In5480- Individual assignment 2 – Julie Hagen Nilsen

Artificial Intelligence – definitions

1. *Artificial intelligence (AI) is an area of computer science that emphasizes the creation of intelligent machines that work and react like humans. Some of the activities computers with artificial intelligence are designed for include speech recognition, learning, planning, problem solving* ("What is Artificial Intelligence - Techopedia," n.d.)

This definition frames AI mainly as a research field where computers are made to mimic humans in different ways - with an emphasis on cognitive abilities.

2. *In computer science AI research is defined as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals.*[1] *Colloquially, the term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving*" (S. J. Russel & Norvig, 2009).

Once more, AI is talked about as a field of research exploring how to make machines imitate human cognitive functions. However, it also emphasise *perception* as a means for task solution. This suggests that AIs can exhibit the ability to identify environments through different sensory inputs.

3. *AI is the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages ("Artificial Intelligence - Oxford Dictionaries," n.d.)*

This definition is similar to the others, although it also includes what I consider physical functioning by including sensory inputs and interpretations such as "sight" (visual) and "sound" (speech). It outlines AI both as the endeavour to develop theory and as the act of developing computers with different "human" capacities.

These three definitions all emphasise the word *intelligent* and mimicking *human functions*, and is thus in line with the discussions we have had in class. The term AI refers to a domain of research concerning the development and use of "intelligent agents". Furthermore, the term can also refer to the machine itself – the machine is "an AI". In our lectures we have talked about different "levels" of AI – namely as a *super intelligence*, a *general intelligence* or a *narrow intelligence*. The definitions mentioned here do not make such distinctions. Moreover, neither of the definitions put any particular emphasis on an AIs ability to learn and improve, something which is one of its defining features as explained in the lectures.

Robotics - definitions

1. Robotics is the industry related to the engineering, construction and operation of robots – a broad and diverse field related to many commercial industries and consumer uses. The field of robotics generally involves looking at how any physical constructed technology system can perform a task or play a role in any interface or new technology. ("What is Robotics? - Techopedia," n.d.)

2. The branch of technology that deals with the design, construction, operation, and application of robots ("Robotics - Oxford Dictionaries," n.d.)

3. The field of computer science and engineering concerned with creating robots, devices that can move and react to sensory input. Robotics is one branch of artificial intelligence. Robots are now widely used in factories to perform high-precision jobs such as welding and riveting. They are also used in special situations that would be dangerous for humans -- for example, in cleaning toxic wastes or defusing bombs. Although great advances have been made in the field of robotics during the last decade, robots are still not very useful in everyday life, as they are too clumsy to perform ordinary household chores. (Beal, n.d.)

Machine learning - definitions

1. *"Machine learning is an artificial intelligence (AI) discipline geared toward the technological development of human knowledge. Machine learning allows computers to handle new situations via analysis, self-training, observation and experience. Machine learning facilitates the continuous advancement of computing through exposure to new scenarios, testing and adaptation, while employing pattern and trend detection for improved decisions in subsequent (though not identical) situations. Machine learning is often confused with data mining and knowledge discovery in databases (KDD), which share a similar methodology*" ("What is Machine Learning? - Techopedia," n.d.)

Machine learning is a sub-branch within the AI-domain with a goal of advancing the machines ability to improve and act correctly in new situations based on experience. This definition touch upon the inner workings by stating that the algorithms funnelling the learning process are based on pattern and trend detection.

2. *Machine learning is the capacity of a computer to learn from experience, i.e. to modify its processing on the basis of newly acquired information* ("Machine Learning - Oxford Dictionaries," n.d.).

Short definition with an emphasis on modification based on experience and new information.

3. *Machine Learning is the science of getting computers to learn and act like humans do, and improve their learning over time in autonomous fashion, by feeding them data and information in the form of observations and real-world interactions* (Faggella, 2016).

This definitions states that the aim of machine learning is to “learn and act like humans do”. I am not sure if I agree, because I believe there are many differences in how computers and humans learn. In this definition *autonomy* is mentioned, suggesting that the learning process the machine is executing is not entirely controlled by people.

