

Individual assignment

steffeam@ifi.uio.no

1. Search and find three definitions of AI, describe these briefly. Make references.

“Artificial Intelligence (AI) is the field of computer science dedicated to solving cognitive problems commonly associated with human intelligence, such as learning, problem solving, and pattern recognition.” (Amazon, u.d.)

- This definition of artificial intelligence compares the ability for computers to learn and solve problems just like humans, using “intelligence”.

“Artificial intelligence is the study of devices that perceive their environment and define a course of action that will maximize its chance of achieving a given goal.” (Poole, Mackworth, & Goebel, 1998)

- AI devices will process, and use gathered data for intelligent decision making to accomplish a given objective.

“The modern definition of artificial intelligence (or AI) is “the study and design of intelligent agents” where an intelligent agent is a system that perceives its environment and takes actions which maximizes its chances of success” (Randal B & Wesley N, 2009)

- This definition refers AI to a of study and design of an intelligent system. Like the two definitions above it refers to intelligence when talking about perceiving to take actions when doing a task.

Modul 2. Discuss definitions relative to discussions of AI in the course.

In module two of this course we look at AI as agentive technology systems. We also discuss how sci-fi literature influence the way people think of AI. Most of the sci-fi AI's falls into three categories of so called strong artificial intelligence: Super, general and narrow artificial intelligence. Whereas super and general AI is a more futuristic view, we dig deeper at the opportunities and limitations of the narrow AI. Narrow AI improves and learn with the use of large datasets and computational power and we look at AI-based interactive systems to see how AI can learn and improve by

gathering data from users. Relative to the definitions above, AI is described as technology that learn with the help of datasets, machine and deep learning and not as intelligent machines that tries to replicate human cognition, behaviour and intelligence as most of the definitions above.

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

“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, 2017)

- This definition defines robots as machines that do a certain job depending on their functionality.

"A robot is an actuated mechanism programmable in two or more axes with a degree of autonomy, moving within its environment, to perform intended tasks. Autonomy in this context means the ability to perform intended tasks based on current state and sensing, without human intervention."
(LeoRobotics, u.d.)

- Here robots are defined as autonomous machines performing tasks without any human interference by sensing and moving in its environment.

“A robot is a machine designed to execute one or more tasks automatically with speed and precision.” (Margaret, 2016)

- Robots are often designed to outperform humans in doing repetitive tasks with greater a speed and precision over time. These robots are often used in industrial work.

3. Search and find three definitions of Machine Learning, describe these briefly.

“Machine Learning at its most basic is the practice of using algorithms to parse data, learn from it, and then make a determination or prediction about something in the world. So rather than hand-coding software routines with a specific set of instructions to accomplish a particular task, the machine is “trained” using large amounts of data and algorithms that give it the ability to learn how to perform the task.” (Copeland, 2016)

- Nvidia’s definition is based on explaining how machine learning works with the use of algorithms to understand the data and then gain knowledge from it. With this knowledge the

machine can understand the world better and make “intelligent” predictions and decisions when performing tasks.

“Machine learning is based on algorithms that can learn from data without relying on rule-based programming.” (Pyle & Jose, 2015)

- Just like Nvidia, McKinsey mention algorithms when referring to machine learning. The algorithms make the machine learn independently without relying on rule-based code.

“Machine learning is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention.” (SAS, u.d.)

- This definition from SAS explains that machine learning is a branch from AI and a method where data is analysed to learn and then use the knowledge building a model for decision making and pattern recognition.

Modul 2. Discuss definitions relative to discussions of Machine Learning in the course.

In this course we look at how AI advances with the progress of machine learning and the use of large dataset in neural networks. To be able to get these large datasets, tech companies such as Google gathers data from their own users through interaction with their many free services.

4. Write in three to five sentences the relationship between AI and Robotics as you understand this.

As I understand this, AI and robotics are two separate fields. However, AI and robotics can combine to create artificially intelligent robots. Robots can be programmed to do a certain job, like picking up objects and place them at a given location. It's possible to give the robot “perception” with sensors and cameras programmed with AI algorithms making the robot “intelligent” and adaptable to its environment.

