It Is Artificial Idiocy That Is Alarming, Not Artificial Intelligence

David Sanders and Giles Tewkesbury
School of Engineering, University of Portsmouth, Anglesea Road Building, Portsmouth, U.K.

Keywords: Artificial Intelligence, AI, Computer, System.

Abstract: Lots of people believe the brain can be simulated by machines and because brains are intelligent, simulated brains must also be intelligent; thus machines can be intelligent. This position Paper discusses whether that is true and whether we should be worried about it if it is.

1 INTRODUCTION

Artificial Intelligence (AI) is about computer systems that can simulate intelligent behaviour and perform tasks normally requiring human intelligence, such as visual perception, speech recognition and decision-making (Bergasa-Suso *et al* 2005; Chester *et al* 2006; Sanders 1999, 2009a).

Engineers also expect systems to interact with the real world to do something, such as to get a mechanical system to move (Sanders, 1995, 2007, 2008b; Sanders and Stott, 1999; Sanders and Tewkesbury, 2009). That involves a lower form of intelligence within control loops that interface with sensors and actuators (Sanders, 2008c), similar to autonomic nervous systems in animals.

Systems with a lower form of intelligence tend to act repetitively and unconsciously. In animals they regulate heart rate etc. These autonomic nervous systems have two branches: sympathetic and parasympathetic (Pocock, 2006). A sympathetic system is quick and mobilizing, and parasympathetic is a more slowly activated dampening system. In engineering that can be similar to needing to quickly control actuators (such as motors) and more slowly to monitor sensors (Sanders *et al*, 1996). Autonomic systems need to be told what to do and for that, some higher intelligence was required.

As autonomic systems became more reliable, they could be left unattended, and attention shifted to more intelligent systems to supervise them.

2 THE BRAINS OF ANIMALS

The more intelligent systems are similar to the brains of animals (Kandel, 2012). That is, they tend to be more cognisant and less repeatable.

The brain is the higher control centre for functions such as walking and it controls our thinking functions and all our intellectual (cognitive) activities. It plans and decides how we will do things, how we understand our world, and it learns and remembers.

Originally, computer engineering was all about continuous systems but the development of digital computers led to discrete computer systems because communications and action were managed by clocks. Many engineering systems that are computer controlled still consist of both digital and analogue components as the analogue components interface to the real world.

Some believe the brain can be simulated and because brains are intelligent, simulated brains must also be intelligent; thus machines can be intelligent. And a computer can do many things over and above managing an autonomic system or two (Chester, 2007; Sanders *et al*, 2009; Stott,and Sanders, 2000). It may be technologically feasible to copy the brain directly into hardware and software, and that such a simulation will be essentially identical to the original (Russell and Norvig, 2003; Crevier, 1993).

Computers have heaps of speed and memory but they can only do what their software designers understood well enough to allow them to do. Some skills and talents that children don't normally develop until they are teenagers may be there, and some competences enjoyed by a two year old are still out (Questions, 2015). The matter is further complicated by the fact that we still have not determined exactly what human abilities are.

When someone does better than a computer on

Sanders D. and Tewkesbury G..
It Is Artificial Idiocy That Is Alarming, Not Artificial Intelligence.
DOI: 10.5220/0005473103450350
In *Proceedings of the 11th International Conference on Web Information Systems and Technologies* (WEBIST-2015), pages 345-350
ISBN: 978-989-758-106-9

some task or if a computer uses a lot of computation to do as well as a human, then that demonstrates that the software engineers lacked a comprehension of the intelligent processes and structures required (Sanders, 2009b; Sanders *et al*, 1999, 2005, 2010; Stott, *et al*, 1997).

Novel computer technologies have appeared on the horizon that may change things (Masi, 2007). Computing has developed over the decades and some has begun to be regarded as AI since John McCarthy coined the term (Skillings, 2006).

