

Individual assignment – HAI

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1 DEFINITIONS OF AI

Search and find three definitions of AI, describe these briefly. Make references. Discuss definitions relative to discussions of AI in the course.

Merriam-Webster Dictionary:

- 1) a branch of computer science dealing with the simulation of intelligent behavior in computers
- 2) the capability of a machine to imitate intelligent human behaviour

Encyclopedia Britannica:

- 3) the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings.

The first definition is related to the work of creating a thinking machine, while the latter 2 are related to the result or product of such work.

In the course we are quite flexible in our discussions of AI, including robotics, machine learning and computer simulated conversation. The definitions all seem to fit quite well with our treatment of the term AI in the context of INF5480.

2 DEFINITIONS OF ROBOTICS

Search and find three definitions of Robotics, describe these briefly.

- 1) Merriam-Webster Dictionary: technology dealing with the design, construction, and operation of robots in automation
- 2) Encyclopedia Britannica: Design, construction, and use of machines (robots) to perform tasks done traditionally by human beings.
- 3) Oxford Living Dictionaries: The branch of technology that deals with the design, construction, operation, and application of robots.

Although only Britannica indicates that robots is made to perform work usually done by humans, all agrees that robotics is related to design and construction of robots or automated machines.

3 DEFINITIONS OF MACHINE LEARNING

Search and find three definitions of Machine Learning, describe these briefly. Discuss definitions relative to discussions of Machine Learning in the course.

- 1) Wikipedia: Machine learning is a field of artificial intelligence that uses statistical techniques to give computer systems the ability to "learn" from data, without being explicitly programmed.
- 2) Techemergence: 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.
- 3) Merriam-Webster: The capability of a machine to improve its own performance.

The Webster definition is perhaps a bit wider than the discussion of machine learning we engage in within the context of AI in INF5480. Self-adjusting ignition timing in cars would fall within the last definition, but not the first two. The second definition suggested by Techemergence would best represent the way we treat the topic, while the first is closely tied to technology.

4 AI AND ROBOTICS

Write in three to five sentences the relationship between AI and Robotics as you understand this. Expand on this text to explain the relation between AI and Machine Learning.

Personally I understand Artificial Intelligence as machines ability to think, learn or solve problems theoretically, while robotics for me is concerned with machines that can do more or less complicated tasks usually without direct human control.

Autonomous robots with the ability to respond or react independently combines the two categories, making intelligent robots.

The level of sophistication of sensing it's surrounding and respond appropriately to solve problems independently could suggest that stationary machines can be robots based on the fact that humans without movement are still humans, but I prefer to make the distinction that robots can move in the real world.

Traditionally Artificial Intelligence relates to the simulation of human behaviour in machines, while Machine Learning is related to the science of making machines improve their skills autonomously through training or learning from experience rather than direct instruction and explicit programming.

5 MY DEFINITION OF AI

Make a text to describe your own definition of AI. Explain briefly this definition.

Artificial Intelligence or AI to me is machines that are able to gain knowledge and skills, and furthermore use what it has learned to analyse or solve new situations or problems. This is based mainly on my perception of what intelligence is.

6 INTERACTION WITH AI

Make a drawing of an interaction with an AI - something that you imagine.



Do you realize that these human-controlled death-traps have been banned for some time now Mr. Deberitz? would you please step out of the vehicle?

Fig 1. Robot Traffic Police

7 INTERACTION DESIGN FOR AI

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

A lot of work has been put into natural language interaction with machines, be it voice or OCR and image recognition, over the last 20 odd years. Although still rather limited in use we now have voice control assistant such as Siri from Apple or Cortana by Microsoft. For those of us that can remember back to the 1980's, speech generation has come a long way since then, but the machine's ability to actually converse or understand more than simple instructions is still limited.

These days learning machines and autonomous machines such as self-driving cars or weaponized robots are starting to become a real threat. More relevant for many of us is that we can be annoyed by computerized customer service in the form of chatbots service rather than talk with underpaid and unpleasant people having to deal with frustrated or angry people all day. The trend to try to automate interaction between human individuals and organizations has been going on for quite a while.

There seems to be three main approaches to human-AI interaction design.

- On the one hand we have the AI that openly engages with the human, such as chatbots or similar technologies that require several iterations of dialog or selections before a goal is reached. More or less humanoid robots are included in this class.
- Secondly we have the "expert" type AI where there is a more or less specialized GUI for input of some data, and the system normally provides some feedback for instance in the form of a prediction or diagnosis.

- Finally we have the “hidden” AI adapting what is presented to us based on an analysis of data believed to be relevant. This may have started in the late 1990s when the possibility for dynamic content generation was combined with the technology to gain insight into users’ movements across the internet and their probable interests. This has been refined and expanded over 2 decades so that many websites such as Google and Netflix present totally different results for different persons based on a set of machine-generated rules.

There seems to be a difference in preferences when it comes to the human likeness being copied in machines around the world, and it seems that Asian people are more at ease with humanoid robots than European and American people. I can only speculate that this might have something to do with popular culture.

