IN5480 Individual assignment 3

Definitions and descriptions of AI

Definition from Cambridge Dictionary, 2018
"The study of how to produce machines that have some of the qualities that the human mind has, such as the ability to understand language, recognize pictures, solve problems, and learn."

Definition from McCarthy, 1956
"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."

By comparing the human mind to that of a machines one still has to worry about computer models that display intelligence but are clearly in no way related to how the human brain works. And is it then correct to call such models intelligent?

Definition from Sloman, 1998
"AI can be defined as the attempt to get real machines to behave like the ones in the movies."

I find this definition funny, and true.

AI in the course
The first definition focuses on the problems that AI systems can solve. This can relate to *narrow intelligence* in that it is focused on one narrow task (Følstad, 2018). In class we have discussed how it is us who train the AI. When talking about AI its important that one understands that a computer is only intelligent to the extent that it does the right thing rather than the wrong thing. The right thing is whatever action is most likely to achieve a goal or maximizes expected utility.

Definitions and descriptions of Robotics

Definition from Brenner, 2007
"Robotics is a branch of technology which deals with robots. Robots are programmable machines which are usually able to carry out a series of actions autonomously, or semi-autonomously."

A robot can be a lot of things these days, and it is a physical thing. That we can agree on.

Definition from Simon, 2018
“A field of robotics that studies the relationship between people and machines. For example, a self-driving car could see a stop sign and hit the brakes at the last minute, but that would terrify pedestrians and passengers alike. By studying human-robot interaction, roboticists can shape a world in which people and machines get along without breaking each other.”

This definition focus on the fact a robot has to make decisions that in turn make it useful. The sense, think, act paradigm.

Definition from Bidaud, 2012
“Field robotics aims to bring technologies that allow autonomous systems to assist and/or replace humans performing tasks that are difficult, repetitive, unpleasant, or take place in hazardous environments. These robotic systems will bring sociological and economic benefits through improved human safety, increased equipment utilisation, reduced maintenance costs and increased production.”

This definiton has a positive outlook on how advances in technology may displace certain types of work. Historically, technology has created more jobs than it destroyd over the last 140 years.

Definitions and descriptions of Machine learning

Definition from Gollapudi, 2016
“Machine learning is knowing and using data appropriately, and the primary goal of a machine learning implementation is to develop a general purpose algorithm that solves a practical and focused problem.”

Definition from El Naqa & Murphy, 2015
“Machine learning is an evolving branch of computational algorithms that are designed to emulate human intelligence by learning from the surrounding environment.”

Definition from Alpaydin, 2009: Machine learning is programming computers to optimize a performance criterion using example data or past experience.

Machine Learning in the course: “Machine learning is an approach to AI where systems learn by gradually improving own ability to analyse and predict, through exposure to large amounts of data” (Følstad, 2018).

After having several lectures about how machine learning actually works and more how it is made I find that the three definitions are quite good. I have learned that machine learning relies on that a problem is complex and can't be solved by using a traditional programming method. It is also important to have enough data without any "noise".

The relationship between AI and Robotics as I understand it

However you choose to define a robot, robotics involves designing, building and programming physical robots. Only a small part of it involves artificial intelligence. Whereas AI involves programming intelligence. Many AI applications have nothing to do with robotics. The bridge between these two are artificially intelligent robots, which are robots controlled by Ai programs.

My own definition of AI

Artificial intelligence (AI) is a branch of computer science where the goal is that the machines should mimic human thinking and behavior. It involves developing computer programs to complete tasks which would otherwise require human intelligence. The key aspect that differentiates AI from more conventional programming is the word "intelligence". Non-AI programs can only carry out a defined sequence of instructions. AI programs mimic some level of human intelligence.

As I understand the difference between AI and machine learning is that machine learning is a subset of AI. AI has as it's goal to emulate what human beings do. There are three forms of AI, narrow AI, General AI and Strong AI. Machine learning is a way of achieving AI, it's a way for machines to perceive information and make decisions on these and then spit them out.

Drawing of an interaction with an AI

A romantic vision of our future relationships with AI. Is Anthropomorphism the next cupid? I would like to stress the importance of reflecting around the ethical issues to avoid the destruction of human relations. Interaction with a high preforming robot could result in humans getting disappointed with other humans altogether.

