Thus, currently, there is no clear-cut way to quantify machine intelligence and therefore infer 'thinking'.

Nonetheless, a look at the problem through the lens of philosophy is still possible.

Maybe, as Turing hinted at, the question itself is unnecessary. Perhaps, we can answer it similarly to Philip K. Dick's 1968 novel title "Do Androids Dream of Electric Sheep?".[2] No, since machines don't need sleep. That's why we built them in the first place!

Turing, as an Atheist, also disregarded the theologic view of God's unique gift of human intelligence.[11] However, it's rather easy to turn this argument on its head. It's a simple perspective switch if one dares to be presumptuous: The created becomes the creator of life and intelligence.

Concluding, can computers think? We don't know definitely but maybe they don't even need to think to conclude. Maybe if Newton was a computer, he would've found the solution immediately instead of strenuous thinking. Who knows?

What's certain is that human intelligence remains Nature's (or God's?) remarkable and unchallenged feat. For now.

References

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