IN5480 - Individual assignment

Anton Lilleby - 20. September 2018

1. Three definitions of AI

The book, Computational intelligence: a logical approach, definition: "Computational intelligence is the study of the design of intelligent agents. An agent is something that acts in an environment - it does something (..) An intelligent agent is a system that acts intelligently: What it does is appropriate for its circumstances and its goal, it is flexible to changing environments and changing goals, it learns from experience, and it makes appropriate choices given perceptual limitations and finite computation." (Poole, Mackworth, & Goebel, 1998, p. 2)
AI from this definition is something that can act intelligently in the environment, i.e. agents that can do appropriate decision independent. For clarifications the aforementioned term "computational" is to be understood as artificial. (Poole et al., 1998, p. xv).

John McCarthy definition: "It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable." (John McCarthy, 1998)
AI according to his definition is the activity of engineering and constructing intelligence in machines/computer programs. AI is also not limited to evolution such as humans are biologically.

SAS definition: "AI makes it possible for machines to learn from experience, adjust to new inputs and perform human-like tasks." (Statistical Analysis System (SAS), n.d.)
AI according to this definition is Machine Learning, from learning through experience the machinery can perform similar tasks as human's can.

2. Three definitions of Robotics

David Hitt, from NASA, definition: "Robotics is the study of robots. Robots are machines that can be used to do jobs. Some robots can do work by themselves. Other robots must always have a person telling them what to do." (Hitt, 2009)
Robots according to this definition are machinery that can do jobs, and the execution of the task

can either have a low or high dependency of humans.

ISO definition: “An automatically controlled, reprogrammable, multipurpose, manipulator programmable in three or more axes, which may be either fixed in place or mobile for use in industrial automation applications.” (International Organization for Standardization, n.d.)
Robot according to this definition concerns industrial robots, humans are in control of them as they are maintainable or manipulative, and the machinery can have many purposes in either a fixed or mobile state.

The book, Robot Law, definition: “A robot is a constructed system that displays both physical and mental agency but is not alive in the biological sense” (Richards & Smart, 2016, p. 6)
Robot according to this definition is a constructed system that “exist” physically, but isn’t alive biologically.

3. Three definitions of Machine Learning

A course about Machine Learning at Stanford University definition: “Machine learning is the science of getting computers to act without being explicitly programmed.” (Stanford University, n.d.)
Machine Learning according to this definition is a system-process of self-learning and self-acting without the machine being explicit told to do something.

Dorian Pyle and Cristina San José, from McKinsey & Co, definition: “Machine learning is based on algorithms that can learn from data without relying on rules-based programming.” (Pyle & José, 2016)
Machine Learning according to this definition is based on algorithms that enables machines to learn from data without being bound to a set of rules.

The book, Machine learning, definition: “A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P, if its performance at tasks in T, as measured by P, improves with experience E.” (Mitchell, 1997, p. 2)
Machine Learning according to his definition is a computer program which improves its

performance in doing a task through its experience.

4. The relationship between AI and Robotics.

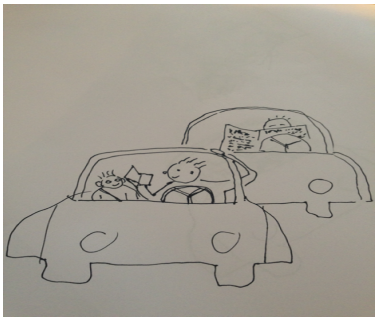
I see AI and robotics as two separate fields, as they can function independent from each other. Regardless of this, they can be combined with each other, creating a relationship. For instance, can a robot be programmed to do a certain automatic tasks. This cause the robot to behave automatic, but not autonomous. For the robot to function autonomous it will first need AI, the brain of the robot.

5. Own definition of AI.

"Machine learning derives from AI, the latter differs as it can perceive its environment and can adapt to it by doing intelligent decision making". AI for me is a self taught and intelligent system, with the features to sense and reason. However, I think it's difficult to truly understand what intelligent means, and how we can distinguish a system from being intelligent or just machine learned. Even James McCarthy, the coiner of AI, seems to find trouble defining intelligence. (John McCarthy, 1998, p. 2)

6. Drawing and interaction with an AI.

This drawing illustrates self-driving vehicles and the behaviour of the drivers. In this image I've tried to portray that the driver's attention is on their phone or newspaper, rather than the road. Hence, the drivers, have become bias to automation.



7. The different perspectives on the human relationship with tools.

The first view is from a German biologist, Jakob von Uexküll (1864-1944). Uexküll writes in his paper "Functional Tone" that each subject lives in its own subjective universe, where the subject and object form their own niche. It's first when the subjects enters into a relationship with an object the object becomes meaningful. The object can also be perceived differently in another subjective universe and thereby get a different meaning. When the subject enters a relationship with an object it imprints a meaning to it, thus the object will transform into

a “meaning-carrier”. As the object becomes a meaning-carrier it obtains a “functional tone” which is based on the subject’s mood. As i interpret it, Üexkull primordial focus was the relationship between animals and objects, but the theory could nevertheless be applied on humans and objects, for instance can a human enter a relationship with a sharp object and use it for dinner purposes or as a weapon, this is dependent on the subjects mood.

