

IN5480 Individual assignment - Iteration 1

Concepts, definition and history of interaction with AI

The history of AI

The term “artificial intelligence” was first coined by John McCarthy in 1956 when he called for participation in a workshop (Grudin, 2009).

Despite McCarthy being the first person to use the term, people have been talking about AI before that. Alan Turing, recognized as a leading code breaker, mathematician and logician, wrote in the London Times in 1949 that he believed machines eventually would take over some of the fields normally covered by human intellect (Grudin, 2009). Before that again, In the 18th century Mary Shelly speculated about autonomous machines when writing Frankenstein.

After World War II several conferences were held about AI, gathering participants with backgrounds such as logicians, mathematicians and psychologists (Grudin, 2009). In the 60's the US government financed several projects in the field of AI during the moon race with the Soviet Union, enabling AI to become a field of its own, both in the US and later abroad (Grudin, 2009). One notable project from this era was the General Problem Solver (GPS), a program developed to simulate human problem-solving methods (Newell & Simon, 1961). In the 70's, the UK government withdrew funding for more AI research as “they did not find any major or even significant results from AI research” (Negnevitsky, 2005). This was during what Grudin (2009) called an “AI winter”. The 80's saw a boom in expert systems and AI research, while during the 90's the field experienced another lull (Grudin, 2009). In our modern times AI is on an all time high, and a lot of work and funding is dedicated to research of robotics, machine learning and speech interaction, to mention a few areas.

Definitions 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).

This definition says something about how AI systems do not necessarily have to imitate human (or animals) intelligence. This definition is from McCarthy, the man that coined the term AI in 1956, but this definition is from 1998.

“The study of how to make computers do things at which, at the moment, people are better” (Rich & Knight, 1991).

Rich and Knight (1991) focus on the fact that Artificial Intelligence is developed with the goal to become more like human beings.

“In computer science AI research is defined as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals. [1] Colloquially, the term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving" (Russel & Norvig, 2009).

This definition describes AI as capable of mimicking certain ways humans think or perceive. It also defines AI as an ‘agent’ capable of acting on what it perceives, which requires a certain degree of autonomy. This quote is from a textbook used in computer science studies.

My own definition:

Artificial intelligence is a branch of computer science that focuses on making systems that are able to perform autonomous or semi-autonomous calculations and/or tasks, where these calculations or tasks traditionally are executed by human beings.

Company

I want to talk about how Telenor, one of Norway’s biggest mobile and web providers, present AI. Their webpage about AI stresses how the technology will change our lives and for the better. They continue talking about how their company support innovation in the AI field in Norway and the place they imagine AI will have in our future.

The text present AI in a very optimistic light, and as an idea or tool that can help and support creation of value in the future.

Film

The film I will bring up is “The Hitchhiker's Guide to the Galaxy”. There are several AI systems in this science-fiction comedy, among them the robot Marvin and Eddie, an AI system that runs a spaceship.

Marvin is a ‘manically’ depressed and very intelligent robot, something he likes to bring up. He is portrayed as very human-like in many respects, in the way he moves and the way he holds conversations. The humans around him talk to him as a human being, although the first time the main character Arthur sees him, he seems impressed and intrigued because of Marvin’s capabilities. Most of the spaceship’s crew treat Marvin as a helper or servant.

Eddie is an AI system that controls the spaceship. The people inside talk to him, much in the way one might talk to a Google Home or Alexa. The interaction starts by addressing his name, and then give him a command or task. He usually replies in a very casual and happy manner before doing what he is told. Because the film was originally a radio-play from 1978, I find it interesting that Eddie resembles something like Google Home.

Robots and AI systems

Robots

According to an article from ‘Wired’ the word ‘robot’ first appeared in 1921, in Karel Capek’s play R.U.R. (Rossum’s Universal Robots) (Simon, 2018). The word ‘robot’ has roots in the Czech, and means forced labour (Simon, 2018).

Thrun (2004) talk about how the field of robotics is very broad, and explains that robots can be categorized in three categories based on their purpose or application - industrial robotics, professional service robotics and personal service robotics. Of these three, the first that came about is industrial robotics, robots that work in an industrial setting (Thrun, 2004). Industrial robots became available on the market in the 60’s and have since become popular in several

industries, in fact, when Thrun wrote his article in 2004 there were an estimate of 780 600 operational robots in use (Thrun, 2004).

Definitions of Robot

“From a technological perspective, robotics integrates ideas from information technology with physical embodiment. Robots share with many other physical devices, such as household appliances or cars, the fact that they “inhabit” the same physical spaces as people do in which they manipulate some of the very same objects” (Thrun, 2004).

