Is a Computer Smarter than a Fruit Fly (*Drosophila m.*)?

by B. Madhava Puri, Ph.D.

Serving Director, Bhakti Vedanta Institute of Spiritual Culture and Science
Princeton, New Jersey, USA
www.bviscs.org

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The dictionary definition of intelligence seems to always refer to it as "the ability to understand." But we never hear about 'artificial understanding' when referring to computers. In fact, the hallmark of computer performances is that they never understand anything they are doing, because they are simply mechanical devices.

We can chat/talk with a computer AI device like Alexa or Siri but we don't expect the device to understand the conversation. When a visual sensor detects an object and records the data for it on a computer, we do not expect the computer to understand that the object is, for example, an apple or the number 1.

Roger Penrose argues that mathematical understanding is something that cannot be modeled in terms of entirely computational procedures. A computer may use rational numbers in its processing but it does not know it is using rational numbers, a fact that is very significant for mathematical philosophers.

An article by Peter J. Denning, and Ted G. Lewis in Scientific American entitled "Intelligence May Not Be Computable" concludes after analyzing the hierarchy of various levels of computer architecture, that human intelligence is not computable. In fact, "The hierarchy shows that none of the machines so far built have any intelligence at all." Starting from the earliest times researchers realized that AI systems lacked even basic common sense.

There is recent internet rage over the ChatGPT bot, which can give apparently authoritative text answers due to its large language database. However, a program developer warned: "because the average rate of getting correct answers from ChatGPT is too low, the posting of answers created by ChatGPT is substantially harmful."[1] In other words, the bot does not know or care if its

[1] https://www.cnet.com/tech/computing/why-everyones-obsessed-with-chatgpt-a-mindblowing-ai-chatbot/

answers are correct or not.

Biologists Humberto Maturana and Francisco Varela[2] explain that the biological structure of an organism determines how it can interact and that consciousness and thought arise in networks of coordination of such actions. Thus the dualistic model of autonomous software operating biologically simulated machines will not suffice to generate machine intelligence.

Hegel's dialectical philosophy of identity in difference presents a similar insight, in which the mind(soul)/body duality is sublated by the dialectical relation [activity] that logically [as thought] holds between soul and body.

Heidegger argued that we can only have a concept of a 'hammer' because we grow up in a culture where such objects are familiar. Dreyfus thought that computers have no body, childhood, or cultural practice and therefore could not acquire intelligence at all.[3]

We do not have to be taught an algorithm [mathematical formalism] in order to learn how to ride a bike. We have what the philosopher Polyani called 'tacit knowledge'.[4] Basically, we learn [gain knowledge] by lived experience.

Neural network computing tries to mimic how the brain is structured with neurons to perform computations. It does not require algorithmic programming to accomplish its work of correlation and probability calculations on what is called Big Data. This would seem to handle the problem of tacit knowledge, but it cannot avoid the problem that the data used is related to the human models by which it is collected.[5]

A modern idea that has become significant lately is called the connectome — comprehensive maps of neuron connectivity to better understand the structural-functional relationship of the brain. So far, the only complete connectome that has been produced in the animal kingdom belongs to the humble roundworm, *C. elegans* with 302 neurons.

What is the result of having this map? Anthony Movshon of New York University said, "I think it's fair to say…that our understanding of the worm has not been materially enhanced by having that connectome available to us. We don't have a comprehensive model of how the worm's nervous system actually produces the behaviors. What we have is a sort of a bed on which we

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[2] Maturana, H., and F. Varela. 1988. The Tree of Knowledge. Boulder, CO: Shambala Publications
[3] Dreyfus HL, Dreyfus SE, Mind over machine. Basil Blackwell (1986)
[4] Polanyi M (2009) The tacit dimension (1966). The University of Chicago Press, Chicago
[5] Ragnar Fjelland, Why general artificial intelligence will not be realized. Humanities and Social Sciences Communications volume 7, (17 June 2020) https://www.nature.com/articles/s41599-020-0494-4

can build experiments — and many people have built many elegant experiments on that bed. But that connectome by itself has not explained anything." Others claim such diagrams provide useful examples of how neurocircuits work.[6]

The often-studied brain of a fruit fly, Drosophila melanogaster, is only about the size of a poppy seed; it comprises roughly 100,000 neurons. A fruit fly's brain consumes only a few microwatts of power, and yet is still able to integrate multi-sensory information, actions of flight, and control over relatively complex behavior in order to survive. Much of its connectome has been mapped. Conventional computers are no way near as efficient. An average computer sensor node consumes about one milliwatt of power, which is around a thousand times more than that used by a fruit fly.

> "Freedom of action from automatic impulses is considered a hallmark of cognition or intelligence. What our findings show is fruit flies have a surprising mental capacity that has previously been unrecognized."[7]

Computers are simply unable to replicate the integral multi-sensory navigational abilities of a fruit fly, what to speak of the engineering feat of producing an aeronautical device of such miniature nature. Contemplating such things may help to create a humble appreciation of the amazing features of Nature and the infinite spiritual potential of human nature that lies beyond the formal intellectual framework of which we are capable.

So far, no autopoietic computer has ever been built. Here is a Youtube video on the subject: Autopoietic Machines: Beyond Half-Brained AI and Church-Turing Thesis
https://youtu.be/uviuBH5VRJs

[6] Scientific American, Ferris Jabr, The Connectome Debate: Is Mapping the Mind of a Worm Worth It? October 2, 2012.
[7] Oxford University News and Events, 22 May 2014.
https://www.ox.ac.uk/news/2014-05-22-fruit-flies-show-mark-intelligence-thinking-they-act