Individual assignment fall 2024

1.1 – Concepts, definition and history of interacting with AI and autonomous systems

Artificial Intelligence has in recent years gained massive attention worldwide. But how did AI come about? It depends on how we look at the term. At one hand, the idea of "Artificial Intelligence" goes back thousands of years. We know that ancient Greek philosophers had some ideas where the word automatons meant something that moved independently despite possible human intervention (*What Is the History of Artificial Intelligence (AI)?*, n.d.). On the other hand, we can say that AI originated and started out in the 1950s where we produce machines and not only base the term around ideas. According to Grudin (2009), the term AI was first used in 1956 by a American mathematician and logician John McCarthy (p. 49). However, McCarthy was not the only one who was credited for coining the term. McCarthy along with Marvin Minsky, Nathaniel Rochester and Claude E. Shannon coined the term together in a proposal they wrote for the Dartmouth conference (which later started the field AI) in mid 1956 ("John McCarthy (Computer Scientist)," 2024). Even though the term was coined in 1956, artificial intelligence had been in research way before. It is said that AI started out in 1941 when Alan Turing was working on the theory of computation and his efforts in WW2 with the groundbreaking deciphering of the German ENIGMA code. Turing was therefore "among the first people to seriously investigate the theoretical possibility of ´machine intelligence´"("History of Artificial Intelligence," 2024).

One of the world's largest IT companies IBM (International Business Machines Corporation), describes AI as "Artificial Intelligence (AI) is technology that enables computers and machines to simulate human learning, comprehension, problem solving, decision making, creativity and autonomy" (*What Is Artificial Intelligence (AI)?*, 2024). Since IBM is one of the best established and well-known IT companies that was founded over 100 years ago, this definition is clear, understandable and most importantly serves as a foundation for Artificial Intelligence. Since AI has changed a lot in recent years, new and more specific definitions of the term have emerged. Let's look another huge and well-established IT company Google. Google has quite a long definition, but the first paragraph is as following "Artificial intelligence is a field of science concerned with building computers and machines that can reason, learn, and act in such a way that would normally require human intelligence or that involves data whose scale exceeds what humans can analyze."(*What Is Artificial Intelligence (AI)?*, n.d.). The third definition I want to cover is by Britannica, "Artificial intelligence (AI), the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings."(*Artificial Intelligence (AI) | Definition, Examples, Types, Applications, Companies, & Facts | Britannica*, 2024). For me personally, all these definitions are valid definitions of the term Artificial

Intelligence, and they are somewhat agreeable with each other. If I were to make a definition of the term, it would be “Artificial Intelligence (AI) is a specific field in computer science that is specialized in developing systems and machines that can do tasks like a human being. These tasks include a sense of human-like reasoning, decision-making, problem solving and learning. These systems and machines should operate and function autonomously and adapt to new information.”. What is important for my definition is to be clear that it is developed by humans and can resemble human intelligence as well as adapting and learning continuously.

The dictionary Merriam-Webster defines the word autonomy as “the quality or state of being self-governing”(*Definition of AUTONOMY*, 2024). I think the two biggest similarities between human and machine autonomy is the capability of decision-making and adaptation to environment. As of right now, the biggest difference in autonomy is the complexity and scope of humans. Our decision-making is far more advanced and has a lot more factors coming into play such as culture, psychology and most of all contexts. Of course, machines might be able to surpass us in these factors in the future. Similarities between the concept automatic and the concept of autonomous however, can be seen as tasks being done repeatedly by itself. You can say that how and what their input is to these tasks, are how they differ from each other. An automatic machine has certain commands which lets it know to do a task, while an autonomous machine can create these tasks on itself based on whatever parameters.

I want to delve deeper into the first article in the curriculum which I already have touched a little bit upon: “AI and HCI: two fields divided by a common focus” by Jonathan Grudin. This article is a great way to be introduced to these two new fields that I personally only have a brief knowledge of beforehand. As I first began to read this article, I found it hard to really understand because of my lacking knowledge in both fields. It was kind of confusing with the use of all the different conferences and various abbreviations. However, the article did a really good job at visualizing the timeline of these two fields and educating me on how the fields have developed over time, but also how they related to each other. It is a great way of being introduced to both fields and getting valuable insights on what has happened over the years.