3 ARTIFICIAL INTELLIGENCE

AI is the intelligence exhibited by machines or software. It is often not about just feigning human intelligence. Expert systems sometimes try to learn something about how to solve problems and behave by observing people but most engineering involves studying real problems rather than studying people or animals. General intelligence is still amongst the long term goals (Kurzweil, 2005) and the central challenges of AI include reasoning, knowledge, planning, learning, communication and perception. The whole discipline is interdisciplinary in an effort to cover all of that, and includes philosophers, linguists, engineers, computer scientists, psychologists, mathematicians and neuroscientists. Prevalent approaches to achieve them include statistical methods, computational intelligence and traditional symbolic AI. There are a large number of tools used in AI, including search and mathematical optimization, logic, methods based on probability, and many others: knowledge-based systems, fuzzy logic, automatic knowledge acquisition, neural networks, genetic algorithms, case-based reasoning and ambient-intelligence(Sanders and Gegov, 2013).

The appropriate deployment of the new AI tools will contribute to the creation of more capable computer systems. Other technological developments that will impact on AI include data mining techniques, multi-agent systems and distributed self-organising systems.

All that still presupposes that at least some of something like human intelligence can be so completely and exactly described that a machine can be built to replicate it. That raises philosophical issues about ethics and the character of the mind, issues addressed by fable, literature and philosophy since time immemorial (McCorduck, 2004). But how can it be done?

Mechanical or formal reasoning was developed by philosophers and mathematicians in ancient times and a study of logic led directly to the programmable digital electronic computer. Turing's theory of computation suggested that a machine could simulate any conceivable act of mathematical deduction by shuffling symbols such as "0" and "1" (Berlinski, 2000). That, along with discoveries in neurology, information theory and cybernetics, inspired researchers to consider the possibility of building an electronic brain (McCorduck, 2004).

The brain is an analogue computer and not a digital computer (Dyson, 2014). Intelligence in the brain may not be an algorithm. There is little evidence for a programmable digital computer evolving abilities to take initiative or make new choices. Why should we think that a digital computer is a good model for a brain? Turing machines are discrete machines and we are continuous organisms. Advances have been made with continuous models of neural systems but the present state of the system tends to determine the next state of the system, so that next state is constrained by the rules and formulae in them. There may be little for awareness and perception to do in a purely digital system.

In the future, humankind may construct a formidable AI but it is not here yet, although it always feels like it is just around the next corner.

4 HOW DID WE GET HERE?

It was probably the idea of making a ``child machine" that could improve itself by reading and learning from experience that began the study of machine intelligence (Sanders and Gegov, 2015). That was first proposed in the 1940s and a number of people independently started to work on intelligent machines. Zadeh (1950) published a paper entitled "Thinking Machines" and Turing (1950) discussed the conditions for considering a machine to be intelligent. He made his claim that if a machine could successfully pretend to be human to a knowledgeable observer then it should be considered intelligent.

In 1956, some computer scientists gathered at Dartmouth College to contemplate a new topic; AI. John McCarthy coined the name "Artificial Intelligence" just ahead of that conference. A fundamental notion was that characteristics of human intelligence could be defined. McCarthy defined AI as "the science and engineering of making intelligent machines" (McCarthy, 2008).

By the 1960s, there were many researchers in the area, and most based their work on programming computers. Minsky predicted in 1967 that "within a generation the problem of creating AI will be substantially solved" (Dreyfus, 2008). But then, the discipline ran into unforeseen problems with the failure of any machine to fathom even the most elementary children's story. Machine Intelligence programs lacked intuitive common sense.

Now (nearly sixty years after that first conference), we have still not managed to create a ``child machine" (Sanders and Gegov, 2015). Programs still can't learn much of what a child learns naturally.

But, we may be at a time when our biology seems too fragile, sluggish and complex in many situations (Sanders, 2008a). We are turning to powerful new technologies to overcome those weaknesses, and the longer we use that technology, the more we are getting out of it. Our machines are exceeding human performance in more and more tasks. As they merge with us more intimately and we combine our brain power with computer capacity to deliberate, analyse, deduce, communicate, and invent then many scientists are predicting a period when the pace of technological change will be so fast and far-reaching that our lives will be irreversibly altered.

A difficulty is that we cannot come to agreement about what kinds of computation we call intelligent. Some think that human-level intelligence might be accomplished by writing large numbers of programs or by assembling enormous knowledge bases in the computer languages being used now. Though, the majority of researchers now appear to believe that new underlying elementary ideas are needed, and so we cannot predict when human-level intelligence will be achieved (McCarthy, 2008).