This definition underlines the fact that robots are physical artifacts, existing in the same spaces as humans. Later in the article, Thrun also explains that the biggest difference between household appliances and cars are that robots are to a certain degree autonomous. Note that this definition does not mention artificial intelligence.

“A robot is an intelligent, physically embodied machine. A robot can perform tasks autonomously. And a robot can sense and manipulate its environment.” (Simon, 2018)

This definition emphasizes the autonomy of robots, and assumes they have a certain type of intelligence that they use to determine how they operate.

Robots and AI

I understand AI as an umbrella term where robotics can be a *type* of AI. Robots might have many qualities that are common in AI programs, for example autonomy, facial or voice recognition and so on. On that note, there are also examples of robots that do not have much to do with AI, for example some industrial robots, as mentioned in Thrun’s (2004) article. An assembly robot cannot be said to be artificially intelligent if it only makes the same motions over and over again, without perceiving or changing its behaviour based on its surroundings.

The main difference between AI and robots with AI capabilities, as I see it, is the physical embodiment that the robot is. Both of the definitions I have brought up earlier defined robots as ‘embodied’. AI might be used in a program that is not physical, Siri on Iphone is an example of this. When we put AI in a physical artifact, it becomes a robot.

An example

The robot AV1 from No Isolation (2018) is a robot made to enable children to take part in lessons in school when they cannot be there, for example because of long-term illness. AV1 enables the children who use it to remotely communicate with their classmates, stream the lesson on their phone and show emotions they are feeling through the robot that is placed in the classroom. The robot is controlled by the child using their phone or tablet from home. AV1 does not move much, but is able to rotate the headpiece when the child controlling it swipes their screen.

Children use the robot by navigating a menu through an app. The options available include sound-control, 'raise hand', which gives the robot a blue light around the head, and several more.

Universal Design and AI systems

Universal design

“Universell utforming handlar om å utforme omgjevnadane slik at vi tek omsyn til variasjonen i funksjonsevne hos innbyggjarane, inkludert personar med nedsett funksjonsevne. Når du lagar noko som er universelt utforma, når du alle målgruppene gjennom éi og same løysing.” (Difi, 2019)

This definition is from Difi, the directory with power to warn and punish in case of breach on universal design rules in Norway. The definition does not mention technology, but “surroundings”. Despite this, digital systems is without a doubt also required to be designed in a way as to not exclude people with disabilities or other groups of people. The definition also adds that one service should not have several solutions to achieve the same goals, on the basis of who uses them.

I understand universal design in respect to inclusion as the act of making solutions that are possible to use for as many as possible. By designing for the whole population, we democratize the solution by not restricting use or information to one or some groups of people, and we enable them to take part in our service, product or whatever we are making.

AI og human perception

AI is often implemented in systems that one might use in the home or at work. By appealing to what is familiar, mimicking human perception, movement or feelings, AI systems might be more approachable and easier to use by humans with little experience in similar systems.

Schulz et al. (2018) wrote that animation can improve how people interact with robots, and used animation techniques to give the robots style in their research paper. Making robots appear to have personality might give the users interacting with them a feeling they are more predictable and easier to understand (Schulz et al, 2018).

I think the same principle can be applied for a chatbot for example. If a chatbot is made to simulate a certain type of person, for example a human working in customer service, it might be easier for users of customer support to relate or communicate with the chatbot than if it was made to simulate a parrot or something else unrelated.

Inclusion and exclusion

It is quite possible to exclude people in AI systems, which is why it is of great importance to think about design choices in making them. Verne and Bratteteig (2018) pointed out in their paper that AI is unpredictable, and it can be difficult to foresee what AI systems might 'learn' with machine learning. Shein (2018) quote in her paper that machines have no common sense, so if a person inputs errors, the machine will continue to apply them. The data fed into a system might be biased or faulty, and this might lead to exclusion of some groups of people. There are several examples of facial recognition that has problems recognizing faces of women or people of non-white ethnicity, probably because these groups were not heavily involved in developing or testing of the software. Similar issues have been raised in predicting policing systems, where data that have been fed to the system was biased, and therefore targeted certain groups or neighbourhoods (Shein, 2018). In addition to this, some AI technologies use a different way of interaction, for example by voice or movement, and this might exclude, or in some cases, include people with different types of disabilities.

On the other hand, AI has great potential to include people. Not only through different ways to interact with the systems, but also because many AI technologies are made to be used for assistance, in the house, as entertainment or for doing tasks that might be difficult for some or many people to do (Schulz et al, 2018).

To ensure that AI include rather than exclude people in the future, Shein (2018) raises arguments that what is being used to train machine learning programs should be transparent,

and that it is important that users of AI systems understand the limitations of their programs, and not trust them blindly.

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