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Randy Johnston • May. 22, 2018



From the May 2018 Issue.

One of the hot areas of emerging technology is Artificial Intelligence or AI. You know a topic is hot when products use the terminology in their name or in their marketing materials. We've see this done with "ease of use", Cloud Computing, and Blockchain. Artificial Intelligence is so hot of a topic among the development community that the marketing teams are saying products have AI when in fact, they do not. Because

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On the positive side:

- Machines mimic cognitive functions associated with human minds such as learning and problem solving.
- As AI becomes more capable, tasks that were considered AI are considered solved, for example, OCR.
- Today, AI developments include human speech, autonomous cars, interpreting complex data like images and video.
- Algorithms can learn from data and provide insight and actionable items with minimal human intervention.

On the down side:

- For difficult problems, algorithms require enormous computation.
- "The development of full artificial intelligence could spell the end of the human race. Once humans develop artificial intelligence, it will take off on its own and redesign itself at an ever-increasing rate. Humans, who are limited by slow biological evolution, couldn't compete and would be superseded." Stephen Hawking. Other critics include: Bill Gates, Elon Musk, and Peter Thiel.
- Devaluation of humanity.
- Decrease in demand for human labor.
- Artificial moral agents.
- Machine ethics.
- Malevolent and friendly AI.
- Machine consciousness.
- Robot rights.
- Superintelligence.

AI has been under development for a long time, starting at Dartmouth in 1956. I was

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computational philosophy, and computer science. Together the human-like behavior, mind and actions make up AI.

We've seen the results of AI with public relations stunts when:

- Deep Blue became the first computer chess-playing system to beat a reigning world chess champion, Garry Kasparov on May 11, 1997.
- In a February 2011 *Jeopardy*! quiz show exhibition match, IBM's question answering system, Watson, defeated the two greatest Jeopardy champions, Brad Rutter and Ken Jennings, by a significant margin.
- At the 2017 Future of Go Summit, AlphaGo won a three-game match with Ke Jie, who at the time continuously held the world No. 1 ranking for two years.

Why?

AI is a broad collection of topics and approaches. Because there are so many topics to cover, there are broad fields of study that each have a lot of depth. However, purists are after the last bullet in the list below, General Intelligence. This is not around the corner, as computer scientists of the 1950's believed, but a decade or more into the future, even with the rapid progress being made today. There are a number of problems AI is trying to solve:

- Reasoning AI has progressed using "sub-symbolic" problem solving statistical approaches to AI mimic the human ability to guess faster and more accurately.
- Knowledge representation a representation of "what exists" is an ontology: the set of objects, relations, concepts, and properties formally described so that software agents can interpret them.
- Planning intelligent agents must be able to set goals and achieve them, modifying inputs as needed.

• Learning – the study of computer algorithms that improve automatically through

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that can recognize, interpret, process, and simulate human affects (=emotions), needed for two reasons:

- o being able to predict the actions of others, such as in self-driving vehicles.
- o facilitate human-computer interaction by showing emotions.
- Creativity theoretical and/or practical generation of novel and useful outputs including music and art.
- General intelligence researchers think that their work will eventually be incorporated into a machine with artificial general intelligence, while a few believe that anthropomorphic features like artificial consciousness or an artificial brain may be required for such a project.

So how do Artificial Intelligence approaches work? They use:

- Cybernetics and brain stimulation connection to neurology .
- Traditional symbolic AI John Haugeland named these approaches to AI "good old fashioned AI" or "GOFAI" exploring the possibility that human intelligence could be reduced to symbol manipulation.
- Cognitive simulation Economist Herbert Simon and Allen Newell studied human problem-solving skills from psychological experiments resulting in the Soar architecture in the 1980's.
- Logic-based John McCarthy in his laboratory at Stanford (SAIL) used formal logic and led to the Prolog language and the science of logic programming.
- Anti-logic or scruffy Marvin Minsky and Seymour Papert found that solving difficult problems in vision and natural language processing required ad-hoc solutions.

• Knowledge-based – led to the development in the 1970's of expert systems,

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- cyconne, contraction, companyer with contract to creat

- Statistical methods sophisticated mathematical tools to solve specific subproblems that are truly scientific, in the sense that their results are both measurable and verifiable.
- Intelligent agent a system that perceives its environment and takes actions which maximize its chances of success.

Read my column next month (June 2018) to find out "What AI Means for the Practice of Accounting and to Accounting Professionals."

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