First module – iteration 1:

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

The origin of AI

Jonathan Grudin (2009) writes in his article about the origin of Artificial Intelligence (AI). During World War II, Alan Turing made a statement about how computers should be able to compete with the human mind, which led to a series of events before the term AI was first introduced in 1956 by John McCarthy (p. 49). Over the next decades, AI research would experience multiple ups and downs when it came to interest in the field (Grudin, 2009, p. 49-55).

Different definitions of AI

Bratteteign and Verne (2018) defines AI as *"a subfield of computer science aimed at specifying and making computer systems that mimic human intelligence or express rational behavior, in the sense that the task would require intelligence if executed by a human."* (p. 1-2). This definition was stated in an article from 2018 describing the relationship between AI and Participatory Design (PD), discussing whether PD will survive the evolution of AI.

IBM is a contemporary company that generally works with technology. On their website, IBM describes that *"Artificial intelligence leverages computers and machines to mimic the problem-solving and decision-making capabilities of the human mind"* (IBM Cloud Education, 2022).

The third definition is from the Norwegian governments' pages. They define AI as systems that execute either physical or digital actions in order to achieve a certain goal. These actions are based on what the systems learn from data (Kommunal- og distriksdepartementet, 2022).

The definitions presented are from three quite different sources. The first mentioned is from an article discussing it in relation to a specific field within design, the second from a private tech company, and the third from a public sector. What these three definitions have in common is the notion that AI simulate the human mind and decision making, and that they learn from massive amounts of data that is presented. My personal definition will therefore be that AI is systems that is capable of simulating or mimicking human capabilities. How well

they are able to do this is limited or supported by the amount, as well as the quality, of data that the systems consume in order to learn.

Differences between human autonomy and machine autonomy

Machine autonomy refers to how well the machine in question can react and adjust to different environmental factors (Thrun, 2004, p. 14). How advanced this autonomy is differs from machine to machine, and is often related to how fast it can adjust or fail to different settings (Thrun, 2004, p.14). While machines and robots often are characterized by the state of the autonomy (Thrun, 2004, p. 14) human autonomy is a general concept embedded in a person. Human autonomy does not describe how well a person will function within a set environment, as machine autonomy does.

Similarities between the concept automatic and the concept autonomous

The concept of something being automatic is often considered as something being executed without a second thought or routinely. Machine autonomy is quite like the concept automatic. "Good" or "strong" autonomy in machines might suggest that it adjusts properly and executes the tasks that it was set to do. One might see this as a machine´s automatic response to the environment and the tasks that it is supposed to do.

Brief review of article from the curriculum

The article "Intelligence on Tap: Artificial Intelligence as a New Design Material" (2017) discusses how the evolution of AI and the new approaches to learning, specifically *deep learning*, have increased the capability of the AI systems which again will challenge and affect how HCI research and design work (Holmquist, 2017). The author describes how intelligence and AI *"will become a new design material."* (Holmquist, 2017, p. 31) and presents throughout the article different challenges associated with this. I am curious to learn just how prominent AI will become in designing solutions, as it still can be quite unpredictable.

Contemporary company, and how they present AI on their web pages

To discuss how a contemporary company describes their work with AI, I decided to look at Apple´s approach to the subject. On their website, they present their products as a combination of a physical object as well as a service which will improve your life. The new apple watch has "Adventure awaits" and "A healthy leap ahead" (Apple, 2022a) as their

immediate taglines, implying how they will contribute to change your life. On their career site for Machine Learning and AI (Apple, 2022b) it is presented as an idea or experience.

Human interaction with AI in a fictional film

The fictional film "Avengers: Age of Ultron" (2015) portraits how scientists design and creates a fully conscious and functional humanlike robot who absorbs massive amounts of data it accesses from the internet, and creates its own perception of the world, along with an agenda to make the world "right". Human interaction with AI is portrayed as rather dangerous and reckless in this film. Although the scientist's idea and vision were a peacekeeping, smart and "good" AI robot, the results are catastrophic.

1.2 Robots and AI systems

The word "Robot" was first introduced in1920 in a Czech theatre performance (Søraa, 2022). However, the first major introduction of robots like todays were in the 1960´s, and in the 1970´s industrial robots were being used on assembly lines (Thrun, 2004, p. 11).

Different definitions of "robot"

Merriam-Webster defines "robot" as *"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, n.d.).

Further, it is described by Thurn as *"systems with multiple actuated elements, often arranged in chains."* (Thrun, 2004, p. 11).