These definitions are in many ways in accordance with discussions we have had in class, although the link to AI is not made very explicit. The focal point seems to be that machine learning enables the modification of behaviour based on experience. The issue of autonomy is briefly mentioned in the last definition. The definitions do not dwell on the more technical aspects of machine learning, but offers an explanation of a complex matter in layman terms.

My understanding of the relationship between AI and Robotics.

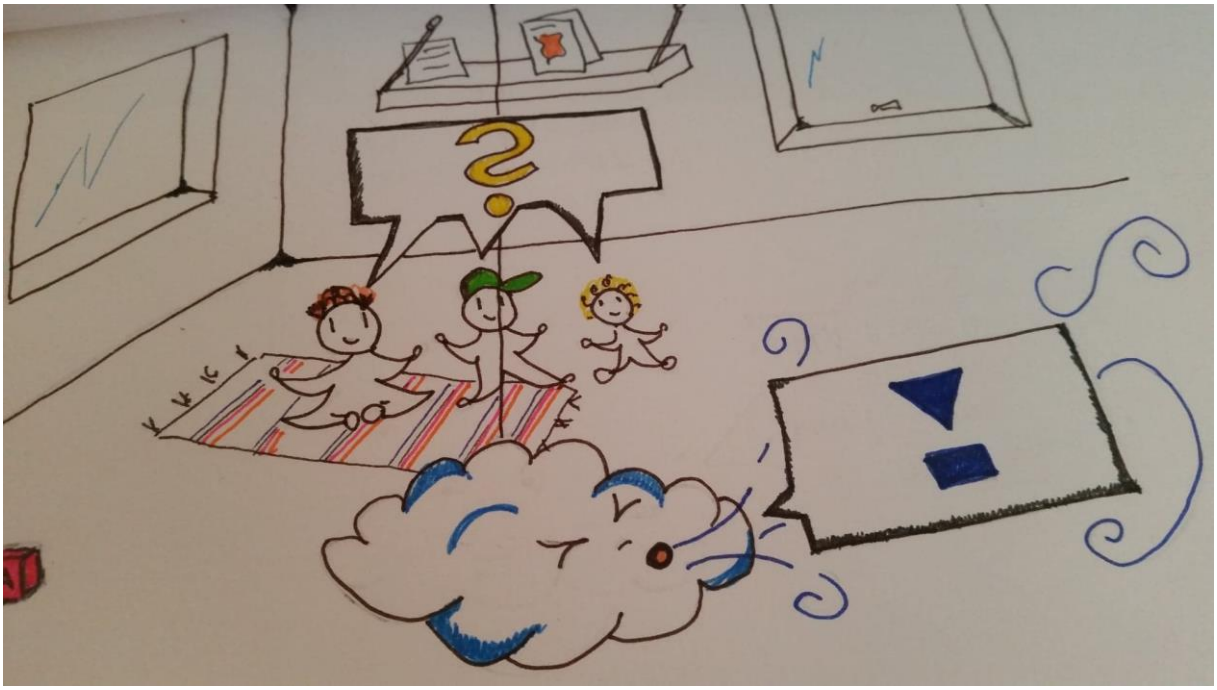
If I envision an AI as a human being, the AI would be the “person” - the persona, tone-of-voice, the entirety of the artificial being. The robot, or physical representation, is the “body”. Machine learning is “the brain” - it determines how the AI thinks, learns and creates solutions to problems.

The field of Artificial Intelligence is very broad, but its focal goal is to develop technology that can mimic complex human physical and cognitive functions. Robotics is a sub-branch of AI, mainly concerned with how the physical manifestations of artificial intelligence can be designed to react its environment and context of use.

My definition of AI

AI is a field of research in which the goal is to make the ultimate trans-human - like the terminator only not terrifying. In short, in building AIs we seem not only to want to replicate, but also improve, parts of the human physicality and cognition. Hence, when building AIs we take elements of human functions, digitize it and then try to optimize it. Machine learning is what improves the “cognition” of the AI. It does this through acquiring information and making inferences so that it can act more autonomously - it is how the AI acquires *knowledge* – and also what makes it somewhat unpredictable.

Drawing



This picture is of a voice interface to which children can ask questions about the air. My master thesis concerns air quality and designing with children and this is one of the ideas we are playing around with.

