Individual assignment 2

---

1. Three definitions of AI

Definition 1:

"[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning ..." (Bellman, 1978).

Bellman (1978) sees AI in his definition as a way of portraying human thinking. Where the goal is to give a machine the "toolbox" that humans have to go through the same processes when thinking about a problem etc.

Definition 2:

"The study of the computations that make it possible to perceive, reason, and act" (Winston, 1992).

Winston's (1992) definition of AI focuses also on portraying human thinking in machines. The difference lies in the reasoning perspective - perceive - reason - act. Where the goal can be to have a machine that can use reason to come up with an answer where there are no concrete ones.

Definition 3:

"The study of how to make computers do things at which, at the moment, people are better" (Rich & Knight, 1991).

Rich and Knight (1991) focus on AI where the goal is to act more like humans, with all of its capabilities: Movement, reasoning etc. A focus that is more present in robotics or in making machines that can pass as humans via the Turing test etc.

1.1 AI in the course

From module one we learnt that AI is a large field and is often seen as an umbrella term for a number of technologies e.g machine learning. In module two Følstad presented that the current understanding of AI may be "Computer systems learning and improving on the basis of large data sources". Morten Goodwin explained that AI could be seen as a tool to find patterns in data. Which is more similar to how the definition Følstad presented.

2. Three definitions of Robotics

Definition 1:

"Robotics is the study of robots. Robots are machines that can be used to do jobs. Some robots can do work themselves. Other robots must always have a person telling them what to do" (NASA, 2009).

NASA has a two factored definition, where they describe briefly what robotics is and focus more on robots for the rest of it. They also describe that robots work differently: either on their own or via "instructions" from humans.

Definition 2:

"Robotics is the study of mechanical engineering, electrical engineering, electronic engineering and computer science and is a broader way of looking at developments" (LEO, 2018).

This definition is more focused on the different disciplines that are involved in robotics, and not about what you do in robotics, besides that, you have "a broader look".

Definition 3:

"The branch of technology that deals with the design, construction, operation, and application of robots." (English Oxford living dictionaries, 2018).

In this definition the broader definitions of work practices are described, contrary to the LEO (2018) one where they name the disciplines.

3. Three definitions of Machine Learning

Definition 1:

"Machine learning is based on algorithms that can learn from data without relying on rules-based programming" (Pyle and San José, 2015)

Pyle and San José (2015) sees machine learning as a way for a machine to gain knowledge and learn from its environment without giving it so-called rules to follow, as you usually do in programming.

Definition 2:
"A branch of artificial intelligence that systematically applies algorithms to synthesize the underlying relationships among data and information" (Awad and Khanna, 2015).

In Awad and Khanna's (2015) definition they also refer to algorithms, but here they talk about how you can use these algorithms to look at relational factors between data and information.

Definition 3:
"Field of study that gives computers the ability to learn without being explicitly programmed" Samuel, 1959 (as cited in The Conversation, 2017).

This definition originally by Samuel (1959) takes in to account the same aspects as Pyle and San José (2015). The difference is in the granularity of the definition, this one being the more "abstract one". But given that this one is from 1959 it is accurate even today.

3.1 Machine learning in the course

In the second part of module two, we have learnt that machine learning consists of different neural network typologies and what the term deep learning means. We also took a closer look on the layers that are usually used: input - dense - relu - softmax - output, and sometimes embed.

4. My understanding og the relationship between AI and Robotics

I think about robotics as the science of making robots. A robot can come in different shapes and have different goals. The common denominator is usually that all robots are some kind of artefact that is designed and programmed to assist humans or other robots in tasks - kind of like software but in a physical form. AI on the other hand does not have to be "a part" of a robot, it can be pure software. In many cases, robots have some kind of AI, especially social robots.

5. My definition of AI

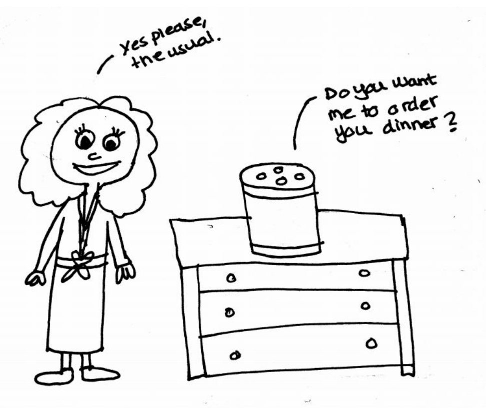
"*You develop AI when you as a programmer give a machine characteristics with the goal of mimicking human thought processes via a "programmed brain". The result is a autonomous machine that can solve problems in its environment, that humans would normally do. " My definition, 2018*

For a machine to have the ability to mimic the human thought process, a programmer needs to define and construct the "machinery" that makes up the machines "brain". You don't program and construct the "brain" of the machine to be equal to a human, but you give it the necessary functions to solve tasks in its environment. You could say that many machines, with and without AI, solve tasks that humans would normally do. But here I think that the task must have a level of complexity which we as humans would solve with "intelligence".

