Iteration 2 - AI

1.1 Concepts, definition and history of AI and interaction with AI

First, write a section about how AI came about, the history of AI. When, and by whom, was the term first used?

The history of how AI came about begins during World War II, where the potential importance of computers was established through its role in code breaking. A leading code breaker at the time, Alan Turing, wrote in the London Times that “I do not see why [the computer] should not enter any one of the fields normally covered by human intellect, and eventually compete on equal terms” (Grudin, 2009). The term “artificial intelligence” (AI) was first used in 1956, in a call for participation in a workshop, written by John McCarty. AI evolved over the decades, and eventually took a turn described by McCarthy who wrote that “[the goal] was to get away from studying human behavior and consider the computer as a tool for solving certain classes of problems. Thus AI was created as a branch of computer science and not as a branch of psychology.” The most recent turning point in the interest of AI came in the year of 1997, where a machine defeated the world chess champion. Further on, events such as launching remotely controlled robots on Mars, the availability of the internet and recommendation systems within it, as well as reduced costs for storage, processing and access, lead to the big interest we have of AI in today's society.

Then, find three different definitions of AI. Describe and explain these three definitions, for example by when it was defined, by whom and in what community. Based on these three definitions, make one definition yourself - and describe and explain your definition.

Definition 1: "AI is a subfield of computer science aimed at specifying and making computer systems that mimic human intelligence or express rational behaviour, in the sense that the task would require intelligence if executed by a human." (Verne & Bratteteig, 2018).

Verne is a Senior lecturer while Bratteteig is a professor, both at the University of Oslo.

Definition 2: "Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving." (Investopedia, 2020)

Investopedia is an American website based in New York City that provides investing and finance education.

Definition 3: "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." (Britannica)

Britannica is a general knowledge English-language online encyclopaedia

The definition by Bratteteig and Verne talks about AI as a field of computer science, while Investopedia defines AI as a simulation, and lastly Britannica writes both about the theory and the development of the systems. These three definitions do not contradict each other, but they focus on three different aspects of what AI is about. The definitions also vary in age, as Bratteteig and Verne's paper is written in 2018, the Britannica definition is from 1998 or earlier (it is difficult to pinpoint when it was actually written as is existed in book form previously , but it was uploaded online in that year), and the Investopedia definition unfortunately has no written date.

My definition of AI would be:
"AI is a machine performing tasks that requires human intelligence, as well as being able to mimic human cognitive processes". This definition is inspired by the other definitions above,

but more focused on the aspects I find important with AI. To me, AI is not a theory or a field, but the actual system performing the tasks and how that system is perceived.

Find one contemporary company that works with AI and describe how this company presents AI on their web pages. In what way does this company talk about AI, as a product, as a service, framework or "idea"?

The company Computas is a Norwegian provider of IT solutions and consulting services in technological innovation. They talk about AI as a theory and a development process, writing on their website that "Artificial intelligence is the theory and development of computer systems capable of performing tasks that require human intelligence" (Computas), very similar to Britannica's definition. They also explain it as taking what is seen as human characteristics, and transferring them to a machine.

Select one documentary or a fictional film, book or game that is about the use and interaction with AI. Describe with your own word how human interaction with AI is portrayed in this work.

The movie Her (2013) is a fictional movie about a man who falls in love with an AI. The plot shows a recently divorced man who feels lonely and misses his ex-wife, but finds company in a new operating system called Samantha. She exists on his computer and his phone, and they have very human-like conversations, which creates the feeling of her being an actual person. In this movie, AI is portrayed as a system that can be perceived as a real human, and a system that can evolve and think on its own. This is shown in the end of the movie, where the system (Samantha) decides on her own to explore outside the operative system, and leaves.

1.2 Robots and AI

Write a section about how the word Robot came about.

The term "Robot" was first used in 1920, by Karel Čapek in his play R.U.R (Rossum's Universal Robots), although he names his brother as the original inventor of the term. However, the word 'robot' was not new, as it had been in the Slavic language for a long

time, having the word *robota* with the meaning “forced laborer”. In the play, Čapek told a story about artificial human bodies without souls doing the work that humans did not want to do, and the word *robot* then fit with the explanation of these artificial workers.

Find two different definitions of “robot”. Describe and explain these definitions. Based on these definitions, make one definition yourself, and describe and explain this definition.

Definition 1: The Robot institute of America defines robot as “A reprogrammable, multifunctional manipulator designed to move materials, parts, tools, or specialized devices through various programmed motions for the performance of a variety of tasks” (Thrun, 2004).

