
From: jeffrey E. <jeevacation@gmail.com>
Sent: Sunday, August 14, 2016 12:00 PM
To: [REDACTED]
Subject: Re:

Thx perfect

On Sunday, 14 August 2016, [REDACTED] = <[REDACTED] <mailto:[REDACTED]> > wrote:

Jeffrey, there are several sides to this:

1. Computers that are technically different from our current digital computer architectures, but can do the same things, because they can mathematically be proven to be equivalent, and we can build a digital equivalent. Examples are computers with ternary logic, neural networks, factor graphs etc.

2. Probabilistic computers: instead of deterministic state transitions, they change state with a certain probability. We can get them to approximate determinism with arbitrary precision by stacking the probabilistic gates. Many cognitive scientists and AI researchers believe that brains are in that category. (We can also reproduce their behavior on a digital computer by adding random noise.)

3. Computers that are technically different from our current digital computers, but are still mathematically equivalent, yet it may not be practical to build a digital equivalent, because it would be too large or too slow. Examples are DNA computers, chaotic computers etc. Digital physicists ([REDACTED]) believe that even the universe is in this category. [REDACTED] thinks the brain is in this category (we need to build electronic simulations of spiking neurons).

4. Quantum computers: they still cannot do anything but manipulate information, but they can (hopefully one day) do a few things efficiently, like factoring large numbers, so they are in principle more powerful than conventional computers. [REDACTED] thinks the universe is in this category, and [REDACTED] thinks the brain is in this category.

5. Hypercomputers with true continuum dynamics. Such computers can solve the 3 body problem with infinite precision in finite time etc. (Most of) traditional physics believed that the universe must be continuous, and even contemporary physics usually has continuous time etc. Such computers can be approximated to an arbitrary degree by digital computation, but not reproduced exactly. Most computer scientists with an opinion on the matter think that such hypercomputers cannot exist.

6. Hypercomputers with true infinities, which can use an infinite number of inputs to compute a result in finite time. For instance, in this view, all of the universe (not just a finite amount of information in its lightspeed cone) could affect a single point.

7. A-causal computers: For instance, a universe with time machines could send information that you compute today to help you in your past. Mathematically, such computers can be described, but there is no indication that they could exist.

8. Reversible computers: A reversible computer cannot delete information, i.e. every state has exactly one preceding state. Reversible computers can be easily implemented in a normal digital computer, but a reversible computer that tries to implement a digital computer will accumulate entropy in the form of garbage bits. I believe that our universe is a reversible computer (our brain is obviously not).

The list is not exhaustive, but I think these are the most relevant categories of unconventional/alternative computation, from a theoretical perspective. Additionally, there are notions of things that are "more than computation" in any of the senses above. They involve referential semantics, normative/social semantics and other dark magic. [REDACTED] and many other philosophers believe that our brains and the universe do "more than computation", but they do not have good concepts to explain or formalize their ideas. They probably cannot have such concepts, because they would have to leave the domain of mathematics (i.e. formal languages) for them, so there is very little to talk about except for negative claims ("computers cannot do X").

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> On Aug 13, 2016, at 15:55, jeffrey E. <jeevacation@gmail.com <javascript:;> > wrote:
>
> http://uncomp.uwe.ac.uk/LCCOMP/Anuncios/Entries/2015/8/31_UCNC_2015.html
<http://uncomp.uwe.ac.uk/LCCOMP/Anuncios/Entries/2015/8/31_U=NC_2015.html>
>
> On Sat, Aug 13, 2016 at 6:36 AM, [REDACTED] <[REDACTED] <javascript:;> > wrote:
> Looks interesting. Haven't seen it before. Sounds like something [REDACTED] would know.
>
>> On Aug 13, 2016, at 6:23 AM, jeffrey E. <jeevacation@gmail.com <javascript:=> > wrote:
>>
>> Natural/Unconventional Computing and Its Philosophical Significance - MDPI
>> MDPI › pdf
>>
>>
>> Have you guys looked at this?
>>
>>
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