Iteration 1

1.1 Artificial intelligence and autonomous systems

Concepts, definitions, and history of interaction with AI and autonomous systems

Artificial intelligence started out in the 1950's by the great British Alan Turing. He is to this date one of the big pioneers for intelligent computing. He suggested that "humans use available information as well as reason in order to solve problems and make decisions". (1) From this quote he figured out that machines could do the same thing. At first, this was a logical framework on paper. At this time computers could execute commands but didn't have a way to store them. A few years later, referred to as the conference that started it all, hosted by John McCarthy, was a conference where top researchers were brought together. This conference made people think at AI was achievable and catalyzed the next twenty years of AI research.

AI definitions:

1. "Artificial intelligence refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions."

2. "Artificial intelligence is an intelligent computer that aims to work independently. The machine goes through a learning period where it analyzes its environment and huge amount of data. The machine is programmed to find and learn from the data so it can understand similar problems and solve them later."

3. "It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable."

4. Own definition: "Artificial intelligence is autonomous and automated technology. For something to be called AI, it must be programmed on a computer to do different operations."

Humans' vs machines

We look at humans and machines as very different, but there are more similarities than one would think. Humas autonomy and machine autonomy are both self-driven. The relationship we have with machines is based on the differences and similarities we have between each

other. Both human and machines exist in symbiosis. They are also very similar in the way that botch can learn, understand, and store information/data. On the other side, computers don't consider empathy, emotions or feeling the way humans do. Computers are also often made to do specific tasks, controlled by another part. This can be sensors, sound, vision etc.

Toward a framework for human-Robot interaction:

The paper "Toward a Framework for human-Robot Interaction" is an introduction to the history of robotics and the vibrant field it is. (2) Robots today are not the same as they were only a few years ago. Because robots and the way we use them will change over the next decades, it is important to know how to interact with robots. There are big differences between robots, such as industrial, professional service and personal service-robots. The biggest different is their need and functions. Robots also have various interface, depending on use and user-group.

The Matrix

The Matrix is a science action film from 1999. The movie is about a society where humans are unknowingly trapped inside a simulated reality, called the Matrix. Intelligent machines have created the simulation to distract humans while using their bodies as an energy source. Watching the Matrix, I get the feeling of having a dream, just being sure that is real. How could humans know the difference between dream and reality if one never wakes up. The interaction with the artificial world really comes to play when the humans have the individual responsibility to choose between the real and artificial world.

Simplifai

Simplifai is one of many companies that offers a product using AI-technology. The product is and automation of unstructured text, also called plain text. Their solution is presented as a non-code solution, which is effective and fast to implement. They create trained automated solutions for different industries, so it has several areas to use. It seems important for Simplifi to convey that their product is very easy to use, although it's very complicated technology.

1.2 Robots and AI systems

The word *robot* was introduced for the first time in 1920 by the Czech Karel Čapek. It is from an old Church Slavic word, robata, which means servitude or forced labor. The word is known

as a product of the central European system of serfdom. The tenants rent could or was paid with forced labor or services.

1. “A robot is a machine, often programmable by a computer, capable of carrying out a complex series of actions automatically.”
2. “A robot is any automatically operated machine that replaces human effort, although it may not resemble human beings in appearance, their functions are very humanlike.”
3. Own definition: “A robot is a physical object that perform based on data. Robots are autonomous or semi-autonomous machines that use computer systems for their control.”

Robot vs AI

Robots and artificial intelligence have different purposes but are often mixed. Robots are hardware and machines designed to do one or several operations, automated with precision. AI is software which often is related to human intelligence, learning and planning. We can say that robot and robots is a field within artificial intelligence that makes use of AI to improve their functions.

Contemporary physical robot

The robot vacuum cleaner is an autonomous robot. The robot is programmed with different cleaning routines and is equipped with sensors and other smart equipment. The owner of the vacuum cleaner can choose where and when the robot is going to “work”. Most robots like this are app-controlled, so one can personalize how their robot behave. The robot also use their sensors to get information about its environment.

1.3 Universal design and AI systems

“Universal design is the process of creating products that are useful and accessible to people within a range of abilities, disabilities and other characteristics.” I understand the definition as something people can interact with. It can be a thing, a system, an app. Universal design is all about making the people have the same opportunities with the same thing. Either your vison is bad, you have bad hearing or sitting in a wheelchair, products that are universal designed could be used by everyone.

AI with respect to human perception:

AI has the potential to consider human perception, human movement and human emotion leading to the inclusion of more users. An example of this is verbal interaction, instead of physical interaction. People who have difficulty using their legs can use their voice instead. Another example is translation programs that use AI. This can be very useful for travelers or if you are learning a new language.