My understanding of the relationship between AI and machine learning

I think of machine learning as a part of AI. Simple question queries could be used in AI to make a computer seem more intelligent, but when you involve machine learning the computer itself has to learn by training on datasets and use this training to give a suitable response.

6. A drawing of an interaction with an AI

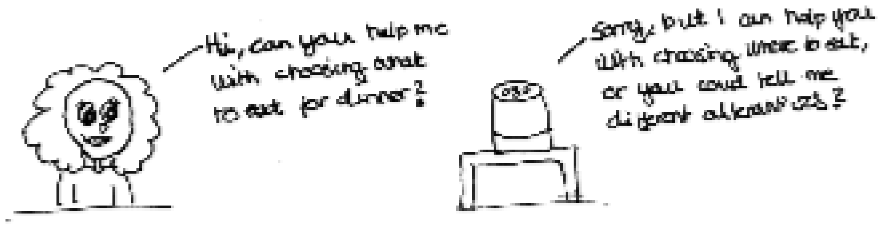


I have drawn one way of interacting with AI, where it is present in an artefact like Alexa or Google home. Where the machine, in this example, knows you have had a long day and wonders therefore if it should order you dinner, so you don't have to.

6.1 Interaction design for AI-based systems

For interacting with AI there are three tentative principles: learn, improve and fuelled by large datasets. Learning happens dynamically which can be hard to design for. Here you can be more clear about the AI's capabilities and limitations to try to match the user's expectations. E.g a chatbot can say "Here are things you could ask me about". Because of the dynamical nature of the AI, you as a designer also have to design dynamically. Mistakes are inevitable when designing for uncertainty, that's why you have to learn from the mistakes and improve. An AI is fuelled by large data sets and the design must take this into account by accommodating the gathering of data from users and make use of it in a way that users can benefit from. Here you should also always incorporate privacy into the design. Because an AI learns from the data it collects you also have to take into consideration that sometimes there is a risk of "being gamed" by the users. E.g Microsoft's chatbot turned neo-nazi sexbot.

6.2 User interface illustrating one or more of the characteristics.



In this drawing, the focus is on the AI's ability to meet the user's expectations and if not state what it could help with. But it is also prepared to learn from you if you still want it to help you choose what to eat for dinner, like in this example.

7. Four Views on Object Perception and Tool Use

In the next paragraphs I will briefly describe the four different relationships that Susi and Ziemke (2005) describes in their article: On the Subject of Objects: Four Views on Object Perception and Tool Use.

1) Functional tone

The relationship between one subjects perception and use of tools can be explained via a functional tone, according to the biologist Jakob von Uexküll. You as a person are here the one that determines the relationships meaning - where it gets a "functional tone"..What meaning you associate with it depends on your mood, context etc.

2) Equipment

Philosopher Martin Heidegger sees the relationship between subjects and objects as something unified, meaning that you can not look at subjects and tools as independent entities. An object gets their meaning through the way they are used. Where a subject manipulates the object and learns about its functionality. But we can not explain the relationship via knowledge or perception. To understand this you need to look at "what it means for a being to exist".

3) Affordance

The American psychologist James J. Gibson sees the relationship through the term affordance. He argues that the objects in its environment possess affordance (a way of perceiving them) how this is perceived is through reflections from surfaces that subjects encounter. But the objects possess affordance even when it is not being perceived by a subject.

4) Entry point

David Kirsh refers to the term 'Entry point' which is a trait that an object possesses that gives the subject an "invitation to enter an information space or office task", almost like affordance. This can, for instance, be a list of things to do. He also uses the term entry point collections which are a personal collection of what you need to do in a day, the next and so forth. You can say it is a system the subject creates to structure their everyday lives.

8. More about the term 'Entry point'

Kirsh research on entry points comes from an office context. Where entry points - or collections of entry points could be found on the worker's desks. Some workers are tidy - who likes systems and has a clean desk. Others can't be bothered with structure and thrive without it, but usually has to use ad hoc systems to structure their work. How these entry points affect the workers can be seen along the six dimensions: 1) *Intrusiveness* - attention-grabbing traits from the objects, like a colour. 2) *Richness in metadata* - information the entry point gives on underlying information, like a heading. 3) *Visibility* - how attention-grabbing the entry point is. 4) *Freshness* - what you used last is most likely to be used again. 5) *Importance* - how important the entry point is, like a due date. 6) *Relevance* - if an entry point is useful for the task at hand, you are more likely to use it.

9. Short about the article: Does AI make PD obsolete?”

Bratteteig & Verne (2016) takes a look at challenges related to the fields of AI and Participatory design. Particularly how users can contribute to the design process when designing for AI, through the lens of participatory design. Here they point out one big challenge which is the fact that AI or the learning process for an AI can happen and change very fast. Which makes it difficult to design for.

10. AI in a fictional book

In Dan Brown’s book Origins, featuring symbology professor Robert Langdon you get to know Winston a personal assistant to the futurist Edmond Kirsch. Winston is a highly intelligent AI that can mimic human behaviour in the form of thought processes and communication (to some degree). When Robert Langdon first encountered Winston he thought that he was talking to a human. So it is safe to say that Winston has passed the Turing test with flying collars. Winston has no physical form but can communicate through several technologies like a cell phone and a computer. He can also “hack” into pretty much every system with internet access. Winston is in communication with Robert Langdon in pretty much the whole book, because of circumstances (don’t want to spoil the book).