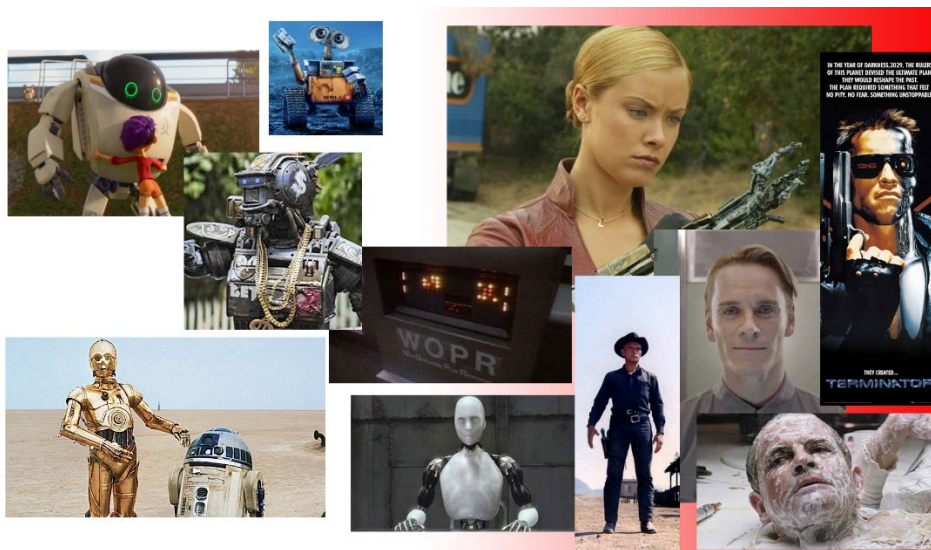


Fig 2. Friendly mechanical robots and evil humanoid robots in film.

It seems that humans seem more comfortable when robots move in a flowing manner, rather than abrupt straight lines which might be easier to program. Soft acceleration and deceleration is more appealing to our sense of safety than things that suddenly appear or abruptly changes directions. This might be linked to the fact that danger signals often are abrupt, and hostile actions or accidents often are sudden. AI design theory borrows from traditional cartoon animation to create interfaces that appeals to humans.

8 ON THE SUBJECT OF OBJECTS

1. Read the article: "On the Subject of Objects: Four Views on Object Perception and Tool Use" by Tarja Susi / Tom Ziemke. Write in your own words one page about the different perspectives on the human relationship with tools.
2. Select one of the perspectives from the article, and go into detail when you describe it.

The authors discuss four different approaches to the relationships between mainly inanimate objects and animals or people, which shows various ways of relating to objects. Although very philosophical and seemingly impractical, it does discuss different ways of relating to things ranging from the idea that objects are nothing in themselves but takes on different meanings or uses (functional tones) based on the animal's mood or needs.

Related to this idea is the view on objects as equipment, and things being of use to humans as such. Although the same object can be used for different tasks, the fact that they are kept close by or on one's person is essential for the idea of things as equipment.

A more balanced view on things, is the concept of things having affordances. In essence - ways an animal can be able to use the object. In this idea, objects have certain physical aspects that can be used by different animals in various ways.

The view of objects being entry points into actions for animals, the object is given a more active role than I would normally attribute to things. It invites the animal to use the object, rather than the animal having a need and the object filling a need.

Although I tend to relate to objects as independent entities in their own right, and understand that they can be used for different purposes if the need should arise, it is interesting to think about how we relate to our surroundings.

I find it intriguing that the concept of things as entry points to experiences or actions rather than objects having affordances has emerged as an idea. It does indicate that animals like us are influenced by objects, not just that we use them. The examples given are mostly made objects designed for a specific purpose, or to help with a number of tasks, and is somewhat removed from the affordances of naturally occurring objects or more simple tools.

9 SUBJECT OBJECTS

Select one other article from module 1, and write with your own words what this article is about.

In her article "Subject Objects" Lucy Suchman looks into different instances of humanoid robots, and their interaction with humans. Both interested in how we humans try to create machines in our likeness, and a proponent of making machines more like humans, she presents interactions with the robots Mertz, Kismet and Robota.

10 WARGAMES

Select one documentary or a fictional film, book or game: describe with your own word how interaction with AI is portrayed in this work.

In the 1983 movie Wargames the military supercomputer W.O.P.R designed by Dr. Stephen Falken to be a strategic and partially autonomous defense system accidentally is hacked by the computer savvy high school student David Lightman played by Matthew Broderick looking for computer games.

Based on traditional logical, apparently self-training, gaming AI technology the War Operating Plan Response machine is made believable through primary access through contemporary microcomputer terminals using keyboards and monochrome green screens and dial-up modem connection. However it is anthropomorphized through the use of speech synthesizer speakers connected to Lightman's computer, and the student talking to the computer as he types. The machine is nicknamed Joshua by the young student, after he discovers dr. Falken's has left a backdoor to the system using his deceased son's name for a password.

