Association for Computing Machinery
Advancing Computing as a Science & Profession

Ubiquity, an ACM publication
December 2014

Ubiquity Symposium

The Technological Singularity

Closing Statement: Reflections on a Singularity Symposium

by Espen Andersen

Editor's Introduction

Espen Andersen summarizes the debate surrounding the "technological singularity" and answers the question: Can computers become smarter than people?

2014 Copyright held by the Owner/Author.
Publication rights licensed to ACM.

Ubiquity Symposium

The Technological Singularity

Closing Statement: Reflections on a Singularity Symposium

by Espen Andersen

Recruiting writers for a symposium consists of writing a document laying out the question to be discussed, sending it to a number of invitees with experience and opinions on the matter, going back and forth a bit about the contributions, arranging them in a thematically useful order, and writing the final statement—summing up what one has learned. All straightforward and logical. So what have I learned from this question: *Can computers become smarter than people?*

First and foremost, though many people have thoughts and (sometimes quite vociferous) opinions about the technological singularity, not many are willing to express them in print. The topic elicits derogatory comments about technological determinism, utopianism, apocalyptic visions, unbridled optimism, and, as one well-known Internet professor called it, mathematical "party tricks" related to choosing scales for exponential functions. (See Modis's "The Singularity Myth" for one example of the latter). Moving their thoughts from oral ephemera to digital perpetuity turns out to be hard, though—whether because of work commitments or (I suspect) difficulty in transforming hastily formed opinion to immaculately executed logical argument.

Nevertheless, some heeded the call, and all the more power to them for being willing to reflect and analyze the concept and the likelihood that it will ever make it into reality.

Ernest Davis's "The Singularity and the State of the Art in Artificial Intelligence"
A professor at NYU, Davis reviewed current AI literature and did not find any indication that the field is progressing fast enough for a singularity to occur within the time frame envisioned by Kurzweil, if ever. As Davis explained, "the quality of the best software tends to plateau out at a level considerably below human abilities, though there are important exceptions. Once such a plateau has been reached, getting further improvements to quality is generally extremely difficult and extremely slow." He concluded "in the current state of the art, success in such tasks can only be achieved to the extent that the issues of real-world reasoning can be avoided," but holds open the possibility that some sort of super-human capability can be reached by sidestepping AI, possibly by including a human in the loop.

2014 Copyright held by the Owner/Author.
Publication rights licensed to ACM.

Kevin Warwick's "Human Enhancement - The Way Ahead"
Kevin Warwick is a British professor with a long history of experiments in human-computer interfaces—directly interfaced, that is. He gave an account of the state of the art of this particular line of research, seeing human enhancement as a possible answer to smarter and smarter computers: "So it is possible that in the future you will have a choice. Maybe you would like to remain a human just as you are, possibly ending up as a pet if you're particularly lucky. Or maybe you would like the option of a simple upgrade by means of a neural implant, why not take it step by step if you can."

Peter Cochrane's "Exponential Technology and the Singularity"
Cochrane is the previous Head of research for British Telecom, now an independent consultant, speaker, and writer. He presented a mathematical argument, arguing the complexity of the human brain increases (with the number of processors) in a steeper curve than possible with digital computers, indicating that the singularity is further off than we think. In short, that "machine intelligence is growing in a logarithmic (or at best linear fashion) rather than the assumed exponential rate."

Leah Greenfeld and Mark Simes's "Computers Versus Humanity: Do we compete?"
Greenfeld, and Simes discussed the notion of intelligence and argued that since computers can never have culture, they cannot be intelligent: "A core quality of the symbolic and historical process of human life, which distinguishes humanity from all other forms of life, making it a reality sui generis on both the collective level (as culture) and on the level of the individual (as the mind), is its endless, unpredictable creativity. It does not process information: It creates. It creates information, misinformation, forms of knowledge that cannot be called information at all, and myriads of other phenomena that do not belong to the category of knowledge. Minds do not do computer-like things, ergo computers cannot outcompete us all."

Peter J. Denning's "What About an Unintelligent Singularity?"
Denning, former ACM chairman and editor in chief of ACM *Ubiquity*, observed that there are three paths to singularity: the bionic (humans assimilating machines), the robotic (smart entities taking over), and, the as yet discussed automation path; where "we are singularly, done in, not by a superhuman intelligence, but by a vast, unintelligent, and unforgiving system of rule-following machines." In other words, we may end up with a bureaucratic singularity.

For my own part, I think the debate—both here and in general—has shown that while the technology keeps progressing, so does our understanding of human intelligence. Computers can now drive cars, win "Jeopardy!" and find seemingly intelligent connections in seas of data. But humans evolve, too—not in the sense that our brains physically change (though, if you are

2014 Copyright held by the Owner/Author.
Publication rights licensed to ACM.

a London cab driver for example, on one level they do), but in that our culture and behavior, collectively and individually, change. An increased ability to communicate leads us to communicate rather than plan; an increased ability to store information leads us to seek answers by search rather than categorization; and an increased ability to process might lead us, as SAP's Hasso Plattner says, to stop treating information in terms of aggregated numbers and instead deal with a world only consisting of individuals.

The question is not really about whether computers become more intelligent than humans in terms of raw information processing capacity—in some dimensions they already are. Whether that constitutes intelligence or not, is a philosophical question rather than one pertaining to computer science, bioinformatics, or whatever. What does concern all of us is that as development of new technology evolves, it tends to follow a certain sequence: First the new technology, then its use, then the cultural norms and social regulations governing it. Runaway computer intelligence needs informed governance—in fact, Edward Snowden in a recent interview said the lack of computer literacy may be the single most important factor in lack of oversight over computer surveillance—and the foresight to understand what the technology can be used for, not merely the will to not have bad things happen. Stephen Hawking and Elon Musk have voiced concerns about "runaway AI" where humans, developing on a biological time scale, may be superseded.

My conclusions for this is similar to Douglas Adams's opening text on the "Hitchhiker's Guide to the Galaxy": "Don't panic." Keep the conversation going. And, perhaps, reflect a bit on what really goes on in that machine you now carry around in your pocket.

Admission: The conclusion of this ACM Ubiquity *symposium has, for a number of reasons, some under my control and some not, been delayed for a long time. For the delays pertaining to me, I can only apologize and hope that the authors providing this material can forgive me.*

About the Author

Espen Andersen is Associate Professor of Strategy and Director of the Technology Strategy Center with The Norwegian Business School in Oslo. He is a frequent speaker and writer on technology and business strategy issues.

2014 Copyright held by the Owner/Author.
Publication rights licensed to ACM.

DOI: 10.1145/2668390

References

Adams, D. "The Hitchhiker's Guide to the Galaxy." BBC. (TV series). 1981.

Andersen, E. Attendre le Suitcase. *Ubiquity* 3, 7 (2002).

Andersen, E. The Waning Importance Of Categorization. *Ubiquity*. 7, 19, (2006).

Modis, T. The Singularity Myth. *Technological Forecasting & Social Change* 73, 2 (2006).

Rusbridger, A. and MacAskill, E. Edward Snowden Urges Professionals to Encrypt Client Communications. *The Guardian*. July 17, 2014.

2014 Copyright held by the Owner/Author.
Publication rights licensed to ACM.