Machine Intelligence combines several cutting-edge technologies to give computers an ability to learn, adapt, make decisions and show new behaviours. There are some technologies that might appreciably boost the ability of computers (Brackenbury, 2002; sanders, 2008):

- Natural language understanding.
- Machine reasoning to provide inference, theorem-proving, and relevant solutions.
- Knowledge representation for perception and problem solving.
- Knowledge acquisition using sensors to learn automatically for problem solving.

At one end of the spectrum of research there are handy robotic devices such as vacuum cleaners and more personal robots. These could be the beginning of a new generation of inexpensive robots with new abilities. At another end of the spectrum, direct brain-computer interfaces and brain augmentation are being considered (together with ultra-high-resolution scans of the brain charted by computer imitation). Some of these are implying the prospect of smarter-than-human intelligence. But what does "smarter-than-human" mean?

There are negative opinions. John Searle says the idea of a non-biological machine being intelligent is incoherent; Hubert Dreyfus says that it is impossible. Joseph Weizenbaum says the idea is obscene, anti-human and immoral. Some people are disillusioned because they invested in AI and computing companies that went bankrupt (Questions, 2015) and others are concerned that AI systems may do us harm (either intentionally or by mistake).

5 CAN THEY TURN HOSTILE?

Is AI going to terminate us all (Lanier, 2014)? We have not created a formidable AI yet but only last December an open letter was signed by a large (and growing) number of people that called for cautiousness to make sure intelligent machines do not run ahead of our control.

A recent letter from Stephen Hawkin notes "*There is now a broad consensus that AI research is progressing steadily, and that its impact on society is likely to increase. The potential benefits are huge, since everything that civilization has to offer is a product of human intelligence; we cannot predict what we might achieve when this intelligence is magnified by the tools AI may provide, but the eradication of disease and poverty are not unfathomable. Because of the great potential of AI, it is important to research how to reap its benefits while avoiding potential pitfalls*."

Other essayists added that "*our AI systems must do what we want them to do*," and they listed some research priorities they think may "*maximize the societal benefit*." The chief worry is not eerie growing consciousness but merely the ability to make high-quality decisions that are aligned with our values (Lanier, 2014), something else that is tricky to identify.

A system that optimises a function of variables, where the objective depends on a subset of them, will often set remaining unconstrained variables to extremes, for example 0 (Russel, 2014). But if one of those unconstrained variables is actually something we care about, any solution may be highly undesirable. This is the old legend of the genie in the lamp; you get precisely what you ask for, not what you want. As systems become more accomplished decision makers and are connected through the Internet then they could have an unanticipated and unpredictable impact.

Improving decision quality has not proven to be easy though. Research has been gathering pace as chunks of the abstract structure come together and the sub systems increase in size, quantity and potency. Researchers are conspicuously more hopeful and confident than they were a few years ago but there is a respectively bigger unease about hypothetical but possibly conceivable menaces.

Instead of just crafting pure intelligence though, we need to be making more useful intelligence. AI is a tool not a threat (Brooks, 2014). He says "relax; chill" … because it all comes from basic misinterpretations about the kind of advancement being made, and from a misunderstanding of how far we really are from having artificially intelligent beings. It is a mistake to worry about us creating malign AI anytime soon and worry stems from not differentiating between the real recent advances, and the massive difficulty of creating perceptive AI. Machine learning allows us to teach things like how to differentiate between categories of responses and to fit curves to data. But that is only a tiny portion of the puzzle. The learning does not help a computer to understand anything about the human users or their intentions or desires. Any spiteful AI would require those abilities.

The intelligent systems we are creating are not able to relate to the real world with any understanding. They do not know that humans exist in any meaningful way (Brooks, 2014). The systems don't even know that computers exist. But they do know about a tiny portion about the world and they might have a little common sense.

There is attention-grabbing research in cloud computing and big data. Connecting the semantic knowledge learned by many computers into a collective public depiction can mean that anything learned by one can be speedily distributed to all, but that can just make the challenges greater. But it is not just a matter of throwing more computation at challenges. What we need is more superior, more convenient and more suitable AI.