Starting a game of simulated thermonuclear war with Joshua, David almost brings about the end of civilization as we know it because the machine is connected directly to all the

nuclear missile silos and doesn't really know how to differentiate between reality and a digital simulation. Luckily the machine can learn quickly the concept of tie through playing tic-tac-toe against itself, initiated by Falken and Lightman, and transfer that knowledge to the global thermonuclear war simulation and realizing that there is no way to win except not to play.

During the 1980's there were quite a few sci-fi films warning us that giving machines control of weapons or too much autonomy. The Terminator series of films featuring evil killer robots controlled by an AI that has realised that humans are a threat to the planet has been going since the 1980's. And the evil AI named HAL in 2001 a Space Odyssey is classic.

W.O.P.R./Joshua in Wargames is different in that it is not evil or even hostile, nor are the people that has created or implemented it. It is just a cautionary tale that is important to remember that things may go terribly wrong if you rely too much on autonomous technology that does not have the "fault" of feeling and making decisions that are not purely mathematical.

11 AUTONOMY

Describe what you understand by autonomy; both human autonomy and machine autonomy.

Autonomy, in essence, is the opportunity to make independent decisions and implement them to the best of one's ability. It doesn't necessary imply reasoning or logical intelligence, rather the ability to act independently of external command.

12 THE ORIGIN OF AI

When was the term "AI" first coined? Please make a reference.

Apparently the concept of artificial intelligence dates back to the ancient Greek myths of a blacksmith that had created living machines of gold to help him work, that could walk and talk like humans.

However the computer science term Artificial Intelligence was coined in 1955.

Websters dictionary

13 QUESTION TO P.DOURISH

Articulate one question for the article "What we talk about when we talk about context" by Paul Dourish in the curriculum

Is there any way to make use of AI to create ubiquitous computing technologies to create context aware systems even though context is complex and evolving?

14 QUESTION TO SCHULZ

Articulate at least one question for one of the articles in the module.

Schulz, Classifying Human and Robot Movement at Home and Implementing Robot Movement Using the Slow In, Slow Out Animation Principle

How would you create a robot that would appear more like a human, using principles from animation?

15 SUMMARY OF CARTER AND NIELSEN'S ARTICLE ON AIA

Choose one of the following two tasks, a or b.

a) *Read the article: "Like Having a Really Bad PA" by Luger & Sellen. Summarize in your own words key lessons learnt for interaction design with dialogue systems. Discuss the relevance of these lessons learnt for interaction with AI-based systems in general (1/2-1 page)*

b) *Read the article: "Using Artificial Intelligence to Augment Human Intelligence" by Carter & Nielsen. Summarize in your own words the articles discussion of different views on computers, and on how AI may augment human intelligence (1/2-1 page)*

The article identifies the traditional view on computers as machines that can help people calculate or remember and uses the term Intelligence Augmentation (IA) for this. They also briefly discuss the current state of Artificial Intelligence and the vision of intelligent machines gathering information and learning to provide us with answers like some ancient oracle. In both case they use term using computers to outsource cognition.

Carter & Nielsen proposes that computers might provide another opportunity to expand the human ability to think better with the assistance of computers. They coin the term artificial intelligence augmentation (AIA) for the use of Artificial Intelligence systems to develop new methods of intelligence augmentation.

Their suggestion that new methods of thinking can be learned at an increased rate with the assistance of computer technology is interesting. A vision of AI helping with creating new thinking models that humans can use to expand their own cognitive capacity. This is a fresh approach to AI, which cannot be measured by Turing tests or comparing improvements in processing speed.

Although quite technical in content this article is surprisingly positive, pro human and philosophical.

16 DIFFERENT LEVELS OF AUTOMATION

Describe with your own words what you understand by different levels of automation? What are the advantages/disadvantages related to higher/lower levels of automation?

Automation for me is a machine's ability to perform tasks or act independently. This can range from a simple machine that can perform one repetitive task while it is turned on, to a self-learning and fully autonomous robot capable of improving and extending its own capabilities.

Low level automation has been used to save manual or animal labour or increase productivity for a very long time. During the last 150 years machines have become rapidly more intricate and able to perform more complicated operations. The last 50 years or so, electronic computing support for machines has increased the level of automation in many areas. Apart from the obvious disadvantage of redundancy of human labour capacity which is a consequence of most forms of automation, higher levels of automation would make more - if not most humans less important in the socioeconomic realm. In my opinion there are disadvantages or risks associated with automation on many levels, depending on what damage the machine can do.

While it might be beneficial for a small, harmless machine taking care of mundane tasks such as housework or maintenance to have a high level of automation, it can be disastrous to enable a high level of automation to anything that can be weaponized. Autonomous machines that has the capability to cause serious damage, such as self-driving cars, obviously is a great risk factor even if they provide services many people would like.

In general, I would say that lower levels of automation which gives assistance to humans is safer in that it is easier to control and more predictable than higher levels of automation where machines are autonomous or intelligent. Although it might be argued that artificial intelligence could potentially provide greater benefits or innovations with a higher level of automation, handing over control to machines seems a very risky proposition.

As long as proper fail-safes are in place and control is kept with responsible and ethical people it could be generalised that increasing automation can provide more benefits, although the technology might not be there yet.