As we all know, there is a huge trend for companies to adapt to the AI wave. More and more companies are paying more attention to AI and trying to develop their own product or service. Obvious companies such as OpenAI, Google and Microsoft have already made some incredible products and systems. But there is one tech company that has had an impressive increase in value over the years that I have not seen as publicly with their AI promotion. If I ask someone randomly if their have heard about Nvidia, most people would probably have heard it before. If I then ask what they do, most people who know about them, would say they make graphic cards for video games. While that may have been the case in the 2010´s, now however, Nvidia is the world leader in Artificial

Intelligence Computing. If you go to their website, they clearly promote their new generative AI "Nvidia NIM". Nvidia states "Part of NVIDIA AI Enterprise, NVIDIA NIM is a set of easy-to-use inference microservices for accelerating the deployment of foundation models on any cloud or data center and helping to keep your data secure"(*NVIDIA NIM for Generative AI*, n.d.). Nvidia talks about NIM as both a product and a platform/framework where the community can create using their API.

There are a lot of these games, tv-series and movies about AI that really has had my interest in my teenage years. One that stood out was the HBO sci-fi tv-show "Westworld". This series is about a futuristic theme park that takes place in the old west. The show delves into complex interactions between the AI "hosts" and the human guests that visit the park. The hosts look and behave identical to real human beings but are in a continuous programmed loop to satisfy the customers. These hosts are designed to cater to human desires and engage in scripted experiences. For the guests, this is just for entertainment and the feeling of doing whatever they want, to whomever they want. The series really made me think about how we as humans can do horrendous actions to objects that look and behave identical to a human, but that we know is not. So why do we as humans have such sympathy for other humans, while with robots that are identical and almost have kind of their own consciousness, we could kill and torment without any sympathy? As the show progresses, the hosts start to gain self-awareness and begin to question their whole existence. This leads to the show exploring themes of consciousness, morality, and the ethical implications of creating sentient beings for our own pleasure. But it also goes way beyond just human and AI interaction, with profound questions about the nature of free will, the responsibilities of creators, and the consequences of blurring the lines between artificial and human consciousness.

1.2 – Robots and AI systems

Something that goes hand in hand with the term artificial intelligence is the word robot. All of us are familiar with this word and have heard or used it in one way or another during our upbringing, but what does it mean and where does it come from? The word originated in a Czech science fiction play called "Rossum´s Universal Robots". The playwright Karel Čapek called these artificial people for robots and the word has been used ever since (Reader, 2019).

There is no direct definition of the word robot in the article by The MIT Press Reader (2019), but they do write about where the word derives from, and we can therefore interpret this as Karel Čapek´s old definition of the word robot. "The word itself derives from the Czech word ´robota´, or forced labor, as done by serfs. Its Slavic linguistic root, ´rab´, means ´slave´. The original word for robots more accurately defines androids, then, in that they were neither metallic nor mechanical" (Reader, 2019). If we look up a more up to date and modern definition, we can use the dictionary Britannica´s definition

to see how it stacks up to Čapek original definition. “Robot, any automatically operated machine that replaces human effort, though it may not resemble human beings in appearance or perform functions in a humanlike manner. By extension, robotics is the engineering discipline dealing with the design, construction, and operation of robots”(*Robot | Definition, History, Uses, Types, & Facts | Britannica*, 2024). The biggest differences in these two definitions are Čapek´s vision about robots being humanlike, while in newer times, robots are mostly machines that does not look like humans at all. I would personally define the word robot as following: “A robot is an automatic machine made by humans that performs tasks human would usually do.”. This is a simple definition, but I feel personally that the word is a very open word and can mean so many different things. A chatbot for example, would be a robot in terms of my definition. The chatbot is made by a human to do a task that normally a human would do.

I would say that a robot could be seen as artificial intelligence, but only if it has the sense of human-like reasoning, decision-making, problem solving and learning that I was talking about earlier. A robot could of course just be a machine in a factory just picking up things and putting them another place. Thrun (2004), explains these types of robots as industrial robots. “An industrial robot has three essential elements: It manipulates its physical environment (e.g., by picking up a part and placing it somewhere else); it is computer controlled; and it operates in industrial settings, such as conveyor belts.”(Thrun, 2004, p. 11). These robots do not have the qualities which I would classify as artificial intelligence. However, some robots can have the abilities of artificial intelligence in my opinion. If we go back to the chatbot example, it would be seen as a robot in my definition. And nowadays a lot of these chatbots are infused with some sort of AI that can have humanlike decision-making, problem solving, learning and adaptation as I was talking about earlier. So, in my opinion, it really depends on what robot it is. Right now, robots are seen as more physical and AI more kind of invisible and not something materialistic. However, artificial intelligence is also human made and performs tasks that humans would usually do, so I would think that in the future, these words will blend in together and basically mean the same thing.