Based on these definitions, I would classify a robot as a system or machine, capable of executing tasks or movement either on its own, or by being controlled by a person. The reason for this is that I understand the term "robot" as something broad, which can apply to many different creations, and work either automatic or autonomously on different levels.

Relation between AI and Robots

Considering the definitions I described as my personal understanding, the main difference between AI and Robots is that AI do not in most instances have a physical "body". A Robot executes tasks they are set to do in physical environments, while AI are often found in systems. While AI learn from the data they are presented and evaluate this to continue their

growth and decision making, robots are often programmed to do specific task without the possibility of learning as they go. However, I believe there are multiple robots with AI as well, who can be classified as more of a hybrid between the two.

Contemporary physical robot

A common contemporary physical robot is the robotic vacuum cleaner. This type of robot is often seen in many households and are a kind of "personal service robots" which aids the user in a domestic setting (Thrun, 2004, p. 12). The robotic vacuum cleaner often has a charging station that it goes back to, and the users usually controls the vacuum with an app to indicate the room layout of their home, which room it should clean, and during which days. If the threshold between rooms is too high, the robotic vacuum cleaner can experience some difficulties entering certain rooms, and the human user must manually lift it or place it in the correct room. When it is finished, or need to charge, the vacuum should ideally go back to its designated spot at the charging station.

1.3 Universal Design and AI systems

Universal Design and inclusion

Universal Design is the notion that everything should be equally usable and accessible no matter your age, situation, or whether you have a disability (uutilsynet, n.d.). This explanation describes how all services should be made to accommodate everyone, not matter what their situation is. Universal Design is an important concept, and by understanding how crucial it is regarding creating and maintaining services and solutions, will it benefit the society as a whole. Universal Design is about inclusion, even though it should be a standard mindset when developing. Everybody deserves equal opportunities no matter their situation.

AI systems and including "more" users

AI has potential regarding aiding people with different challenges or disabilities in their everyday life. With new technology such as voice recognition, text to speech, eye tracking and more, the user group of different technologies becomes broader. An example is Apple´s newest Siri remote, which gives you the possibility to use the buttons on the remote as originally intended, or to speak with Siri giving voice commands instead of touching the remote. Text to speech programs is also a great way of making written sources available for people that are blind, or generally people with problems connected to eyesight.

While AI has the potential for including people, it also has the potential of excluding people. Regarding how AI learn, people are being reduced to data and numbers, and not treated as individuals which will lead to systems disregarding more complex and personal circumstances (Hagendorff, 2020, p. 110). Multiple parking houses has implemented a system that automatically scans your numberplate when entering, and then register the number again when you drive out. The thought behind this might be to make the parking experience smoother and reduce the need of the user to pay on machines. However, to register properly within these facilities, you need to either download an app or use a new machine where you register your plate number. This new way of registration may exclude some user who potentially does not have a smartphone, or does not know how these new machines work, nevertheless being forced to use them when the old system is no longer in use.

WCAG 2.1, Human AI-interaction and the concept of "understanding"

The WCAG 2.1 principles includes the word "understandable". This concept is described as "Information and the operation of user interface must be understandable." (W3C, 2018). This definition of the word refers to how the user must be able to understand and interact with a solution. When discussing if machines "understand", I believe they do understand within their own limits and data. However, as Bratteteig and Verne writes *"Human cognition and actions take place in a context and cannot be represented by algorithms or in a machine."* (2018, p. 2). There might be social cues or restrictions that a machine does not comprehend in the same way.

1.4 Guideline for Human-AI interaction

Microsoft´s 13th guideline: *"Learn from user behavior"* (Amershi et al., 2019) can be described by how Word alters their spellcheck and grammar system to adapt to the user. When the user often misspells the same word and accepts Words suggestion to what the user intended to write, it will begin to automatically change the word.

Jakob Nielsen´s HCI heuristics describes 10 guidelines for Human-Computer interaction design that will help to make a solutions or system user-friendly (2020). Microsoft´s guidelines for human-AI interaction and Nielsens HCI guidelines shares many similarities in the sense that the main goal is for the user to have a good and clear experience when interaction with the system. However, Nielsen´s 5th guideline "Error prevention" focuses on

how the solution should avoid having flaws or errors, although IF an error occurs, the message describing it should be concise and clear (Nielsen, 2020). Microsoft´s 2nd guideline: *"Make clear how well the system can do what it can do"* (Amershi et al., 2019) concentrate on making it clear to the user the limitations of the solution, and which errors might occur during the interaction. While the HCI guidelines strive for as little flaws as possible, the Human-AI interaction guidelines normalizes that there will be weaknesses in the system and focuses on informing the user of this early on.

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