1st iteration of individual assignment - IN5480

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1.1 Artificial Intelligence

The history of AI

The history of artificial intelligence (AI) began with World War II, with the English mathematician Alan Turing in the front lines. Turing was hired by the British government to help encode the strategic messages sent by the Germans to their allies. This was a very difficult task, as there could be millions of different combinations to the solution and the code changed every 24 hours. To boost the effectiveness of this, Turing created a machine that would try all possible combinations automatically. After the war, Turing published the seminal paper “Computing Machinery and Intelligence” which introduces us to the famous “Turing Test”. His research formed the field of computer science as we know it today.

Although Turing was the first to introduce this concept, the actual term “artificial intelligence” was first used by an American computer scientist named John McCarthy in 1956 in a proposal he wrote for the famous Dartmouth conference. This conference was where AI was first stated as a field (Grudin, 2009).

Definitions of AI

As it was John McCarty who first used the term, it is only natural to begin with his definition of AI:

> *“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." (McCarthy, 1998)*

McCarthy's definition is focused on explaining AI as a field of science, more than an actual computer system. Another definition worth mentioning is from the English Oxford Living Dictionary:

> *"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" (*Lexico 2020)

This Oxford definition defines AI as a way to adapt human intelligence into an automated system, giving it human-like abilities. What is interesting about this definition is that it is a bit more modern than what the previous was. It is more theoretical and takes modern technology into account. AI is still a field in great development and is in many ways still being defined.

The Britannica Dictionary had another similar, yet different definition:

> "*Artificial intelligence (AI), the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings."*
> *(Copeland, 2020, section 1)*

<u>My definition of AI:</u>

> ***"****Automated systems created to simulate human behavior, used to simplify and bring efficiency to tasks usually conducted by humans."*

My definition of AI comes with the reasoning that AI-systems do not have emotional behavior and human reasoning. They simulate these behaviors, but they are all pre-learned patterns or a result of pattern recognition or learning.

AI in business (GHOST)

Ghost is one of the top 50 businesses on Forbes Most Promising Artificial Intelligence Companies, and they have a goal of delivering perfectly safe, self-driving cars, by the end of 2020. They advertise AI as a product with a software you can install in the car you already own, and market this by saying you do not have to pay attention when driving, as the computer will do all the thinking for you.

> "*Real self-driving means you can fully turn your attention elsewhere and leave control of your car, to a computer." (Ghost, 2020)*

In addition to this, they say their product is safer than driving yourself, as the computer is better at expecting unpredictable situations and will avoid other dangerous drivers. *(Ghost, 2020)*

AI in entertainment (HER)

Artificial intelligence has always been an exciting subject and is regularly portrayed in literature, tv-series and movies. It usually plays with the futuristic aspect of society, lets us predict the future both rationally and irrationally, and gives us an idea of what society might look like years from now.

One of the more prominent movies out there with a focus on artificial intelligence, is the American science-fiction movie *"Her"* from 2013. The plot takes place in the near future, and revolves around a newly divorced, lonely writer who earns his living by writing love letters for other people. Struggling with the split from his wife, the writer gets introduced to a new operating system portraying the traits of a human being. He installs this in his apartment and gives it the name of *"Samantha"*. Samantha is able to evolve and learn new things as time passes, and he eventually starts a relationship with *"Her"*.

In this movie, AI is portrayed as a way of filling the void of human contact. The AI-system works as a replacement for actual social interactions, and it is tailor-made to fit perfectly for the end user by adapting to his pattern and lifestyle. Throughout the

movie you get to see the AI evolve and learn to a point where you barely can separate between it, and an actual human being.

1.2 Robots and AI systems

The history of the word "Robot"

The word "Robot" was first used by the Czech writer Karel Capek in 1921. He wrote a play called "Rossum's Universal Robots, and in these stories the robots were usually portrayed as servants for the humans. The word Robot comes from the Czech word *Robota*, which means "laborer". In this play the robots eventually rebel against the humans, which leads to an extinction of the human race.

Definitions of "Robot"

The first definition of the word "Robot" is from The English Oxford Dictionary. They define it like this:

> *"A machine resembling a human being and able to replicate certain human movements and functions automatically" (*Lexico 2020)

What is interesting in this definition from Oxford is that it has to function automatically for it to be a robot. It does not include the concept on remote-controlled devices. The second definition comes from Webster, an online dictionary who explains the term like this:

> *"An automatic device that performs functions normally ascribed to humans or a machine in the form of a human."* (Merriam Webster, 2020)

Both of these definitions describe a robot as something physical that replicates both human behavior and form. It does not take into account that a robot might be formed like another biological creature, or not like a creature at all.

My definition of Robot:

> *"A machine that resembles or takes inspiration from biology in the way it can physically move parts of itself, and that can operate periodically or indefinitely without physical human interaction."*

I have created my own definition of the word, based on the two definitions above. I made some alterations on the parts of the definitions I did not agree with above.