11. Human- and machine autonomy

A human has autonomy when it has a choice to do what it wants (with some limits), without being controlled by others. Machines, on the other hand, is today controlled by humans and are rarely fully autonomous. Aspects like AI contribute to this autonomy, and some machines run autonomously if turned on - like those in a factory. So a machine can have autonomous tasks, like vacuuming (for a vacuuming robot) but when and where is determined by humans.

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

The professor emeritus John MacCarthy was the first person to coin the term "AI" in 1956. The computer scientist has had a big role in creating systems that can mimic human skills like vision, hearing etc. His work with AI is just one of many inventions on his resume, he invented among other things the programming language LISP (The Independent, 2011).

13. Question to: "What we talk about when we talk about context"

How can you use this way of thinking about context when designing for more tangible interfaces - where a screen is not so prominent and the information flow/processing is not so easy to visualise?

14. Question to: "Does AI make PD obsolete?"

Can Participatory design become more important in the after-design process since AI is constantly evolving?

15. "Like Having a Really Bad PA" by Luger & Sellen (2016)

Luger and Sellen (2016) have in their article "Like Having a Really Bad PA" gathered qualitative data by conducting interviews with people using computer assistants (CA). Their findings are summarized below:

Design should reveal system intelligence: many participants turned to more "economic interaction" by avoiding complex tasks and limiting the language. By giving the CA human traits the perception of system failure also became somewhat unrealistic. Making the participants frustrated and questioning the intelligence of the system. This was not always the case for more experienced partitioners.

Reconsidering the interactional promise made by humour: Many of the participants thought it was a fun way to get to know what the CA could do through exploring jokes and easter eggs. But this in turn also formed their expectations, making them expect more "intelligence" from the CA in other situations as well.

Consider new ways of conveying CA capability through interaction: many of the participants struggled to realise that CA is for the most part only a presenter of task-related information. If the participants asked the CA for something and the CA didnt understand they often blamed themselves or abandoned the tasks. Here it could be an idea to give more information about limitations and capabilities.

Rethink system feedback and design goals in light of the dominant use case: when performing tasks that require more attention - e.g cycling the participants wanted to ask the CA about different topics while being “hands-free”. But most of the time they also had to visually approve or check the screen because the CA didn't understand. This points to needing a more compellig way of designing a CA.

Relevance for interacting with AI-based systems?

I think all off the lessons the article presents can be used when interacting with AI-based systems in general. Many of these lessons also compliment what was discussed in task 6.1. Especially because of where the technology for AI is today I think that one of the most important lessons is that you should design systems that have a “natural affordance” which are often more focused on for visual computer systems og tangible user interfaces then AI-based systems.

Reference list

Awad M., Khanna R. (2015) Machine Learning. In: Efficient Learning Machines. Apress, Berkeley, CA.

Bellmann, R.E. (1978). An introduction to Artificial Intelligence: *Can Computers Think?* Boyd & Fraser Publishing Company.

Bratteteig, T. & Verne, G. (2016) Does AI make PD obsolete? Exploring challenges from Artificial Intelligence to Participatory Design.

Dourish, P. (2004). What we talk about when we talk about context. Personal and ubiquitous computing 8, 19–30.

English Oxford living dictionaries (2018). Retrieved from. https://en.oxforddictionaries.com/definition/robotics (2018, September 09).

LEO: Centre for Service Robotics (2018). Defining Robots and Robotics. Retrieved from. http://www.leorobotics.nl/definition-robots-and-robotics (2018, September 09) .

Luger, E., & Sellen, A. (2016, May). Like having a really bad PA: the gulf between user expectation and experience of conversational agents. In Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (pp. 5286-5297). ACM.

NASA (2009). What Is Robotics? Retrieved from. https://www.nasa.gov/audience/forstudents/k-4/stories/nasa-knows/what_is_robotics_k4.html (2018, September 09).

Pyle D., San José C. (2015). An Executive's Guide to Machine Learning. Retrieved from. https://www.mckinsey.com/industries/high-tech/our-insights/an-executives-guide-to-machine-learning (2018, September 09).

Rich, E. and Knight, K. (1991). Artificial Intelligence (second edition). McGraw-Hill.

Susi, T., Ziemke, T. (2005). On the Subject of Objects: Four Views on Object Perception and Tool Use. 1 3, 6–19.

The Conversation (2017). What is Machine Learning? Retrieved from. http://theconversation.com/what-is-machine-learning-76759 (2018, September 09).

The Independent (2011). John MacCarthy: Computer scientist known as the father of AI. Retrieved from. https://www.independent.co.uk/news/obituaries/john-mccarthy-computer-scientist-known-as-the-father-of-ai-6255307.html (2018, September 12).

Winston, P.H. (1992). Artificial Intelligence (third edition). Addison-Wesley.