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

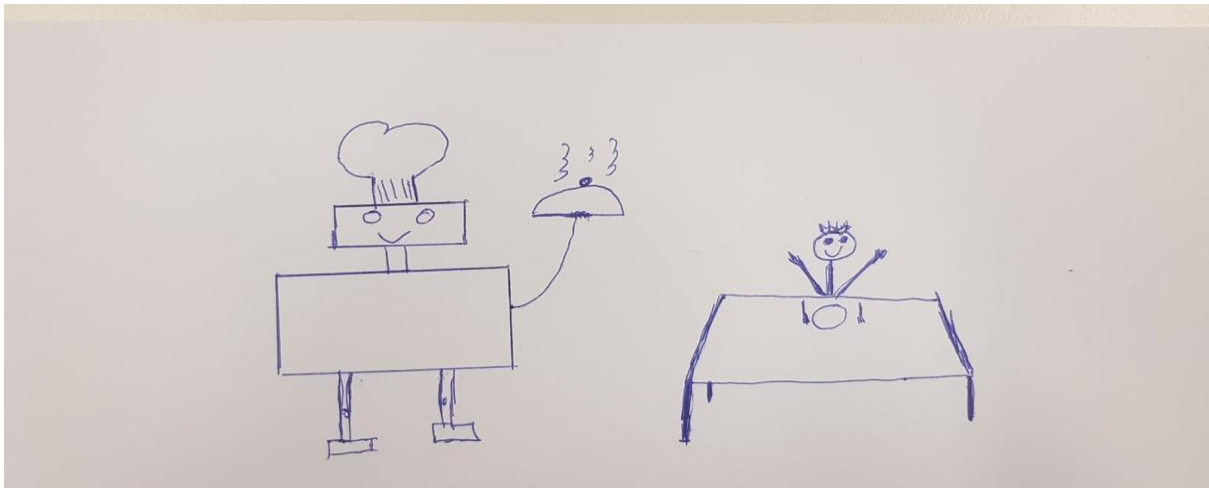
Artificial intelligence is the field of computer science that are trying to replicate human mind and behaviour being able to reason, communicate and learn similar to humans.

- As I see it, the goal of AI is to make machines with the capacity of a human brain, or even surpass the human cognitive capabilities.

Modul 2. Expand on this text to explain the relation between AI and Machine Learning

Machine learning is often referred as a branch of AI and it's the idea of that machines and systems can learn from big datasets. With this data the machine can learn to recognize data patterns and make accurate assumptions with little to no interference from humans. The relation between AI and machine learning is in my opinion that you need machine learning to be able to get AI.

6. Make a drawing of an interaction with an AI - something that you imagine. Describe with some sentences your drawing.



Here is a drawing of me and RoboChef. RoboChef is my personal chef and he makes excellent food on my request. He even goes to the grocery store when needed. Yay!