The relation between robots and AI

By taking the previous definitions in account, there is a clear difference between artificial intelligence and a robot. While AI is a system or a digital program, robots have more of a physical appearance. They are both able to help humans and fulfill certain human-like tasks, and we are able to interact with them in different ways. An AI is more of an intelligent system that is able to learn, adapt and analyze. It can be installed or programmed into a robot to give it these traits, but a robot without an AI system will in my opinion be more autonomous.

Human-robot interaction (PEPPER)

Pepper is a commercial robot created by Softbank Robotics, and is the first social-humanoid robot who is able to recognize faces and basic human emotions. He is currently used by over 2000 companies worldwide to welcome, inform and guide guests when they enter stores and buildings. He can communicate both through conversation (15 different languages) and through a touch-screen placed on his chest. The robot is programmed to mimic and imitate basic human movements, with both cameras and sonars around him for autonomous navigation.

Pepper is mostly used in retail to enhance the user experience when shopping by engaging in conversations with the customers, but also to gather comprehensive data and generate client insight. (Softbank Robotics, 2020)

1.3 Universal Design and AI systems

Definition of universal design

> *"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."* (Difi, 2017)

Universal Design is about ensuring that everyone regardless of disabilities are able to partake in society. It is about designing products and solutions in a way that doesn't exclude people from participating in activities, without the use of external aids. In Norway we take universal design very seriously, and it is mandatory by law to follow certain design principles (Lovdata, 2013). These principles are enforced by the Norwegian Directorate for Management and ICT.

The potential of AI

AI can be used to extend human capabilities in a lot of ways. One example is self-driving cars. An AI will be able to interpret situations and minimize the risk of accidents, since it often reacts much faster than what a human is capable of. It can also be of help for people with different disabilities. People with visual impairment might have problems reading but will be able to have access to information with an AI reading the text out loud for them.

AI and exclusion

Even though AI can be of great use when it comes to including people in our society, it can also touch upon exclusion. One of the groups who might fall behind with this technological progress, is the older generation. Technology can at times be too advanced for them to keep up on, as they are not used to learning technologies like our generation today. It is also important to have people with different disabilities in mind. For example, people who are mute will also have trouble using voice-recognition and voice-controlled devices, as people.

1.4 Guideline for Human-AI Interaction

Learn from user behavior

Guideline number 18 in the Microsoft Guidelines for Human-AI interaction is to" Learn from user behavior" (Microsoft, 2019). This example states that the AI should personalize the user's experience by learning from their actions over time. By tailoring the user's actions, the human-AI-interaction will be more efficient and fluent. An example of this could be a search-engine who memorizes your last searches, or an auto-generated playlist with all your favorite songs. This guideline is similar to number seven of Jakob Nielsen's design heuristics:

> *"Accelerators — unseen by the novice user — may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions."* (Nielsen, 1994)

HCI guidelines and Human-AI guidelines

Looking at Nielsen's Design Heuristics, there are several other guidelines who are comparable to the Microsoft Guidelines for Human-AI-Interaction.

They are both invested in being clear on what the system can do. It should be easy for the user to understand and make connections just by looking at them. This also applies to showing clear and relevant information to the user. Both of the guidelines include error prevention, and relevant feedback when an error occurs as well as. (Nielsen, 1994)

Sources:

Grudin, J. AI and HCI: Two Fields Divided by a Common Focus. AI magazine 30, no 4 (September 18, 2009). https://aaai.org/ojs/index.php/aimagazine/article/view/2271

McCarthy, J. (1998). What is Artificial Intelligence? Available from http://cogprints.org/412/index.html (Retrieved: 09/09/2020).

Lexico (2020) *Artificial Intelligence.* Available from: https://www.lexico.com/definition/artificial_intelligence (Retrieved: 09/09/20).

Lexico (2020) *Robot.* Available from: https://www.lexico.com/definition/robot (Retrieved: 09/09/20).

B.J. Copeland (1998-2020) *Artificial Intelligence.* Available from: https://www.britannica.com/technology/artificial-intelligence (Retrieved: 09/09/2020).

Ghost (2020) *About us.* Available from: https://driveghost.com/about/ (Retrieved 09/09/20)

Merriam Webster (2020 *Robot* Available from https://www.merriam-webster.com/dictionary/robot (Retrieved 09/09/20)

Softbank Robotics (2020) *Pepper.* Available from: https://www.softbankrobotics.com/emea/en/pepper (Retrieved 09/09/09).

Difi (2017) Kva er universell utforming? Available from: https://uu.difi.no/kva-er-universell-utforming (Retrieved 09/09/020)

Forskrift om universell utforming av IKT-løsninger (2013) *Forskrift om universell utforming av informasjons- og kommunikasjonsteknologiske (IKT)-løsninger* Available at: https://lovdata.no/dokument/SF/forskrift/2013-06-21-732 (Retrieved: 09/09/20)

J. Nielsen (1994) *10 Usability Heuristics for User Interface Design.* Available at:https://www.nngroup.com/articles/ten-usability-heuristics/ (Retrieved: 09/09/20)

Microsoft (2019) *Guidelines for Human-AI Interaction* Available at: https://www.microsoft.com/en-us/research/project/guidelines-for-human-ai-interaction/ (Retrieved: 09/09/20)