AI may just be a fake thing (Myhrvold, 2014). It may just add an unnecessary philosophical layer to what otherwise should be a technical field. If we think about specific practical problems confronting researchers, we actually end up with something more boring but that makes more sense. For example, fuzzy logic can decide between classifications and that is useful (Gegov *et al*, 2014a and 2014b). It may not matter so much that they cannot discuss politics with us. That sort of sensible puzzle solving is not leading to the creation of life, and definitely not life that would be superior to us. If we think about AI as a bundle of methods or as a mathematics subject then it brings tangible improvements and benefits. If we think about it as a mythology then we waste time and effort.

It would be thrilling if AI was functioning so well that it was about to get frightening (Wastler, 2014) but the parts that may cause real difficulties to us are not computers but actuators, as they interface to the real world, and that is where bad things happen. A one or two year old infant version of AI may be more frightening. One and two year-olds don't realise when they are being damaging.

6 WHERE ARE WE GOING?

Some developments might advance progress: Cheap parallel computation might deliver the equivalent of billions of neurons; Big Data might help with classification; and superior algorithms may allow high speed learning. Increasing availability of relatively cheap massive computing power and improvements in science are allowing recursive algorithmic solutions to problems as opposed to searching for closed-form solutions (Kucera, 1997).

But as computers are getting cleverer, what should they be allowed to? Should they decide who to kill on the battlefield? The Association for the Advancement of AI has formally addressed these ethical issues with a series of panels (Muehlhauser, 2014).

Decision-making systems need interdisciplinary research and cross-fertilization. Emerging areas include hybrid systems, fuzzy logic control, parallel processing, neural networks and learning.

The idea that a machine can ultimately think as well or better than a human is a welcome one (Myhrvold, 2014) but our brain is an analogue device and if we are going to worry about AI we may need analogue computers and not digital ones. And analogue computing is making a comeback. But, the map is not the territory and a model is not the reality. If our replicas ever surpass the phenomena they're modelling, it would be a once-in-a-lifetime event.

People seem to be troubled by the thought that AI may take over choices that they think should be made by human beings, for example driving cars or aiming and firing missiles. These can be life and death decisions as well as ethical problems. If an AI system makes a decision that we regret, then we change their algorithms. If AI systems make decisions that our society or our laws do not approve of then we will modify the principles that govern them or create better ones. Of course human beings make mistakes and intelligent machines will make mistakes too, even big mistakes. Like humans, we need to keep watching over them, coaching and improving them but a problem is that we don't have a agreement on what is acceptable.

There is a difference between intelligence and decision-making. Intelligent machines can be very useful but stupid machines can be scary. As for human beings, Bishop has said that it is machine stupidity that is dangerous and not machine intelligence. A problem is that intelligent algorithms can make many appropriate decisions and then suddenly make a crazy one and flunk dramatically because of an occurrence that did not appear in training data. That is a problem with bounded intelligence. But we should fear our own stupidity more than the theoretical wisdom or foolishness of algorithms yet to come. Ingham and Mollard have said that AI machines have no emotions and never will because they are not subject to the forces of natural selection.

Kelly has said that there is no metric for intelligence or benchmark for particular kinds of learning and smartness and so it is difficult to know if we are improving.

As AI systems make blunders then we can make a decision about what is tolerable. Since AI is taking on some tasks that humans do, we have a lot to teach to them.

As humans, we only discern the real world through a virtual model that we think of as reality. Our memory is a neurological fabrication. Our brains produce our stories and although they are inaccurate, they are sufficient for us to stumble along. We may be beaten on specific tasks but overall, we tend to do admirably against machines. Brockman has said that they are a long way from replicating our flexibility, anger, fear, aggression, and teamwork. While appreciating the limited, chess playing talent of powerful computers, we should not be unsettled by it. Intelligent machines have helped us to become more skilful chess players. As AI develops, we might have to engineer ways to prevent consciousness in them just as we engineer other systems to be safe. After all, even with Deep Blue, anyone can pull its plug and beat it into rubble with a sledgehammer (Provine, 2014).