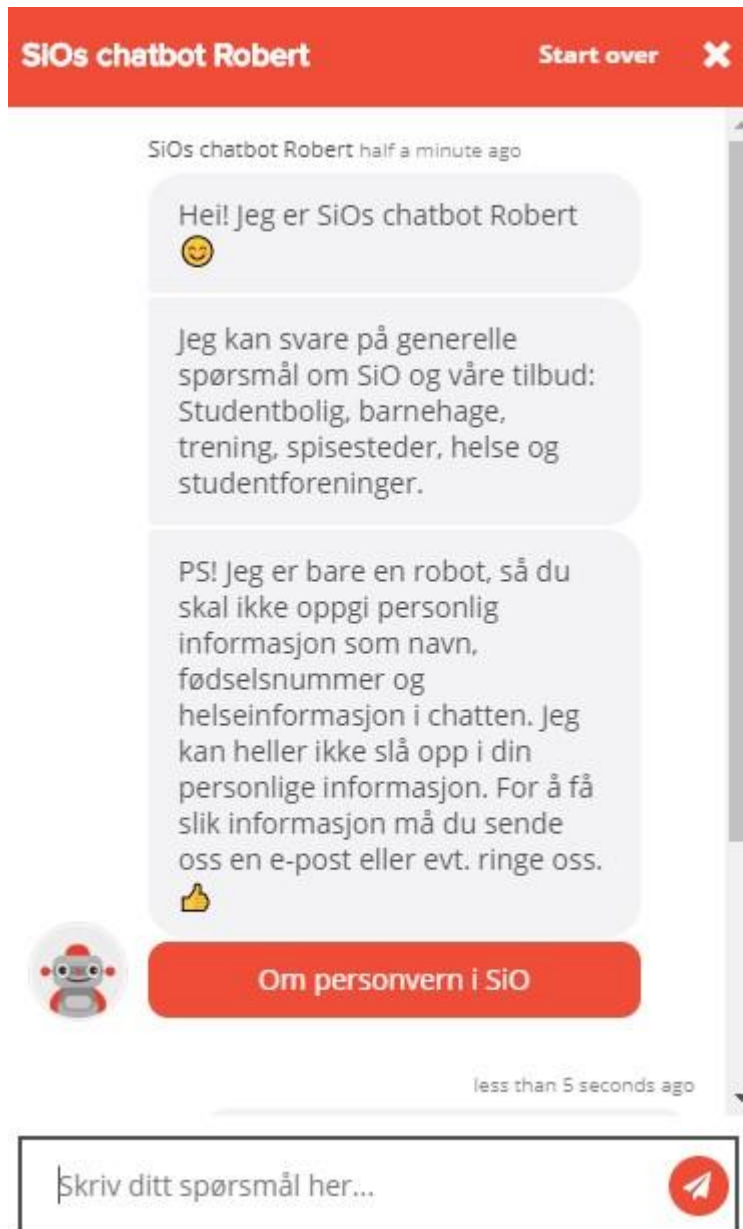
Modul 2. Summarize key characteristics of interaction design for AI-based systems (challenges, principles, trends). Sketch a user interface illustrating one or more of these characteristics

Importance of understanding conversational processes:

- Conversational implicature, stereotyped expectation of conversation. The four maxims of conversation

The maxims of conversation are a set of guidelines in how you engage a conversation. This can be applicable when designing AI-based interaction systems. The four maxims state that you should be as informative as possible, speak the truth, be relevant and be clear and brief.

Key characteristics are that the system should be dynamic, acknowledge that mistakes are inevitable and data gathering through interaction. The system should be clear on its functionality, capabilities and set the expectations of what the user can do. It should learn from mistakes and adapt depending on the level of certainty. It also should gather data from users and make the users benefit from this data gathering. (Følstad, 2018)



The picture illustrates the SiO chatbot Robert. Robert clarifies that you are not talking to a human being and explains which questions he is able to answer. This will help to set the users expectation from the start.

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

In this paper by Tarja Susi and Tom Ziemke you get an overview of four different views on how subjects perceive the physical object it encounters and their possible uses.

The German biologist Jakob Von Uexküll worked with the idea that the subject imprints meaning to objects it encounters, making them meaning-carriers for the subject in its own perceived universe (Umwelt). Before the object is given a meaning, it's neutral for the subject, but as soon as they enter a form of relationship the subject ascribes meaning to the object. This is what Von Uexküll termed functional tone. When the relationship is formed the object may be given different meaning depending on the subject's mood. To explain this, Von Uexküll uses an example of a stone. On the ground the stone has a "path-quality" and supports a road walking on. But if the stone is picked up and thrown at someone / something, it gets another meaning and quality for the subject. The functional tone of the stone shifts depending on the subject's mood.

The German philosopher Martin Heidegger worked with the concept of equipment. Heidegger focus on the subject-object relation was to explain what it means for something to exist in the world. He termed objects we encounter in our everyday activities' equipment or useful things and their feature was to get something done. Heidegger thinks there is nothing like *an equipment* or *a useful thing*, but in the totality of things, the equipment whole, the objects get their different functionality. How the object is perceived depends on the subject's current activity.