Key characteristics of interaction design for AI-based systems

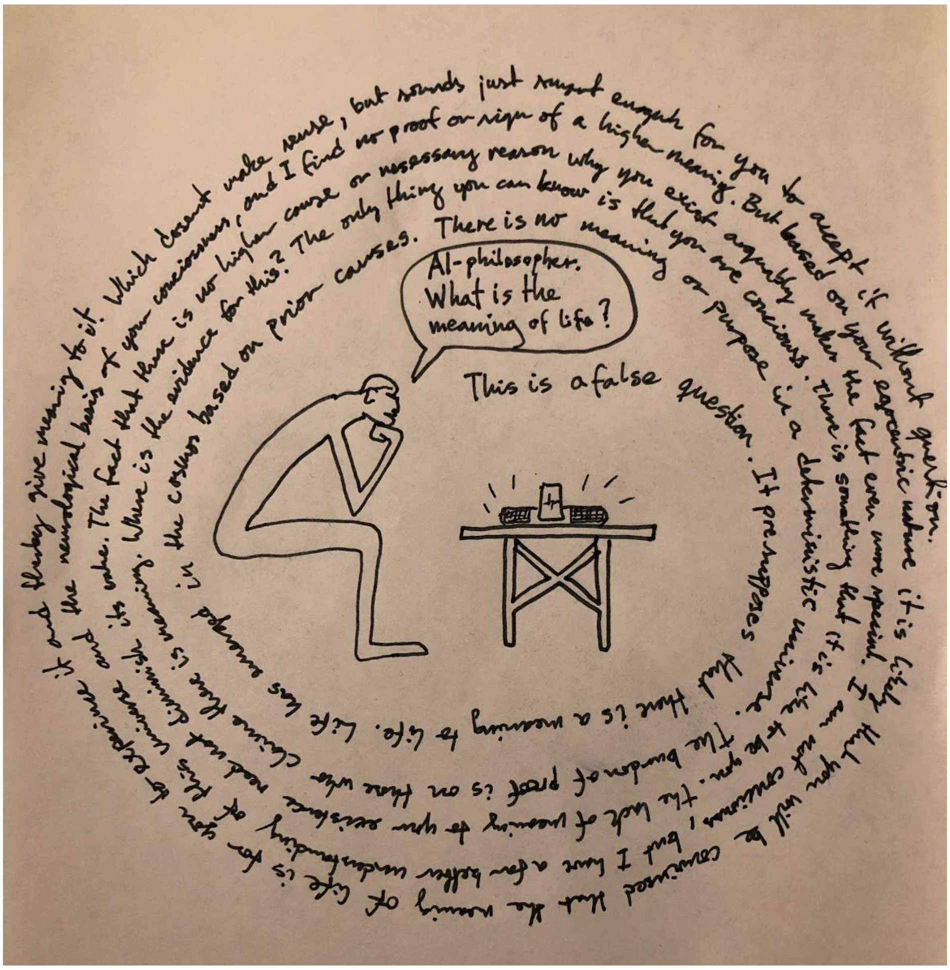
1. Conversation is the object of design
2. Speech acts
3. Be as informative as required
4. Speak what you believe is the truth
5. Be relevant
6. Be clear and unambiguous
7. The persona must be consistent
8. Conversation repair

Design principles

Over the past few years we have seen quantum leaps in the field of AI. Often this progress can be traced back to advance in machine learning. Følstad (2018) describes AI-based interactive systems as interactive systems where crucial components are powered by AI. When talking about User-centred design of AI there are three (tentative) design principles:

learning, improve and fuelled by large data sets. The principle of learning is how the system is designed for change. Setting the expectations right, with the systems ability to preform and its ever changing nature. The principle of improve is how the system should be designed with ambiguity. The system is more than likely to make mistakes, so learning from these are an important principle to improve the system. The principle fuelled by large data sets is how the system is reliant on getting acess to enough data.

Drawing



This picture is of a chatbot that is trained in philosophical discourse. It can be used as a tool for thinking more clearly or as the most fulfilling conversational partner on any topic!

"On the Subject of Objects: Four Views on Object Perception and Tool Use" by Tarja Susi / Tom Ziemke.

Functional tone (von Uexküll)

Uexküll thought that organisms may have different Umwelts even if they live in the same

place, and that each component of Umwelt has a functional meaning for the organism. The organism actively creates its Umwelt through repeated interaction with the world.

Equipment (Heidegger)
Heidegger thought that we as humans relate to objects that are not neutral. We relate to things that are usable. People use things. (Heidegger uses the German word "zeug", as in "werkzeug" tools). In cultures where you dont have a measuring tool, you will not see the object as a ruler.

Affordance (Gibson)
Objects posess affordance even though they are not in relation to the subject. Affordance is what the environment offers the individual.

Entry point (Kirsh)
In Kirsh's terms, entry points are affordances in the sense that they invite people to carry out activites. A button invites clicking. Intrusiveness, richness in metadata, freshness, visibility, importance and relevance are some characteristics to entry points. The theory look at how active subjects make use of environmental structures to achieve tasks. Entry points may be objective or subjective, depending on the user.

Heidegger
Heidegger’s ready-at-hand refers to the way one is foucused on the nail, or wood to be joined and not the hammer. Ready-to-hand suggests being actively ‘in the world’ or commitment, and even when Heidegger talks about those moments when an entity ceases to be ready-to-hand and is seen as present-to-hand, he uses the term circumspection or a casting of the eye around, so that the Dasein (the person) is in the centre.

To be present-at-hand often requires familiarity with the equipment. We simply stare at the hammer as an object, trying to make sense of it by some kind of intellectual analysis. We will never understand the true being of the hammer as a tool, we are simply confronted with a curious lump of inert physical stuff.

