History and Concepts - Module 1 Individual Assignment

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September 8, 2021

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1.1 Concepts, definition and history of AI

The term AI first came about in the mid 50's where the it was first used by the scientist and mathematician John McCarthy in a workshop. In this first era of AI research and speculations, most scientist looked upon AI as a locomotive of thought that might outperform human cognition in the future, however this conception was mostly restricted to arithmetic reasoning. Historically, AI as a scientific activity has since the beginning of time been a opposing trend to HCI and the CHI community. Whereas HCI focuses on improving applications and making them more user friendly, AI strongly focused and future possibilities and tolerated slow progress (Grudin, Johan, 2009, s. 1).

Following the history of AI, there are different definitions of this technology and employment, and in this section three of these will be discussed. The first one is a more recent formulation from 2010 stated by Russell and Norvig :

Definition nr.1
"AI is a subfield of computer science aimed at specifying and making computer systems that mimic human intelligence or express rational behaviour, in the sense that the task would require intelligence if executed by a human" - (S. RUSSELL, P. NORVIG, 2010.)

The second definition, is stated by the AI Magazine in 1987, and compared to the first definition by Russell and Norvig is more centered towards programs learning of themselves, rather than resembling or mimicking human intelligence.

Definition nr.2
"AI is the science of endowing programs with the ability to change themselves for the better as a result of their own experiences." - (AI Magazine Volume 8 Number 4 (1987)

The last definition, stated by IBM also relate it to the ability of computers to mimic that behaviour of the human mind. IBM was also the company that builds the chess machine that beats the world champion in chess, in two matches.

Definition nr.3
"Artificial intelligence leverages computers and machines to mimic the problem-solving and decision-making capabilities of the human mind." - (IBM 2020)

My own definition
"Artificial intelligence leverages computational technology and branches of ML and DL to simulate human reasoning and intelligence"

Grudin, Jonathan. AI and HCI - Two Fields Divided by a Common Focus (2009) goes into depth of how the field and research around AI have evolved since the mid 50's, and as a pendulum to the research of the HCI field, which has had it ups when AI had it downs.

From the get-go, AI as a practice was first employed under the ww2, when the English mathematician and scientist Alan Turing, publishes the Computing Machinery and Intelligence, where he poses the question, can machines think? Turing was also famously know for cracking the Nazi Enigma machine under the war.

An example of how the HCI field has been a prohibitor for the research of AI, was evident when Sketchpad first was developed in the early 60's, which was product that contained most of the concepts we know of today as GUI. Due to this discovery, AI and the field received less attention and thus the development and interest stagnated.

IBM is one of the present companies that are highly invested into the research around AI and was a pioneer in the space in the late 90's when they managed to design and implement a system that could beat the present world champion in chess. Furthermore, IBM has a historical perspective to AI as a

field and practice where they present a timeline of important events that has happened on that frontier. Nevertheless, they also try to frame the technology in relation to other branches that are relevant within the space, and even distinguishes between weak and strong AI. (weak AI is what is most present today, which focuses on performing specific tasks and can be found in most VUI'S such as Amazon Alexa, Apple Siri etc. Strong AI is more focused on having intelligence equal to humans, however this is only theoretically defined as of today)

I, Robot is movie from 2004 based on Isaac Asimov science-fiction novel from 1950 about a possible future where humans and robots live side aside. In the movie, humanoids, which are robots that are highly intelligent and tries to resemble humans in the way they look, are serving humanity. The plot itself starts after Chicago police officer distrust robots after he was saved by a robot in a traffic incident, where the humanoid robot chose to save him over a 12-year old girl.

The officer is put on the case of a suicide of the Alfred Lannings, who was the founder of the U.S robotics foundation. The humanoid robots all have to obey the three rules of robotics which positioned the robots as servants to humanity. The rest of the plot revolves around the breakout of some robots that starts to defy these rules.

