

# IN5480 Individual assignment fall 2020

## Iteration 1

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

#### History of AI

The term *artificial intelligence (AI)* was coined by American mathematician and logician John McCarthy in 1956. He first used the term when he called for participation in a workshop regarding the topic (Grudin, 2009).

While John McCarthy was the first person to use the term, the topic of AI had been discussed in earlier years. The British mathematician and logician Alan Turing stated his opinion on the topic when writing in the *London Times* in 1949, where this statement would later become sensational. He shared that he did not see any reason why computers should not enter any of the fields normally covered by human intellect (Grudin, 2009).

#### Definitions of AI

AI has been proven to be a vast topic, and people do not always agree on the definitions of the term. The broader definition is often described as an approach to simulate intelligent behavior using technology, however it gets a bit trickier when going into detail. Despite this, there have still been attempts to pinpoint what exactly an AI is. Some of the many definitions for AI is has been described as:

1. *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).*

John McCarthy had previously coined the term, and redefined it in 1998. He puts emphasis on it being especially applicable for intelligent computer programs, simultaneously stating that its intelligence is not necessarily confined to what's biologically observable.

2. *Artificial intelligence (AI) is a wide-ranging branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence. (Built In, n.a.)*

Built In is an online tech newspaper, and much different from McCarthy, describes the term as machines that are capable of performing tasks that typically require human intelligence. This definition restricts artificial intelligence to human-like abilities or intelligence.

3. *Artificial intelligence enables computers and machines to mimic the perception, learning, problem-solving, and decision-making capabilities of the human mind. (IBM, 2020)*

Similarly to Built In, IBM defines AI as a machine with human-like abilities, and expands on what these abilities include.

I believe that in order for me to define AI, I have to break down what the two words in the term mean by themselves. In the Cambridge Dictionary, artificial is described as “made by people, often as a copy of something natural” (Cambridge Dictionary, 2020a), while intelligence is described as “the ability to learn, understand, and make judgments or have opinions that are based on reason” (Cambridge Dictionary, 2020b). In my opinion, humans are not the only beings on earth to have these abilities, albeit being the most advanced at them. In my own attempt to define AI, I resonate the strongest with McCarthy’s statement as his statement does not limit AI to what’s biologically observable, but I want to expand even further on the limits. I believe that a machine that mimics other animals whose intelligence equals that of Cambridge Dictionary’s description of intelligence can also be regarded as AI.

### **AI in Facebook Inc**

Facebook Inc is a multinational Internet corporation, and owns Facebook, a social media platform with 2.7 billion monthly active users (Statista, 2020). While being most known for this platform, Facebook also has a research group within the field of AI called Facebook AI Research (FAIR). One of FAIRs work includes AI Habitat, which is a simulation platform for research in embodied AI<sup>1</sup>. On their website, AI Habitat is presented as a service used to aid

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<sup>1</sup> Embodied AI is the study of intelligent systems with a virtual or physical embodiment, such as robots and personal assistants.

research within embodied AI. They aim to use this research train and test their embodied AI agents in simulation before applying this in the real world (AI Habitat, 2019).

## **AI in Portal and Portal 2**

Portal is a franchise of puzzle-platform video games consisting of two games: Portal and Portal 2. The game revolves around the protagonist Chell, who is the only human you get to meet through the entire game. Chell is held hostage for the entertainment of a malicious AI called GLaDOS at Aperture, a former science facility center. Chell's goal throughout the game is to abide by GLaDOS' orders to go through different test chambers in hopes of eventually being released. As you progress through the story, you learn that she was created by scientists working at Aperture with the intention of making an AI capable of human emotions.

GLaDOS is portrayed as an entity lacking conscience almost throughout the entire series, showing no mercy towards her victims. As many other fictional stories, Portal is a tale of the dangers of an AI exceeding the intelligence and lacking the morals of a human. The game raises a lot of ethical questions, such as “will we reach a point where AI becomes a danger to humans?” and “should AI be able to truly mimic human emotions?”

## **Robots and AI systems**

### **Origin of robots**

The word *robot* originates from the Czech word “robota”, which translates to “forced labor”. It first appeared in Karel Čapek’s play R.U.R. (Rossum’s Universal Robots) in 1920. It was his brother, Joseph Čapek, who had come up with the term. In the play, “robot” is used to describe human-like machines (Lexico, 2020).