Summarize key characteristics of interaction design for AI-based systems (challenges, principles, trends). Sketch a user interface illustrating one or more of these characteristics

Sorry, did not have time to do this. Will include in next iteration.

On the Subject of Objects: Four Views on Object Perception and Tool Use"

This article describes four perspectives on how objects are understood and used by people. Pertaining to the field of technology design this is relevant because it examines how people and artefacts relate to one another, and how different uses of artefacts originate. Furthermore, it critically examines how we can design something to convey its range of use and functionality. Is it possible to convey functionality just by design, or do the user need to build a relationship with the object before its usage "reveals" itself? Furthermore, it is interesting in relation to the construction of AI because we might want to build robots that make use of other objects as tools. How are robots to learn to use other objects if not taught it beforehand, and how are robots to make sense of the environments they are places within?

The four perspectives the authors account for is *functional tone*, *equipment*, *affordances*, and *entry point*. They try to convey these different views by discussing whether a certain type of usage emerge from the attributes of the object itself, from people's perception of the object in question, through the context of use, or a combination of these. The four perspectives discussed converge on some aspects but differ on others. Uexküll contends that the object itself is neutral, and that the usefulness and meaning of the object only appears when

brought into a relationship with a subject. Depending on how the object is perceived by the subject (receptor image), in addition to an effector image, the object takes on a *functional tone*. The meaning or function attributed to the object is subjective and may change according to the users need or mood. Heidegger talks about objects as *equipment* and argues that an object only becomes useful when embedded as part of an activity. Hence, the object is part of a contextual and equipmental whole. It is only when used for something that the functionality of the object emerges. Gibson talks about *affordances* as qualities in an object that invites certain types of usages. The properties of the artefact are objective and invariant. Whether they are discovered or not is closely connected to the bodily movements of the subject. Lastly, Kirsh concept of *entry points* is closely related to that of *affordances* but refers to externalised structures that indicate cognitive affordances. These entry points invite a person to engage in a specific activity and externalises cues to decrease a person's cognitive load.

The authors examine several other aspects of the subject-object relationship, including the role of social norms and knowledge, the neutrality of objects, the role of the body, context dependence, the subject-object dichotomization, the distinction between the physical environment and the perceptual world, and the agent-environment relationship.

Functional tone – Jakob von Uexküll

The perspective of *functional tone* is attributed to Jakob von Uexküll who contends that how an object is utilised is largely dependent upon the subject, and that the object itself is initially neutral. The object obtains meaning by being brought into a relation with a subject. When a connection between the subject and the object is established, the object can take on several different *functional tones*, i.e. it can be used in different manners. The objects form is constant, and consequently it is the subject's *mood* that determines whether an object such as a glass is used for drinking liquids, as a container for flowers, or for trapping spiders. If a subject is unable to attribute meaning to the object it is discarded. To me, this perspective resembles the theoretical approach of constructivism found within the field of Science and Technology Studies and explains how one technology might be used in different ways by different people.

"Interactive Robots as Social Partners and Peer Tutors for children: A field trial" - a short recap.

Kanda, Hirano, Eaton and Ishiguro examine how robots should be designed so that people will form lasting relationships with them. They detail findings from a trial where they deployed an interactive robot in a classroom. The robot's purpose was to make the children practice their English skills. They stress that for human-robot relationships to emerge, the robot must inhabit some basic social skills and should have the ability to learn so that the relationship have a natural progression. This is important because we want the robot to be interesting to its users after it has lost its novelty. The robots should have the ability to recognize people, have a proper range of interaction kills, and adequate language skills. The authors also discuss the advantages of humanoid robots in the process of building lasting relations. They also stress the fact that real-world environments are very different from laboratory settings. Thus, the robot's ability to "sense" and take in complex dynamic environments is imperative for its success.

AI in movies - HER

Through telling the story of Theodore and Samantha, the movie HER explores the nature of identity, intimacy and authenticity. Samantha is an AI persona - an operative system with a voice interface that sounds and acts just like a normal human being. Theodore is the protagonist and is portrayed as a rather lonely and awkward man in the midst of personal turmoil. He ends up developing a friendship and eventually engages in a romantic relationship with Samantha. He brings her on trips, they hang out with his friends, and they have a sexual relationship. Except for the fact that Samantha has no tangible body the relationship seems normal. However, she is always there, readily available to Theodore whenever he needs her.