Definition 2: “A machine that resembles a living creature in being capable of moving independently (as by walking or rolling on wheels) and performing complex actions (such as grasping and moving objects)” (Merriam Webster Dictionary)

The two definitions are different from each other, in the way that the first definition only talks about it being a manipulator and its functionality, while the second definition mentions the machine's resemblance to a living creature as well.

My definition of a robot would be:
“A machine made by humans with the purpose of doing complex tasks” Whether the machine resembles a living creature or not, is not essential to me when defining a robot. The important part is that the machine is able to do complex tasks, with a purpose set by the designer of the machine.

Discuss the relation between AI and Robots. Is “a robot” different from “an AI”? In what ways are they different and similar? Bring in the definitions that you described earlier about robots and AI for this discussion.

When talking about a robot, one generally only talks about the tasks that the machine is able to do, while the AI adds the element of human intelligence. A robot is only defined as “a manipulator designed to move materials”, it is more of a physical tool in a way. A definition of an AI often includes “mimicking human intelligence” (Verne & Bratteteig) and

cognitive skills like “visual perception and speech recognition” (Britannica), which can make an AI more of a collaborative partner than a simple tool, like a robot is.

Find one contemporary physical robot, either described in a research article - or a commercial robot, and describe how this robot moves and how a human user is interacting and using the robot in a specific situation.
A commercial robot that I have experience with, is the robot vacuum cleaner. This is a simple robot, programmed to analyze a room and then clean it by driving back and forth until it has covered the entire space. Usually, the human does not have to interact with it much for it to function. Either, the human user has to program it once with time intervals, and then it will do the job on its own periodically, or the human user has to go turn it on manually every time they want the floors cleaned. These robot vacuums have a “home station” that they return to when finished cleaning the floors, which also acts as a charging station.

1.3 Universal Design and AI systems

Please find and describe a definition of Universal Design. Explain this definition, how you understand what Universal Design is about with respect to inclusion.
“Universal Design is the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability.“ (Universaldesign.ie)

This definition talks about access, understanding and usability, by all people. These three words are essential when talking about universal design, because when something is universal, that means it is for everyone, regardless of their abilities or disabilities. If something is designed to leave any one user group out, then it is not universally designed.

Describe the potential of AI with respect to human perception, human movement and human cognition/emotions. You are encouraged to use examples.
AI can be used to aid companies in customer service, by being used in chatbots, where they are to be perceived as humans in customer service, able to help customers with simple

tasks and questions. AI also has the potential to help aid people with movement, like having self driving cars for people who struggle with driving themselves.

Describe the potential of AI for including and excluding people. You are encouraged to use examples.

AI has the potential to help include everyone, as they can help people with difficulties within perception, movement and cognition. For example voice controlled AI (like Siri) are used a lot as a tool for visually impaired people, to help navigate as well as perceive information. Voice controlled AI can also end up excluding people, for example people who have trouble speaking or have a speech impediment.

In WCAG 2.1 principles and in the Human AI-Interaction guidelines the concept "understand" and "understanding" is used. Explain briefly in what way you make sense of the concept "understand" and "understanding". Then address the question: Do machines understand?

To me, the concept of "understanding" something means that you perceive the *meaning* of what is said or done. I see this as a human skill, and not something machines can do to the same extent. When a machine "understands" a command, it only reads it and its following actions are then programmed, it does not have its own personal understanding of the word or the action that has taken place. I think that a machine can be perceived to understand something, but not truly understand it as it only "understands" what it is told that something means.

1.4 Guideline for Human-AI interaction

Please select one of the 18 guidelines from Microsoft, and describe this guideline with a different example than what is given by Microsoft.

G13: Learn from user behavior.

AI should learn whether a user is experienced or inexperienced, and then respond thereafter so as to aid the user in the best possible way, whether that be explain more in detail or skip explanations all together.

Search, and find one set of HCI design guidelines. Discuss briefly similarities and differences between the HCI design guidelines and the Human-AI interaction guidelines.
I have chosen Donald Norman's seven principles of interaction between human and computers. There are a lot of similarities between the two sets of guidelines, as they both write about the importance of the user understanding. Donald Norman's guideline "*Make things visible*" and the Human-AI interaction guideline *"make clear what the system can do"* are both about showing the user what the system's abilities are. When it comes to differences, Donald Norman's principles are more specifically about understanding, whereas the Human-AI interaction guidelines also cover social elements and efficiency.