The second view is also from a fellow German, the philosopher Martin Heiedegger (1889-1976). In his article “Equipment” it emerges to me that subject and object cannot be fully separated and that there is a correlation between them. Perception cannot explain the relationship between subject and object and that we have to see beyond this relation and look at the “bigger-picture”, what it means for a being to exist. Subjects are according to him “being-in-the-world”, and the subject’s activity is what forms the perception of a tool and its use. Thus, objects are only a tool in a meaningful context. For instance, for the ongoing activity “dining” at a living-space-environment a sharp object is used by a human e.g. as a knife for slicing the bread which is a meaningful activity and thus is the object also perceived as a tool in this meaningful context.

The third view is from an American psychologist, James J. Gibson (1904-1979). He opposes the activity of dividing the subject and object relationship, and rather emphasis their mutual relationship. For him each animal, the subject, lives in its own special environment or an environment with a set of affordances. The reflected lights from the surface is how the affordance is made available for perception by the subject. Depending on the subject’s bodily movement, the subject’s needs may change and is crucial for becoming aware of the affordance through the senses. Affordance is objective properties in the environment and is always there to be perceived by the subject, as they are objective properties they are also never changing i.e. the affordance is always there even though the user’s activity and their bodily movement may change. As an example of the concept of affordance in a human-tool perspective: when a human perceives a stone on the road it can afford walking on, throwing, holding, lifting etc.

The fourth and last view is from David Kirsh (1950), a researcher in cognitive science. He describes how active subject structures their environment to achieve tasks. Humans will actively structure their space and thereby create entry points which sets up a structure for their work day. This will, according to him, reduce cognitive demands. Entry points may be objective (user independent) or subjective (user depended). In the perspective of a human-tool use an entry point may be objective when it’s in the dimension “visibility”, a to-do list for instance is a user

independent entry point or i.e. a tool to structure humans daily work. An entry point may be subjective when it's in the dimension "relevance". For example, when a programmer is handling errors related to a system, the exception-handler tool gives several entry points where to look to find the error in the code, the programmer may get an entry point which is more relevant for him in his search for the cause of an error.

8. One perspective from the article

David Kirsh is a cognitive-scientist, he takes interest in how work-context can be understood and improved. When he talks about work-context, he mainly refers to work places like offices. In his view, achievement of various tasks in subject's interactions with the environment can be done more efficient by restructuring the environment. Hence, reduce cognitive efforts, and improve their performance at work. This cognitive reduction is achieved when subjects actively structures their day by creating entry points which organise and prioritise their workload. Entry points are environmental structures which invites subjects to information or activities, i.e. to-do list, files, papers etc. In likelihood with affordance, entry points invite humans to do certain things.

9. Summary of an article from module 1

I chose the article Automation Bias in Intelligent Time Critical Decision Support System by M.L.L Cummings. In this article Cummings discusses and suggests how various levels of automations (LOA) should be designed in intelligent decision systems, the discussion is situated in the aviation domain. The discussion elaborates that humans tend to be automation bias, which means that we trust automation too much and accept its decision as correct without searching for a contradiction. The consequence of automation bias can be major incidents in the aviation domain, where there is no room for errors. LOA is a concern when designing intelligent decision systems, and designers should be aware of the negative effects of increasing LOA and keeping humans out of the decision making.

10. Summary of a fictional TV-series

I've selected the TV-series Black Mirror and the episode "Be Right Back", which tells the story about Martha who lost her boyfriend Ash in a car accident. As she mourns him, a friend tells her about this new and exciting AI technology which can mimic the voice of Ash. Martha isn't

interested at first, thinking Ash is irreplaceable, but after a lot of grief she decides to try it out. The conversation goes through a Chabot, she quickly finds comfort speaking to the bot, or more precisely the bot's imitation of the boyfriend, and from here it escalates to the thirst of having more for Martha. Further into the story she upgrades the Chabot with new features and properties, until there is an actual intelligent robot, looking and behaving just as her boyfriend. Despite that the robot is satisfying her in different ways, she finds something odd in the interaction with it. One evening she gets irritated of the robot's silly answers, and orders it to leave the house, the robot does as its instructed, which annoys her as the real boyfriend would have argued against. Through out the story, misunderstanding between her and the robot awkwardly happens — and that is also how she realise that her boyfriend, Ash, is and always will be irreplaceable.

11. Human autonomy and machine autonomy.

Autonomy is about having a choice and execute a decision independent without being influenced from anyone else. For humans, autonomy is the decision to self-determine what's right without being influenced by other humans. For machinery, autonomy is also the decision to self-determine what's right without being influenced by other systems, a controller or programmed to do a task.

12. When was the term "AI" first coined?

The term AI was coined by James McCarthy in 1955 when he in a letter proposed a meeting concerning the field of AI, his proposal was later carried out at the Dartmouth conference in Hanover, New Hampshire 1956. (J. McCarthy, Minsky, & Shannon, 2006)

13. One question for the article "What we talk about when we talk about context".

What could Dourish view be on designing predefined context in computing?

14. One question for any other article in the curriculum.

As I see it, automation bias could be a reason to disclaim accountability, this is particularly an issue concerning intelligent systems that can harm people. According to Cummings, designers of intelligent systems is advised to design with automation bias in mind (Cummings, 2004, p. 5), should designers of these systems therefor also have an ethical perspective in mind?

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