This movie made me reflect upon several ethical dilemmas such as if we should design AI's to behave exactly like human beings. If a commercial company can literally make you fall in love with its operative interface, that takes customer loyalty to another level entirely. The AI in this movie is made to anticipate and fulfil the protagonists every need – both emotional and physical - thus Samantha is in a way a personification of Theodores emotional states. This resembles manipulation – but I guess that also depends upon whether you believe that machines and people can have true intimacy and companionship. Lastly, I think the movie intends us to think about what it means to be human.

How I understand autonomy

I understand human autonomy as independence or the freedom to make your own choices without other actants asserting control over your behaviour. People most often make choices or act based on motivation and intent, they want to accomplish something specific, and autonomy is when you have the freedom to make this choice. There are limits to human autonomy and people are restricted by societal, religious and cultural structures. Machines are autonomous when they can act without direct influence or manipulation by human agents. However, machines are programmed by people, and so they are predisposed and limited to certain types of behaviours.

The "term" Artificial Intelligence

It was John McCarthy that first used the term Artificial Intelligence in 1955 in relation to a conference he held on the subject (M. Russel, 2011).

Question for "What we talk about when we talk about context" by Paul Dourish.

If context is always subjective and dependent upon situation and other dynamic properties, it cannot be fully defined or anticipated. How then, are we to design for what we call "context of use" beyond just adding flexibility?

Do technologies influence context as much as context influence technologies? Is there a reciprocal relationship between the two?

Paul Dourish claims that practice is the lens through which we can resolve the problems of context. If this is the case, what then of technologies that are designed for ludic activities or activities that are not a part of a particular practice?

Question – "Toward a framework for Human-Robot Interaction"

In what ways can robots manage the user's expectations of its range of abilities?

How do we decide what degree of autonomy a robot should have? Furthermore, how does the need for autonomy relate to the desire for predictability in devices people bring into their home?

Is it possible for a robot to develop a personality as it learns more and interacts more with people?

"Like having a really bad PA" – Summarize and discuss

This paper explores what factors affect interaction with conversational agents when they are used in natural environments. Based on interviews with 14 users of CAs, the authors describe four key lessons learned in relation to design of dialog-based systems. Luger & Sellen (2016) define conversational agents as agents who complete tasks on the behest of its users through spoken or written dialogue based on text to speech conversion. A conversation is a transaction dictated by judgements of social cues, something which makes it very complex. Research shows there are differences in the way people interact with machines as opposed to humans. The main lessons learned are the following:

Lesson 1 – Setting realistic expectations

Currently users expect much more from conversational agents than the technology can deliver. When there is an absence of social cues that communicate intelligence the users tend to become confused. They try to adapt their strategies of use by simplifying language, avoiding difficult tasks, and attributing anthropomorphic qualities to the technology. To rectify this, designers of conversational agents should be attentive to how they communicate system intelligence to its users.

Lesson 2 – humour as system feedback

Humour is a distinctive human trait, and when conversational agents display a sense of humour it might lead to unrealistic expectations of proficiency. Humour and banter are important elements of the user experience, however, the authors advice restraint as it enhances the anthropomorphic qualities the users attribute to the agent.

Lesson 3 – revealing system capabilities

Users were not able to assess the level agents' level of intelligence as they apply mental models of human interaction and behaviour to the conversational agent. Although the users adapted their behaviour as they learned more, the absence of any natural way of assessing

intelligence resulted in misapprehensions of capacity. How do we design to help the users create an appropriate mental model of the systems capabilities?

Lesson 4 – Make clear the goal of the system

It is important to convey the capabilities and limitations of the system before the breakdowns occur.

General discussion

These lessons are relevant in regard to interactions with AI because users will inevitably try to assess the level of intelligence in machines that display some autonomy and/or "smarts". If the users assessment is incorrect, either believing the machine to be smarter or dumber than it actually is, this can be the reason that the users abandon the technology altogether. How can we design machines that are fun to talk to and use, but which at the same time remind its users of what it actually is – and set realistic expectations of its capacities?

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