REFERENCES

Bergasa-Suso, J., Sanders, d., Tewkesbury, G., 2005. Intelligent browser-based systems to assist Internet users. IEEE T EDUC 48 (4), pp. 580-585.

Brackenbury, I., Ravin, Y., 2002. Machine intelligence and the Turing Test, *IBM Syst Jrnl, Vol: 41 3, pp 524-529*.

Brooks, R., 2014. *Artificial intelligence is a tool, not a threat* http://www.rethinkrobotics.com/artificial-intelligence-tool-threat in rethinking robotics. Jan 15.

Berlinski, D., 2000. The Advent of the Algorithm, Harcourt Books. ISBN 0-15-601391-6.Crevier, D., 1993. *AI: The Tumultuous Search for Artificial Intelligence*, New York, NY, USA: BasicBooks.

Chester, S., Tewkesbury, G., Sanders, D., et al 2006. New electronic multi-media assessment system. 2nd Int Conf on Web Info Sys and Tech, pp: 424 Year.

Chester, S., Tewkesbury, G., Sanders, D., et al 2007. *New electronic multi-media assessment system*. Web Info Systems and Technologies 1, pp 414-420.

Dreyfus, H., Dreyfus, S., 2008. *From Socrates to Expert Systems: The Limits and Dangers of Calculative Rationality*. WWW Pages of the Graduate School at Berkeley 15 Jan 15. http://garnet.berkeley.edu.

Dyson, G., 2014. *AI Brains Will be Analog Computers, Of Course*. Space Hippo. http://space-hippo.net/ai-brains-analog-computers. http://space-hippo.net/ai-brains-analog-computers. 15 Jan 15.

Gegov, A., Gobalakrishnan, N., Sanders, D., 2014b. *Filtration of non-monotonic rules for fuzzy rule base compression*. INT J COMPUT INT SYS 7 (2). pp. 382-400.

Gegov, A., Sanders, D., Vatchova, B., 2014a. C*omplexity management methodology for fuzzy systems with feedback rule bases*. J INTELL FUZZY SYST 26 (1). pp. 451-464.

Kandel, E., 2012 *Principles of neural science* ed: Kandel, E., Schwartz, J., Jessell, T.,. Appleton and Lange: McGraw Hill, pp. 338–343.

Kucera, V., 1997. *Control Theory and Forty Years of IFAC: A Personal View*. IFAC Newsletter Special Issue: 40th Anniversary of IFAC, Paper 5. http://web.dit.upm.es. Accessed 15 Jan 15.

Kurzweil, R., 2005. *The Singularity is Near*, Penguin Books. ISBN 0-670-03384-7.

Lanier, J., 2014. *The Myth Of AI - A Conversation with J Lanier*. Edge. http://edge.org/conversation. Jan 15.

Masi, C., 2007. *Fuzzy Neural Control Systems — Explained*. Control Engineering. http://www.controleng.com. 15 Jan 15.

McCarthy, J., 2008. *What Is Artificial Intelligence?*" Computer Science Department WWW Pages at Stanford University. http://www-formal.stanford.edu/jmc. Retrieved 14 Jan 15.

McCorduck, P., 2004, *Machines Who Think: A Personal Inquiry into the History and Prospects of Artificial Intelligence*, New York, AK Peters.

Muehlhauser, M., 2014. *Three misconceptions in Edge.org's conversation on "The Myth of AI"*.