Potential of AI

In the future we will see different use of AI that could both include and exclude people. A project from 2018 regarding face-ID and face recognition, it came forward that AI could be excluding. (3) During the project they tested different face recognition-algorithms on four different categories. All algorithms failed on females with dark skin. This can be perceived as discriminatory and racist. Despite the downside of AI, it can also be used to include people. Voice recognition is one part of AI that can be including. People with talking disabilities could easier be understood with AI.

Understand and understanding

For someone to understand something, they must create links between different concepts, actions. A good example in an article written by Thomas Dietterich said that; "Today's language translation systems correctly link "water" in English to "agua" in Spanish, but they don't have any links between "water" and "electric shock." (4) Does it mean that machines understand the word and concept of water because it can translate it? No.

1.4 Guideline for Human-AI interaction

Guideline: *"01 – Make clear what the system can do."* In the guideline from Microsoft this guideline is described as "Help the user understand what the AI is capable of doing." (5) This guideline means that a system should always be informative with the user, considering how much it will do. If a user has too high expectations to a system, their interaction with the system might not be that good. The system should therefore be clear on what it can and can't do. This will not only improve the user-experience, but the system will also be used to its fullest.

Iteration 2

2.1 Characteristics of AI-infused systems

Artificial intelligence-systems are own systems that uses the technology of AI. Users of systems like are exposed to this technology, thus can be face-ID recognition, translation, or other filters. AI-systems are relatively new but grows faster and faster. According to our lectures on design of interaction with AI, the characteristics between AI-systems is that they are learning and improving over time. The systems can recognize patterns and change looks and content based on how the user interact with it. Although we know that AI adapt and change over time, it's not always easy to understand how an AI-system learns. (6)

Example of an AI-infused system: Netflix

One of the biggest streaming sites in the world uses AI for better content recommendation. After using Netflix for some time, it automatically recommends new shows for users in a specific order. (7) Netflix is consciously using a recommendation engine to filter data. The data is using an algorithm to filter a catalog predicting relevant movies, series, and documentaries to the user.

This algorithm is based on the users' previous views and generate new recommendations within the same pattern. For their very accurate predictions, Netflix won a 1$-million-dollar prize in 2009 for their algorithm-ideas and have developed it to become one of the most precise and personalized user experience. According to various articles, their recommendation engine is today worth over 1$ billion dollar each year.

2.2 Human AI-interaction design

There are many different approaches to development of AI. Human-AI interaction is extremely important, and in the article from Amershi et al 2019, one can read about the 18 guidelines for design within human-AI interaction. For development in the future, their goal is that as many as possible keeps these guidelines in mind when designing.

G13- *"Learn from user behavior"*

Based on what kind of movies or series you watch on Netflix; the application will suggest movies and series. On Netflix one can both like and dislike content and based on this Netflix will improve the user experience by suggesting content that they think the user will like.

G8- *"Support efficient dismissal"*

After finishing a movie, series or documentary, Netflix will automatically start the countdown for other content to start. The user can either continue watch the content related to what it just finished, or simply exit back to the "home screen".

Bender et al. (2021) wrote an article where the key discussion and investigation is about possible challenges regarding the use of large language models for AI systems. The first problem they look at in the article is the environmental risk and financial cost of deep learning systems. They suggest that they should document costs and evaluation of work, based on how much resources they are using. They point out that AI can have a hard time understanding data. This can cause implications and shape the system in wrong directions. The author reflects and suggests that it would be a good idea to invest in resources and document the data, instead of using everything that is available.

2.3 Chatbots/conversational user interface

Chatbots have become more and more common for companies to communicate with their customers. These AI-infused systems are designed in different ways and it's just important to understand the role of the chatbot as the user's journey. When designing a chatbot, one cannot design the framework while dropping the conversational content. The communication is what describes the chatbot's look, feel, and experience. This is fundamental for a good user-experience.

How the users interact with a system is incredibly important for it to work properly. With chatbots, user experience is also very important and crucial. In the article from Kocielnik et al. (2019) (8) and Amaersi et al. (2019) (9) they both discuss how expectations with AI-systems can influence the user experience. If a chatbot doesn't receive or give clear instructions, the user experience will not be good.

The guidelines G1 and G2 are written as follows:

⇒ G1: Make clear what the system can do.
⇒ G2: Make clear how well the system can do what it can do.

G1 – Figuring out how to adapt new technology can be a both challenging and time-consuming. It is very important in the early stages to figure out what is the purpose of the system, what it's going to do/solve and what it's not going to do. Mapping these things in the early stages of development would increase the probability for the system to give the users a better experience. I believe that there are way too many systems that have been put out without them being thoroughly thought through.

G2 – Both guidelines G1 and G2 go into each other. If a user is introduced to a chatbot, not knowing its limitations, the interaction can rapidly become poorly. One cannot ask a chatbot the exact same questions. It is important for the user to know what the chatbot do, and if the user is informed about this, it's experience will be better. The earlier the better. If the user can interact within its expectations, the overall experience would be good.

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