Characteristics of AI-infused systems

Drawing on the first lecture of Module 2 and the four mandatory articles (Amershi et al. (2019), Kocielnik et al. (2019), Liao et al. (2020), Yang et al., (2020)). Identify and describe key characteristics of AI-infused systems.
When talking about Artificial Intelligence (AI), we differentiate between three different types of AI ;

- Artificial super intelligence: When doing something that matches or goes beyond human capabilities.
- Artificial general intelligence: When the AI mimics general human intelligence.
- Artificial narrow intelligence: When the AI focuses mainly on simple and narrow tasks.

The AI that we are familiar with in today's society is the artificial narrow intelligence, which is what I will be referring to when writing about AI-infused systems and their characteristics in this text.

Characteristics of AI
Følstad mentioned, during the first lecture of module 2, four key characteristics of AI-infused systems; Learning, improving, blackbox and fuelled by large data sets.

Learning within the area of AI implies that the system is very dynamic, and that it is designed for change. An AI is never "complete" when it comes to learning about the users and how to cater to them. Amershi et al (2019) writes about how these systems often have an element of uncertainty, where errors are common, often producing false positives and negatives, which can be confusing and offensive to the users.

Improving refers to how the AI evolves through the learning process, and becomes better at understanding the user and making the right actions. A way to learn would be through making mistakes, and then getting feedback from the users on these. Amershi et al (2019) mentions how AI-infused systems often are personalized in the way that they have filters built in "behind the scenes", that act on behalf of their users, such as filtering content. However, they might not always be aligned with the users' preferences, which is something that often can be improved through the system learning about the user and its preferences.

The Blackbox refers to how AI is viewed by many, as black solid boxed, where you are unable to see what happens inside. The "phenomenon" of AI can be very confusing and difficult to understand, when all you see as a user usually is the result. This also makes AI-infused systems difficult to use, especially for inexperienced users. This is supported by Kocielnik, who then suggests that "providing explanations will lead to higher perceptions of understanding how the AI system works" (2019).

Being *fuelled by large data sets* means that the AI learns through receiving loads of information, collected through interaction with users. Through receiving this data, either actively or passively, the system improves over time to learn how to cater better to the users.

Identify one AI-infused system which you know well, that exemplifies some of the above key characteristics. Discuss the implications of these characteristics for the example system, in particular how users are affected by these characteristics.

Netflix

I have chosen the service Netflix and its recommendation-system as my AI-infused system. This service helps you find new movies or series by suggesting some based on what I have

watched before. As well as my view-history, they also base their recommendation on whether i liked a movie/series or not, which I tell them through using thumbs up (“I liked this”) or thumbs down (“this was not for me”). Netflix allows you to have several profiles as well, so that I can get individual suggestions based on only my preferences, and not the rest of my family as well. I find the system to be very intuitive, as the symbols for “like” and” dislike” is very universal, and its placement next to the movie/series makes it easy to understand what you are reacting to. It also is clear that the system learns through user feedback, as the suggestions become better and better consistent with the amount of feedback I give. However, it is not clear *how* Netflix chooses the movies/series that they suggest to me, and so the blackbox-element of AI is very relevant here.

Human-AI interaction design

Amershi et al. (2019) and Kocielnik et al. (2019) discuss interaction design for AI-infused systems. Summarize main take-aways from the two papers

Amershi et al. (2019) propose 18 design guidelines for human AI interaction as a way to better the communication within a field that is currently advancing quickly. They present several issues with human AI interaction, such as producing false results, hidden personalization and unexpected changes that come with misunderstood learning over time. With these guidelines, they are hopeful that it will “result in better, more human-centric AI-infused systems”, and that their synthesis can facilitate further research.

In the Kocielnik et al. (2019) paper, they “explore techniques for shaping end-user expectations of AI-powered technologies prior to use and study how that shaping impacts user acceptance of those technologies”. They focus on different types of methods for setting expectations before initial use of an AI-based system, more specifically they use an Scheduling Assistant to explore this subject. They explore two different versions of the Scheduling Assistant, designed with two different focuses on the types of errors to avoid.

Select two of the design guidelines in Amershi et al. (2019). Discuss how the AI-infused system you used as example in the previous task adheres to, or deviates from these two design guidelines. Briefly discuss whether/how these two design guidelines could inspire improvements in the example system.

I have chosen guideline 1 and 9, where I will discuss how Netflix meets or deviates from these guidelines.