The American psychologist James. J Gibson used the concept of affordance to explain the subjectobject relationship. In Gibson's view what we perceive of information and affordances in the environment are surfaces that ambient light are reflecting. An affordance is what the object offers by showing its possible actions a subject can do with it. The affordance of something does not change depending on the subject's mood, like Von Uexküll functional tone, but the subject can shift focus on affordances according to its needs.

A central concept of David Kirsh work are entry points. In Kirsch view reconstructing the environment to increase performance and efficiency instead of adapting oneself is the best way to reduce cognitive demands doing a certain job or task. In this paper he focuses on work context of offices. The entry point concept is used to create a structure of affordances as a reminder of what needs to be done. Creating such structure invites people to do things similarly to affordances. The entry points created have different properties with several dimensions affecting the way people react

and understand them. For instance, visually attention like colours and shape, metadata like headings and pictures and the relevance of the entry point at that given time.

8. Select one of the perspectives from the article and go into detail when you describe it.

James J. Gibson theory of affordances describes the environment and what it can *afford* the subject. He uses the concept of niches. A niche is a place in the environment that the animal utilizes. It refers to how an animal lives in this niche environment where the animal is offered a set of affordances relative to that specific animal. He points out that the affordances of the environment are objective, real and physical and are not subjective and mental like values and meanings. According to Gibson we see the objects affordances rather than its qualities looking at it. The object various shape, size and colours are irrelevant, and our attention is on what the object affords us. Gibson distinguish between attached and detached objects. Detached object could be something graspable and portable that affords lifting, carrying and manipulation. Gibson uses examples as sheets, sticks, fibres and tools as detachable objects that affords manipulation.

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

Automation Bias in Intelligent Time Critical Decision Support Systems

This article is about, what the title describes, bias in automation of decision systems, and particularly about systems in aviation.

Intelligent decision support systems (IDSS) can be fully automated leaving all the decision making to the machine, or it can have minimal automation, where it only suggests recommendations that the operator can accept or decline. In systems where there is no too little room for decision making and with a low probability of unexpected system failure, fully automated systems are often recommended. However, full automation or even partially automated systems can result in human errors, loss in performance and decision biases. In the discussion about automation bias, the article looks at three aviation-related IDSS: Computer-assisted route planning, Critical event diagnosis and action and Time-sensitive resource allocation.

Studies provide clear evidence that automation biases do occur and are a concern in development and use of IDSS. In the article they use an example of automation bias from a deadly aviation accident in 1972. When landing they get an indication of error with the nose gear. They engage the autopilot to focus on the problem, but in the process accidentally turned the autopilot off unnoticed. Believing the

autopilot would keep the right altitude while fixing the alerted error they failed to see what was going on, leading to deaths of 101 crew and passengers.

As studies and real live cases demonstrate, automation bias is a real concern in the use and development of IDDS. When designing intelligent automated systems, we must be aware of the risks removing the humans from the decision-making process.

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

“San Junipero” is an episode from the British science fiction series Black Mirror. (Spoiler alert!)

The setting of this episode is in a town named San Junipero In 1987 and the main character is a young girl named Yorkie. She is a shy girl, and a first-time visitor in San Junipero. At a club she meets the outgoing party girl Kelly. They have a connection, flirting and eventually falls in love with each other. After a while it’s revealed that San Junipero really is simulated reality. In the real world, Yorkie and Kelly are elderly women with deadly health related conditions. In San Junipero they can inhabit the healthy younger versions of themselves for a short time every week. It’s also possible for the deceased to have an afterlife in San Junipero, when dying they can request to get uploaded and stay there permanently, in some form of virtual heaven.

Yorkie and Kelly, who are both dying in the real world have different views on the topic of an afterlife in the simulated world. They argue about this, but Kelly who had lost her husband and daughter, plans to die like they did, not getting uploaded. Like other Black Mirror episodes, you would expect a grim ending to this story. But Kelly changes her mind and after her death she is reunited with Yorkie in the digital heaven... forever. If this is considered a happy ending are certainly debatable, but I think the big question to the viewer of this episode is: “Would you?”.