Machine Intelligence Research Institute. https://intelligence.org/2014/11/18. 15 Jan 15.
Myhrvold, N., 2014. *Untitled*. Edge. http://edge.org/conversation. 15 Jan 15.
Pocock, G., 2006. *Human Physiology 3rd ed*, Oxford University Press. pp. 63–64.
Provine, R., 2014. *Untitled*. Edge the-myth-of-ai. http://edge.org/conversation. 15 Jan 15.
Questions,. 2015. *Basic Questions-what is Artificial intelligence?* Stanford University. http://www-formal.stanford.edu/jmc/whatisai. 15 Jan 15.
Russel, S., 2014. *Of Myths And Moonshine*. Edge. http://edge.org/conversation/the-myth-of-ai. Jan 15.
Russell, and Norvig., 2003. *Artificial Intelligence: A Modern Approach*, Pearson Education.
Sanders, DA., 1995. *The modification of pre-planned manipulator paths to improve the gross motions associated with the pick and place task.* ROBOTICA 13, pp: 77-85.
Sanders, DA., 1999. *Perception in robotics.* IND ROBOT 26 (2), pp: 90-92.
Sanders, DA., 2007. *Viewpoint - Force sensing*. IND ROBOT 34 (4), pp: 268.
Sanders, DA., 2008a. *Progress in machine intelligence*. IND ROBOT 35 (6). pp. 485-487. ISSN 0143-991X.
Sanders, DA., 2008b. *Controlling the direction of "walkie" type forklifts and pallet jacks on sloping ground.* ASSEMBLY AUTOM 28 (4), pp 317-324.
Sanders, DA., 2008c. *Environmental sensors and networks of sensor.* SENSOR REV 28 (4), pp: 273-274.
Sanders, DA., 2009a. *Introducing AI into MEMS can lead us to brain-computer interfaces and super-human intelligence*. ASSEMBLY AUTOM 29 (4), pp: 309-312.
Sanders, DA., 2009b. *Recognizing shipbuilding parts using artificial neural networks and Fourier descriptors.* P I MECH ENG B-J ENG 223 (3), pp: 337-342.
Sanders, DA., Bergasa-Suso, J., 2010 *Inferring Learning Style From the Way Students Interact With a Computer User Interface and the WWW.* IEEE T EDUC 53(4), pp: 613-620 .
Sanders, DA., Hudson, AD., 1999. *A specific blackboard expert system to simulate and automate the design of high recirculation airlift reactors.* MATH COMPUT SIMULAT 53 (1-2), pp: 41-65.
Sanders, D., 2015. *Artificial Intelligence in Control Engineering – this time it's powered wheelchairs.* Control Engineering, Feb 2015, pp 38-40.
Sanders, DA., and Gegov, A., 2013. *AI tools for use in assembly automation and some examples of recent applications.* ASSEMBLY AUTOM 33 (2). 184-194.
Sanders, DA., Haynes, BP., Tewkesbury, GE., 1996. *The addition of neural networks to the inner feedback path in order to improve on the use of pre-trained feed forward estimators*. MATH COMPUT SIMULAT 41(5-6), pp: 461-472.
Sanders, DA., Stott, I., 1999. *A new prototype intelligent mobility system to assist powered wheelchair users* IND ROBOT 26 (6), pp: 466-475.
Sanders, DA., Urwin-Wright, S., Tewkesbury, G., et al 2005. *Pointer device for thin-film transistor and cathode ray tube computer screens*. ELECTRON LETT 41 (16), pp 894-896.
Sanders, DA., Tan, YC., Rogers, I., et al 2009. *An expert system for automatic design-for-assembly*. ASSEMBLY AUTOM 29 (4), Pages: 378-388.
Sanders, DA., Tewkesbury, G., 2009. *A pointer device for TFT display screens that determines position by detecting colours on the display using a colour sensor and an Artificial Neural Network*. DISPLAYS 30 (2), pp 84-96.
Skillings, J., 2006. *Getting Machines to Think Like Us.* http://news.i.com.com. 10 Mar 14.
Stott,I., Sanders, DA., 2000. *New powered wheelchair systems for the rehabilitation of some severely disabled users.* INT J REHABIL RES 23 (3), pp 149-153.
Stott,I., Sanders, DA., Goodwin, M., 1997. *A software algorithm for the intelligent mixing of inputs to a tele-operated vehicle*. Euromicro Conf 95 in J SYST ARCHITECT 43 (1-5), pp 67-72.
Tewkesbury, GE., Sanders, DA., 1999. *A new simulation based robot command library applied to three robots* J ROBOTIC SYST 16 (8), pp: 461-469.
Turing, A., 1950. *Computing machinery and intelligence*. Mind, 1950.
Wastler, A., 2014. *Elon Musk, Stephen Hawking and fearing the machine*. CBN technology. http://www.cnbc.com/id/101774267#. 15 Jan 15.
Zadeh, L., 1950. *Thinking machines. A new field in electrical eng*. Col Eng Q 3: pp 12-13 and pp 30-31.