

ARTIN FUTURE PROJECT

What is AI?

A handout for educators

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Artificial Intelligence - Introduction

Artificial intelligence (AI) is a contested concept and scientists and researchers in the AI field have not managed to agree upon its uniform definition. Even though in popular culture AI is usually presented as hyper-intelligent, robotic beings, and movies such as *The Terminator* or *2001: A Space Odyssey* depicted AI as rogue killing machines, artificial intelligence is a more abstract concept. It is usually defined as a machine's ability to mimic human reasoning and decision-making.

The goal of this handout is to equip the educators with the fundamental knowledge of artificial intelligence and enable them to recognise different forms of AI and how is AI used on a daily basis.

To clarify the concept of AI, the document provides the educators with a definition of AI. In it, three types of AI – weak (narrow) AI, strong (general) AI, and artificial superintelligence (ASI) – are presented as well. Finally, to bring the concept closer to the educators, and show the ubiquity of AI, several examples will be given as well.

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1. What is AI?

a. Definition

As the phrase says, artificial intelligence or AI is a non-human intelligence. It is usually defined as the ability of a machine to think, learn, plan or make a decision in a similar way humans do. Unlike the restricted natural intelligence that humans possess, artificial intelligence has the potential to learn from and analyse a vast amount of information, and make a decision based on such data.

b. Origins

The research and development of AI dates back to the 1950s. Alan Turing, the famous British computer scientist and code breaker, is generally considered as one of the founding fathers of artificial intelligence. Based on his ideas of thinking machines that could act autonomously, in 1956 a group of American computer scientists coined the term 'artificial intelligence'. John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon presented the term for the first time in their proposal for the famous Dartmouth Conference. On this event, the group founded AI as an academic discipline as well.

c. AI Today

Thanks to technological advances in computing power and the enormous quantities of data, AI has seen major breakthroughs in the 21st century. Nowadays, AI is not only able to collect and process large number of information and work autonomously, but also able to adapt its behaviour by independently analysing its previous actions. Because of that, the scientific community and people in all branches recognise the ability to create new solutions and the general positive impact AI could have on improving our lives.

2. Types of AI



To better understand AI, it is important to be aware of two classifications.

In general, there are two types of AI:

- a. **software AI** such as ‘virtual assistants, image analysis software, search engines, speech and language recognition systems.’ [1]
and
- b. **‘embodied’ AI** – ‘robots, autonomous cars, drones, Internet of Things’ [2]

Based on its performance ability, we can differentiate three types of artificial intelligence. As mentioned at the beginning, not every AI ‘thinks’ the same. AI that is capable of performing one or a limited number of tasks is called **weak or artificial narrow intelligence (ANI)**. This is the most common type of AI which we use in our day-to-day activities – speech recognition, language translation software etc.

The following two types of AI have not been developed and are still hypothetical. The type of AI that could perform multiple tasks and imitate human brain in the future is called **strong or artificial general intelligence (AGI)**. The third and final type of AI that also exists only in theory is the **artificial superintelligence or ASI**. The capabilities of ASI are expected to be much bigger than those of humans and completely surpass human intelligence.

These three types of artificial intelligence will be presented in more detail on the following pages.

a. Weak or artificial narrow intelligence (ANI)

Weak or artificial narrow intelligence (ANI) is a type of artificial intelligence that can perform a limited number of tasks by itself. ANI represents 'intelligence systems that have been taught or have learned how to carry specific tasks without being explicitly programmed how to do so'. [3]

Weak AI is all around us. The Internet, our computers or laptops are all powered by ANI. For example: Siri, Alexa or Google translate are technologies that heavily rely on weak AI. They are **natural language processing tools** that process the human language and return to us with results they find the most fitting.

Apart from language processing, ANI can be found in many other areas:

Customer service – chatbots on commercial websites that carry out customer service tasks are another example of ANI.

Healthcare and diagnostics – researcher have developed AI programmes that can detect and recognise diseases.

Transport – AI-powered applications such as Google Maps process real-time data and let us know about the traffic and optimal routes to reach a destination.

The main benefit of AI is that it is able to perform tasks in a quick (and sometimes) more accurate manner than people. With more input, weak AI can improve upon its algorithms and learn from past mistakes.

b. Strong or artificial general intelligence (AGI)

AGI refers to the artificial intelligence that has the same capabilities as human intelligence. In theory, this type of AI mimics humans and its way of decision-making. It is expected to easily change its mind and choose another solution to the problem, have memories and act upon instincts, and be creative or imaginative just like humans are.

No such intelligence has yet been developed. To replicate such complex human behaviour, machines would need to be conscious and sentient beings, which they are currently not.

AGI has been popularly represented in the movie industry. For example, HAL 9000 from Stanley Kubrick's *2001: A Space Odyssey* or Samantha, a virtual assistant from the movie "*Her*" are fictional examples of AGI.

c. Artificial Superintelligence (ASI)

In theory, ASI represents the form of intelligence superior to those that humans have. In comparison to ANI and AGI, ASI would be the most advanced type of intelligence. Many in the scientific community have been sceptical about such artificial superintelligence. Professor Stephen Hawking said in an interview that the 'development of full artificial intelligence could spell the end of the human race'. [4]

No one knows when exactly we will be able to develop artificial superintelligence, but many researchers believe that a transformation from artificial general to superintelligence will be a quick one. As the development of artificial intelligence progresses, it is almost inevitable that it will evolve into AGI and finally ASI.

3. Further reading

To get more information about artificial intelligence, its forms and use, the educators may find helpful the list of the following links:

<https://www.europarl.europa.eu/news/en/headlines/society/20200827STO85804/what-is-artificial-intelligence-and-how-is-it-used> - this European Parliament's guide to artificial intelligence provides essential information about AI and its use.

https://www.sas.com/en_us/insights/analytics/what-is-artificial-intelligence.html?utm_source=display&utm_medium=cpc&utm_campaign=bbc_custom_contenthub_us – an overview by SAS of the past and present of artificial intelligence

<https://www.brookings.edu/research/what-is-artificial-intelligence/> - The Brookings Institution's text about artificial intelligence and its main components

<https://medium.com/mapping-out-2050/distinguishing-between-narrow-ai-general-ai-and-super-ai-a4bc44172e22> - a short guide to help distinguish between narrow, general, and artificial superintelligence

<https://www.techopedia.com/definition/32874/narrow-artificial-intelligence-narrow-ai> - a definition and short explanation of artificial narrow intelligence

<https://www.techopedia.com/definition/31618/artificial-general-intelligence-agi> - a definition and short explanation of artificial general intelligence

https://medium.com/@the_manifest/16-examples-of-artificial-intelligence-ai-in-your-everyday-life-655b2e6a49de - a list of the most common examples of AI people use in everyday life

<https://www.wired.co.uk/search?q=AI&sort=score+desc> – the Wired Magazine's database of articles about AI; here you can find the newest and most relevant updates in the field of artificial intelligence

References

- [1] “What is artificial intelligence and how is it used?” 2021.[Online]. Available: <https://www.europarl.europa.eu/news/en/headlines/society/20200827STO85804/what-is-artificial-intelligence-and-how-is-it-used> [Accessed October 2021]
- [2] Ibid.
- [3] “What is AI? Here’s everything you need to know about artificial intelligence,” 2021. [Online]. Available: <https://www.zdnet.com/article/what-is-ai-heres-everything-you-need-to-know-about-artificial-intelligence/> [Accessed November 2021]
- [4] “Stephen Hawking warns artificial intelligence could end mankind,” 2014. [Online]. Available: <https://www.bbc.com/news/technology-30290540> [Accessed November 2021]



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