### **Definitions of robots**

The Cambridge Dictionary defines a robot as “a machine controlled by a computer that is used to perform jobs automatically” (Cambridge Dictionary, 2020c). This definition removes humans out of the equation, and is the part that differentiates robots from other types of machines. The controller of a robot is said to be a computer instead of the typical human operator. It also says that the jobs should be performed automatically.

NASA describes robots as “a machine that is built to do a certain job again and again, or to do work that might be dangerous for humans” (May, 2020). Contrary to Cambridge Dictionary’s definition, this definition does not state whether or not a computer has to be fully independent in order to qualify as a robot. Instead, it mentions repetitiveness in tasks and its purpose.

Personally, I find NASA’s definition too specific and limiting to agree with. I do not believe that a robot is always made with the intention to do work that could be dangerous for humans. While it is indeed sometimes the case, I also see robots being used for simplifying and reducing tasks for humans and other times simply for entertainment. My own definition of a robot is a physical machine that can perform tasks independently without the assistance of humans. This description is much broader and covers what I envision as robots.

### **Relation between AI and robots**

While AI and robots might seem very similar at first, they both have qualities that differentiate the two. I do however not think that one should exclude the other. In my earlier definition of AI, I described it as a machine with the ability to learn, understand, and make judgments or have opinions based on reason. Here, I did not specify if the AI had to take shape in a physical form. For robots, I defined them as physical machines that can perform tasks independently without the assistance of humans. This means that while not necessary, a robot can contain an AI. Science fiction often portrays robots as intelligent. Both also require programming in order to operate and are artificial, which is why they can often be mistaken as the same thing.

### **Robotic vacuum cleaners**

Robotic vacuum cleaners are commercial automatic vacuum cleaners, and have found home in increasingly many households since the mid 2000s. They are designed to have wheels to move around the room easily. With today’s technology, most of these robots have sensors that allow them to change direction when approaching an obstacle.

## Universal Design and AI systems

### **Definition of Universal Design**

Centre for Excellence in Universal Design defines universal design as “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.”

(Centre for Excellence in Universal Design, n.a.) I chose this definition since it reflects my opinion on what universal design is. Moreover, I want to add ethnic background into the list. Universal design is all about inclusion and is a measure to prevent discrimination of people with different qualities. Especially people who are part of a minority will often meet different challenges throughout their day. By adding universal design into our services and everyday products, we contribute to removing an obstacle in their life.

### **The Potential of AI**

Implementing AI into robots can start a new way of interaction between humans and robots. A robot that mimics or recognises human perception, movement, cognition and emotions could possibly bond with humans in need of therapy. The health sector in Norway is struggling to find enough nurses for retirement homes and are not equipped for the age wave that is rapidly approaching. Using AI-implemented robots could benefit both the workers in the health sector and the elderly people in need for care. Many elderly people can often feel lonely in retirement homes. In the case of people with dementia, a lot of them feel angry, confused and lost. Having specialised robots with the intelligence to understand their emotions and heal their pain could help reduce the work tasks of a nurse, which in turn would allow the nurses to shift their attention to other tasks.

AI also has the potential to include people. For instance, using an image recognition tool could help users understand images on web services. On the other end, there is also potential to exclude people with AI. Some facial recognition softwares have a hard time recognising people with darker skin tones. This is usually due to the AI being trained with limited sample data. This is a problem that researchers and creators of AI should address to make sure that their AIs are inclusive and non-offensive to users.

## Guideline for Human-AI interaction

### **Match relevant social norms**

Microsoft proposes 18 design guidelines for human-AI interaction. Guideline number 5 is to “match relevant social norms” (Microsoft, 2019). This guideline is relevant during interaction with the AI and means that the AI should act in a way that is expected according to the user’s social and cultural context. This guideline has similarities to one of Jakob Nielsen’s 10 heuristics:

*Match between system and the real world: the system should speak the users’ language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order. (Nielsen, 1994)*

I chose this heuristic as it mentions that the system should behave according to the real world and create familiarity to the user. This could be achieved by matching social norms. Additionally, I have interpreted the word “language” to not be restricted to sound, but to include hand movements and body language - both of which can differ in various social and cultural contexts.

### **HCI design guidelines and the Human-AI interaction guidelines**

Nielsen’s 10 heuristics and Microsoft’s guidelines for human-AI interaction both take into account the users of the systems. They facilitate the user’s behaviour and needs, inclusion and matching the systems with the real world. Both also put importance on providing clear and efficient information when something has gone wrong. What mainly differentiates the two is that Nielsen’s heuristics focus on what should be provided for the users, while Microsoft’s guidelines is more about how the system should behave.

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