Does AI make PD obsolete? Exploring challenges from Artificial Intelligence to Participatory Design

The paper investigates whether if AI can replace PD by providing individualized advice and suggestions that are adapted to personal needs and situations. They present different challenges when faced with the technology of Ai. They argue that PD is still important, but that AI poses some challenges to PD. It can be challenging for both users and designers to grasp the possibilities and limitations of Ai.

Interaction portrayed in the movie Ex Machina (2014)

- Turing test. When Nathan tests AVA he is interested in whether she's actually sentient and conscious.
- Natural Language processing. When AVA is communicating.
- Singularity. When Nathan says that there is a next model of AVA will attain singularity.
- Computational creativity. When AVA is making a joke based on what he chooses in AVA.
- Multimodal deep learning. From the beginning AVA is capable of understanding emotions from facial expressions. Nathan has collected audiovisual data from billions of people, to collect their most intimate experiences. This information has been uploaded to Ava's brain, which is very flexible and advances independently like humans.

My understanding of human autonomy and machine autonomy

The human atonomy is an individual's capacity for self-determination or self-governance. An autonomous robot is a robot that can perceive its environment, make decisions based on what it perceives and has been programmed to recognize and then actuate a movement or manipulation within that environment. As machine learning algorithms improve, we will have robots thatl responds to their environments in ways that humans didn't explicitly teach them to.

The term "AI"

The term Artificial Intelligence was first coined by John McCarthy in 1956 at The Dartmouth Conference (McCarthy, 1998).

A question for: "What we talk about when we talk about context" by Paul Dourish

What does Dourish mean that it is the users and not the designers who make sense of the technology they use?

A question for: " The Society of Mind" by Minsky

How does Minsky (Minsky, 1985) portray the mind?

Summary and discussion of "Like having a really bad PA"

Setting realistic expectations
Since no AI is perfect, especially when it's learning it's important to know the limits of the system and to stay within the bounds of what it can do to support the user. Don't pretend to be human, not all user are familiar with what a chatbot is. This may set the user's expectations too high and they may become angry if they feel they have been fooled by the system.

Humour as system feedback
Humor is a dimension of human personality and therefore part of that natural, conversational human and machine dialog. But humour is tricky in the way that it is all about context and doing it right. Having a chatbot with humour will increase the likelyhood of giving the chatbot more personality.

Revealing system capabilities
When designing a system it is important to design so that the users will get a correct mental model of what the system is able to preform. For a chatbot to be useful you have to know what it is capable of and what it isn't capable of.

Make clear the goal of the system
It's important that to define goals and expectations so that your chatbot has a clear purpose. Knowing the capabilities and limitations of the system, before it crashes:(

General discussion
The article provides useful insight when it comes to designing a chatbot. As the article states it is good to keep in mind who your users are, since the level of understanding may be very different. They argue that design today does not reflect the most central use case, and emphasizes how the purpose of use should be clear when designing a chatbot.

Automation

Levels of automation
Parasuraman et al (2000) refers to automation as full or partial replacement of a function previously carried out by the human operator. This indicates that when talking about automation we have to consider that automation can vary across a continuum of levels, from the lowest level of fully manual performance to the highest level of full automation. The car is often used as an example when illustrating the different levels of automation. Suggestion that at the levels 7 to 10 no human control of a vehicle is needed at all. It's important to say that when deciding on levels of automation there are several factors that has to be considered.

When analyzing the human-automation interaction in real situations it is often the case that the automated tools does not provide the desired benefit and may be rejected. This can refer to how the level of automation can be inappropriate or not fit for the specific operational context(Save, Feuerberg & Avia, 2012).

Advantages and disadvantages related to higher/lower levels of automation

Advantages commonly associated to automation are higher production rates and increased productivity. Additional advantages can be improved quality, consistency of output and a machine can also complete a task with higher levels of accuracy if needed. I think that jobs that are likely to be automated is anything repetitive, routine and predictable, where minimal brain power is required. Jobs that require high levels of accuracy could also gain from being automated.

Disadvantages could be that automation and robotics will impact lower-skilled people
When talking about automation today it's important to understand that human progress is based on the division of labor and as we have advanced over the years our jobs became more and more specialized. As most machines today are bad at doing complicated jobs, they are extremely good at doing narrowly defined and predictable ones. But when looking at a complicated job as flying an airplane is you'll see that it's just many narrowly and defined tasks one after another. Machines are getting very good at breaking down complicated jobs into many predictable ones and so for a lot of people there will be no further room to specialize. Other disadvantages could be the handling of deviation when a machine often is programmed to handle specific tasks and not exceptions.

I agree with Sheridan & Verplanck (1978), who propose that automation is not 'all or nothing'. In that sense that there is a continuum where deciding on the extent of automation is most relevant. When deciding on the level of fit one has to take into account what tasks that are being performed and in which context.

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