G1: Make clear what the system can do. ***Help the user understand what the AI system is capable of doing.***

I believe that Netflix could do better on this guideline concerning their services. It is not obvious that it is possible to use the "thumbs up" and "thumbs down" functions, as they are never presented when joining the service. They are also a bit hidden from the user, and many are not aware of this functionality. I believe that it would better the user experience if more users were made aware of the functionality, as they would most likely receive better recommendations when using it.

G9: Support efficient correction. ***Make it easy to edit, refine, or recover when the AI system is wrong.***

If Netflix suggests a movie/series that I do not like, I have the option to mark it as "not for me". What happens then is that the movie/series is "greyed out" and made to stand out from the rest. This is a very easy and efficient way of marking that the AI made a bad suggestion, and then simultaneously make me aware to avoid it in the future. However, I believe that the best way would be for it to be removed from my suggestions all together, as I clearly am not interested in watching it. I tried to refresh the service, but it was still present in greyscale.

Chatbots / conversational user interfaces

There are several implications that can occur when designing a chatbot, and I will firstly discuss three implications presented by Følstad during our lectures, as well as findings from a paper written by Yang, Steinfeld, Rosé & Zimmerman.

Conversation as design object

When designing other user interfaces, the focus is usually on different graphical design features such as navigation and interaction with elements. With the user interface of a chatbot, it is much more blank where most services are hidden from the user. This creates a difficult task for the designers, which have to move from design being an explanatory task, to seeing design as an interpretational task of understanding what the user needs, and then how this can then be presented.

Necessary to move from UI design to service design

When designing chatbots, the attention has changed from previously being focused on the user's goals, towards a focus on the interactive system, much like the ways of service design. Chatbots will be differentiated by their convenience in accessing the context of conversational threads (Følstad & Brandtzæg 2017).

Necessary to design for networks of humans and bots

When designing for typical HCI systems, one usually designs with one user and one system in mind. However, the future of the use of chatbots within systems can lead to the need for multi-agent systems, systems where both human users and chatbots will work together. This already exists in several places, and they have encountered problems surrounding their communication. Følstad & Brandtzæg mentions a case where different bots on Wikipedia went around reworking each other's work on articles, which is very unnecessary and unproductive.

Rapid prototyping and testing

When working with HCI, one core practice is" rapid prototyping, assessing the human consequences of a design and iteratively improving on it" (Yang, Steinfeld, Rosé & Zimmerman, 2020). However when working with AI, this is very difficult as the process of developing an AI is very intricate and comptex. One can never fully anticipate all the different developments and consequences that can occur during the learning process of an AI. These consequences can be harmful, an example being the chatbot Tay from Microsoft who ended up being a racist and mean chatbot after learning from users wanting to harm it.

Revisit Guidelines G1 and G2 in Amershi et al. (2019). Discuss how adherence to these could possibly resolve some of the challenges in current chatbots / conversational user interfaces.
I think the main problem with chatbots today, is that the users do not understand what the chatbot is created to do. Many users have unrealistic expectations about its functionality, and therefore can end up angry and annoyed after having tried to use a chatbot. If they have a certain issue, and are met with a chatbot that implies that it is there to solve the problem for them, but ends up not being able to, the user will feel upset and that they have wasted their time. This will reflect badly both on the company/system using the chatbot, as well as the concept of chatbots itself. If guideline 1 is followed, this might be avoided in a lot of situations. If the chatbot makes clear what it is capable of doing, the user might understand when the chatbot is not able to help them, before spending time trying.

This is also connected to the issue of "how well can the chatbot do what it can do". For example, if a chatbot says that it can book cinema tickets for you, but then doesn't disclose that it is not able to take into account if the user is handicapped, then it can be frustrating to use for those in that situation. It is therefore also not only important to make clear what the system does, but also guideline 2, make clear how well it can do it. If a chatbot has limits, for example when a chatbot is in its learning stages, it will with certainty make a lot of mistakes. If the chatbot discloses this as an introduction to the user, the user will not be surprised when the chatbot meets its limits, but rather be prepared and more understanding of the situation.

Feedback

I got feedback about the fact that I did not make my own titles, but rather used the questions in the assignment. I will consider changing this for the final delivery, but as of now I will keep them in to better be able to navigate around as well as make changes to the assignment before final report delivery.
I also was asked to provide more about the people giving the definitions (of AI i presume), so I have tried to add in some information about that.

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