One robot that I find interesting and that has had a lot of popularity in recent years is the robot lawnmower. It is a simple concept that is effective and makes life a lot easier for a lot of people. The robot is given instructions by a human on an app and then it knows where to mow and when. This concept is described as personal service robots in Thrun´s (2004) article about the three different types of robots. In the article, he shows examples of personal service robots such as nurse robots that help elderly to walk, and even a robot vacuum cleaner which is heavily like a robot lawnmower (p. 13).

1.3 – Universal Design and AI systems

There can be some various definitions of the term universal design. Centre for Excellence in Universal Design has a solid definition of this term. “Universal Design (UD) 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.”(*About Universal Design*, n.d.). This basically means that we should design systems and things that are for all people. When we design these things, we should try to make it usable and accessible to absolutely everyone. While it is almost impossible to cater absolutely everyone, it is important to try our best to reach as many people as possible. However, it is not a strict requirement, but important for good design.

As I have spoken about earlier, I think that AI has huge potential in the future. As of right now, AI´s ability to have human perception, movement and cognition is a little bit far-fetched. But with the speed of the development in the AI field, I have no doubt that someday AI will reach human-like perception, movement and cognition. It is not about if, but when. We can already see some products that tries to achieve this. There is for example Unreal Engine 5´s own perception system and even bionic prosthetics that are powered by AI. These products are of course only in their starting phase, but the potential is there.

As for inclusion and exclusion, AI has the potential to be something that can help a lot of different people out. A good example of this is an earlier group project I had in the course IN3010. We had hearing impaired people as users and a tourist guide wanted to make it easier for them. We created an AI map of the area where they were touring, and the user had the option to write questions to a chatbot that would answer with points on the map. This was our attempt to include more people into tourism with the help of AI. But AI might also contribute to exclusion, like the biased datasets I will talk about in the next paragraph. This could be for example a face recognition not working as accurately with people in different races.

In both WCAG 2.1 and human-AI interaction guidelines, “understand” and “understanding” refer to the system´s ability to clearly and accurately present content or actions so users can comprehend and interact. In WCAG 2.1, this means making content accessible to users of varying abilities. In AI interaction however, it involves ensuring users can grasp the AI´s functions and behavior. As of right now, machines do not truly “understand” like humans do. Their understanding is limited to processing patterns and data without deep cognitive comprehension. They simulate understanding through programmed responses, but lack human-like awareness or context.

1.4 – Guideline for Human-AI Interaction

Microsoft´s guidelines for human-AI interaction designs are good principles to follow when designing an AI system. What caught my attention, was the 6th guideline "Mitigate social biases"(Maryatt, 2019). It is important to understand that when designing for human-AI interaction, you sit on enormous responsibility. AI systems learn from input data, which can lead to outputs that are biased, stereotypical, or unfair. This concern aligns with broader issues seen in the current AI landscape, where social biases, such as gender imbalances and the undermining of human autonomy, remain major challenges (Hagendorff, 2020). Despite ethical guidelines calling for improvements, AI continues to foster issues like radicalization and social division, exacerbating existing inequalities and diminishing social cohesion (Hagendorff, 2020).

There are no official set of guidelines for HCI design, but we can use various principles and rules from different people. The one set of guidelines I personally find most similar to Microsoft´s set of guidelines for human-AI interaction is "Norman´s Seven Principles" (*Guidelines in Human Computer Interface(HCI)*, 2023). If we look at these seven principles and the guideline for human-AI interaction, we can see that both emphasizes on optimizing user experience. Similarities like usability, contextual awareness and building trust are key elements in both guidelines. Both sets of guidelines also are similar as they promote accessibility and inclusivity. Where they differ however, are in how AI guidelines address long-term interaction, system learning, and adapting cautiously, while HCI focuses on immediate design principles.

1.5 – Journal – everyday engagement, interaction and use

The first two days of writing with pen and paper went great and I felt that I really got to write everything that I was feeling in that moment. It was good to have something physical, so it kind of became a reminder when I went to bed, and it was lying next to me. It also helped to do it in the evening, so I got sleepier than being on my phone before bed. The next two days with journaling through QWERTY keyboard and a screen went okay. I think having it digital kind of loses its value to me and I had to set a reminder to remember writing. As of content, it was fairly the same as using pen and paper. The last two days I used a plugin in the note app obsidian which let me record audio files and they get stored as a daily note. This was easy and effective to do because I could just record and then talk away. The information seemed to flow much better, but sometimes I would kind of go silent for some seconds thinking about what to say. I personally liked the voice to speech variation of journaling best because I could just get on right away instead of taking time to write and when I did that, it felt like I had to take pauses thinking because my writing was not up at the same speed. When talking, my thoughts and feelings just flowed out naturally.

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