AI in this movie is portrayed as something that that is embodied by the humanoid robots and carefully designed and coded to obey humanity. When the robots the starts to defy the rules, a more present form of strong AI is present when the robots becomes foes.

1.2 Robots and AI systems

The term Robot is drawn from an old Church Slavonic word, robota, for "servitude," "forced labor" or "drudgery."

The robot institute of America has defined in 1979 robots as:

"A re-programmable, multifunctional manipulator designed to move materials, parts, tools, or specialized devices through various programmed motions for the performance of a variety of tasks"

Merriam Webster's collegiate dictionary (1993), defines a robot as a :

"An automatic device that performs functions normally ascribed to humans or a machine in the form of a human."

Based on my own conception of what a robot is i have made a definition of my own:

"A robot is a machine that have features defined important for the robot's use purpose, where the input and output can be programmed or constrained by humans"

Is a Robot different from an AI?

Comparing AI to Robots is not an apple vs oranges comparison as the former is a means to be deployed in the latter. While AI is a concept of autonomy and aims in high degree to mimic human intelligence and even behaviour, robots are machines designed at performing specific tasks for specific purposes, as of today.

A similarity between the two is that they both can operate autonomously, where a robot can function fine without being autonomous, an AI kind of loose its purpose if it were to not function autonomously. Looking at the definition made of AI :

Artificial intelligence leverages computational technology and branches of ML and DL to simulate human reasoning and intelligence

vs

A robot is a machine that have features defined important for the robot's use purpose, where the input and output can be programmed or constrained by humans

An important distinction is that AI is a concept of intelligence while a robot is a concept of an automated machine that can accomplish task related to the domain in which it is spawned.

Boston dynamics is a company that are highly involved in the development of robots and have a dog-like robot called 'Spot'. This robot have multipurpose use in that is can function as platform for extentions of capabilities, parts can be added as the engineer best likes. Additionally, the robot has a form of animalistic behaviour in that the movement of the robot highly resembles the movement of e.g a dog or four legged animal.

1.3 Universal Design and AI systems

Universal Design (UD) is an approach to design that increases the potential for developing a better quality of life for a wide range of individuals. It is a design process that enables and empowers a diverse population by improving human performance, health and wellness, and social participation (Steinfeld and Maisel, 2012).

The definition to Steinfeld and Maisel have a broad view for what UD is and its reach. However, in short it can be explained as a design principle that is established to design for diversity, be it people that are impaired or come from different cultures.

UD and AI could e.g merge together to make systems that are even more personalized for the persons that are users of the systems of even products. More specifically, having a systems that learn what type of perceptions are most efficient for the user, could utilize those and ditch or reduce the other so the experience are tailored to the specific user.

WCAG 2.1 defines the concept of "understanding" and "understand". These terms can be discussed from different angels when looking at machines. E.g, a machine can understand its input based on software running in the microchip in the head of the robot of machine. However, this understanding is based on electrical signals passing through different NOR/OR/AND transistors in the CPU, which in result gives and output of 0 or 1. This calculation then results in an output that similarly is digital. Understanding in terms of humans, are more related to making sense of something and reasoning reflecting on past experiences and what is present in the environment.

1.4 Guideline for Human-AI interaction

Chosen microsoft guideline:

13. Learn from user behavior

This principle leads to how the system or interface adapts and learns the users behaviour and routines. This principle is highly relevant for AI systems where there is a necessity that its understanding of the user becomes richer and more thought as the system is used, e.g making a wearable glass gadget for visually impaired people, that utilizes AI software to give more definite feedback guidance to the user.

Ben Schniderman's fifth principle of the eight golden rules for designing interfaces;

5.Offer simple error handling

is somewhat in the same alley as the one from Microsoft. This principle imply that the system should be designed to handle errors, and in an easy and understandable fashion so the user understands it - also, this is important in order for the user to have trust and confidence in using the system. Relating this to the one human AI-interaction, it is inevitable that an AI system does not commit errors, and in these situations it is important to display or present this to the user in a way that is not confusing or misguiding.