When machines can do any job, what will humans do?

13 February 2016

Rice University computer scientist Moshe Vardi expects that within 30 years, machines will be capable of doing almost any job that a human can. In anticipation, he is asking his colleagues to consider the societal implications. Can the global economy adapt to greater than 50 percent unemployment? Will those out of work be content to live a life of leisure?

"We are approaching a time when machines will be able to outperform humans at almost any task," Vardi said. "I believe that society needs to confront this question before it is upon us: If machines are capable of doing almost any work humans can do, what will humans do?"

Vardi will address the issue in an 8 a.m. Sunday presentation, "Smart Robots and Their Impact on Society," at one of the world's largest and most prestigious scientific meetings—the annual meeting of the American Association for the Advancement of Science in Washington, D.C.

"The question I want to put forward is, 'Does the technology we are developing ultimately benefit mankind?'" Vardi said. He will present a body of evidence that suggests the pace of advancement in the field of artificial intelligence (AI) is increasing, even as existing robotic and AI technologies are eliminating a growing number of middle-class jobs and thereby driving up income inequality.

Vardi, a member of both the National Academy of Engineering and the National Academy of Science, is a Distinguished Service Professor and the Karen Ostrum George Professor of Computational Engineering at Rice, where he also directs Rice's Ken Kennedy Institute for Information Technology. Since 2008 he has served as the editor-in-chief of Communications of the ACM, the flagship publication of the Association for Computing Machinery (ACM), one of the world's largest computational professional societies.

Vardi said some people believe that future advances in automation will ultimately benefit humans, just as automation has benefited society since the dawn of the industrial age.

"A typical answer is that if machines will do all our work, we will be free to pursue leisure activities," Vardi said. But even if the world economic system can be restructured to enable billions of people to live lives of leisure, Vardi questions whether it would benefit humanity.

"I do not find this a promising future, as I do not find the prospect of leisure-only life appealing. I believe that work is essential to human well-being," he said.

"Humanity is about to face perhaps its greatest challenge ever, which is finding meaning in life after the end of 'In the sweat of thy face shalt thou eat bread,'" Vardi said. "We need to rise to the occasion and meet this challenge" before human labor becomes obsolete, he said.

In addition to dual membership in the National Academies, Vardi is a Guggenheim fellow and a member of the American Academy of Arts and Sciences, the European Academy of Sciences and the Academia Europa. He is a fellow of the ACM, the American Association for Artificial Intelligence and the Institute for Electrical and Electronics Engineers (IEEE). His numerous honors include the Southeastern Universities Research Association's 2013 Distinguished Scientist Award, the 2011 IEEE Computer Society Harry H. Goode Award, the 2008 ACM Presidential Award, the 2008 Blaise Pascal Medal for Computer Science by the European Academy of Sciences and the 2000 Goedel Prize for outstanding papers in the area of theoretical computer science.

Vardi joined Rice's faculty in 1993. His research centers upon the application of logic to computer science, database systems, complexity theory, multi-agent systems and specification and

verification of hardware and software. He is the author or co-author of more than 500 technical articles and of two books, "Reasoning About Knowledge" and "Finite Model Theory and Its Applications."

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