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

My understanding of human autonomy is that human beings can make independent decisions without the influence or control of others. To a certain degree it’s the same with machine autonomy. An autonomous machine should perform its function or task(s) in the real world without the interference from people.

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

Artificial intelligence as a term was first coined by John McCarthy at a conference about the subject of AI. (Myers, 2011)

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

Dourish alternative view on context suggest that context is first produced while doing an activity, wouldn't this view make context-aware computing impossible/difficult/hard (because we can't determine the context)?

14. Articulate one question for any other article in the curriculum.

A question from the article Cummings, M., 2004. Automation bias in intelligent time critical decision support systems:

What kind of tools, techniques and methods can designers of intelligent systems use to better see the potential negative effects with higher level of automation?

Modul 2. "Like Having a Really Bad PA" by Luger & Sellen. Summarize in your own words key lessons learnt for interaction design with dialogue systems.

Conversation with our gadgets is becoming a more common thing in how we interact with technology today. In this article regular users of conversational agents (CA) are interviewed to understand what motivates and limits the use of CAs and what considerations we need to make in future designs of interaction with the machines.

One of the key lessons learnt is that people differ from how they interact with a CA.

Almost all participants in this study started to engage the CA in a playful way to understand which tasks it could or could not do. This playful interaction drew a mental model of the CAs capabilities that was not equal to the reality. When the playful interaction phase passed, and the participants wanted to perform key tasks, they became less forgiving of failure. When failing completing complex tasks the expectations of what it could do were lowered and it was relegated to just do basic tasks the user know it could do. However, users with more technological knowledge seems to be more forgiving and had lower expectations of what the CA actually could do. This is explained by Norman's "gulf of execution and evaluation", the more knowledge the user has about limitations of a system, the more accurate are the expectations of what it can do, thus a more satisfying user experience.

To narrow the gap of expectations when users interact with AI-based systems it's needed to rethink system feedback and reveal the systems real intelligence. Giving the CA humanlike characteristics can set unrealistic expectations and the user may get a mental model of possible interaction that doesn't fit reality.

Module 3. 16. Different levels of automation and advantages/disadvantages related to higher/lower levels of automation.

The different levels of automation presented by Sheridan and Verplank range between 1 to 10 (Sheridan and Verplank, 1978).

This scale represents how independent a machine is in the case of decision-making. The levels can vary from fully automated, where the human is completely left out of the decision process (level 6 – 10), to levels where the human operator always have the final say (level 1 – 5).

Table 2. Levels of Automation

Automation Level	Automation Description
1	The computer offers no assistance: human must take all decision and actions.
2	The computer offers a complete set of decision/action alternatives, or
3	narrows the selection down to a few, or
4	suggests one alternative, and
5	executes that suggestion if the human approves, or
6	allows the human a restricted time to veto before automatic execution, or
7	executes automatically, then necessarily informs humans, and
8	informs the human only if asked, or
9	informs the human only if it, the computer, decides to.
10	The computer decides everything and acts autonomously, ignoring the human.

My understanding of the different levels is that the level of automation a certain task or decision should be, depends on what kind of job or information that needs to be automated. In non-complex systems, with repetitive tasks, a high level of automation can be seen as beneficial and as an advantage. However, in complex time critical systems such as aviation or military control operations a higher level of automation can have fatal consequences. An automated system can lead to lack of human performance and situational awareness as the operators tend to let the automated machines take care of the decision process (Cummings, 2004).

In an aviation study examining effectiveness of automated recommendations on pilot's ability to counter icing problems, pilots were presented with either just a status information display (LOA 2) that alerts the pilot where ice was building on the aircraft surfaces or a command display (LOA 4) that indicated actions that could solve the icing problem. When the computer provided a correct advice the pilots with the command display outperformed the pilots with the status display. However, when the

computer was inaccurate, pilots with the information display outperformed those with the command display. The recommendation after these results was that unless a decision system are perfectly reliable, a lower level of automation like the status displays should be used instead of the command display.

Studies like this emphasizes the issue of high automation in complex systems, because humans tend to trust the automation in systems they do not understand themselves.

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