

THE HUMAN BRAIN AND ARTIFICIAL INTELLIGENCE

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The Human Brain

In the human brain, there are about 100 billion neurons, and each neuron connects to about 1,000 other neurons. Each neuron fires (or sends a message) around 200 times a second. That's 20 million bits of information sent around your brain every second. In a typical minute:

200 million emails are sent.
47 thousand apps are downloaded.
20 million photos are uploaded.
6 million Facebook pages are viewed.

The Roots of Artificial Intelligence

John Mc Carthy (1956) – 'Artificial Intelligence' arrives, and during the 1960s he founded the Stamford Artificial Intelligence Project, with the goal of building a fully intelligent machine in a decade. Herbert Simon also predicted during this time, that machines will be capable of doing work that a man can do. Marvin Minsky (Founder of the MIT AI Lab) forecasted that within a generation, the problems of creating 'artificial intelligence' will be substantially solved. An early example was developed by IBM's Deep Blue machine with specialized hardware for playing chess, which reached the Grandmaster level, and in 1997 the program defeated the reigning world chess champion Gary, in a six-game match.

Symbolic AI

AI symbolic programs consist of words/phrases along with understandable rules which are programmed to perform a task. These early programs are called General Problem Solver (GPS) created by the cognitive scientists Herbert Simon and Allen Newell. An example of GPS is the task – 'Missionaries and Cannibals' puzzle (See: YouTube). 3 Missionaries and 3 Cannibals are standing on the side of a riverbank. How do you get all 6 across the other side of the river in a boat that holds only 2 people?

AI - GPS

Current State:

Left Bank = (3 Missionaries, 3 Cannibals, 1 Boat)
Right Bank = (Empty)

Desired State:

Left Bank = (Empty)
Right Bank = (3 Missionaries, 3 Cannibals, 1 Boat)

You then solve the problem, and code it.

While these symbols represent human interpretable concepts such as missionaries, cannibals, boat and left bank, the computer running the program of course has no knowledge of the meaning of these symbols. You could replace all occurrences of 'MISSIONARIES' with Z372B or any nonsense string, and the program would work in the same way.

AI Today

Artificial Intelligence (AI) therefore, is when a computer program or machine can perform tasks, think, and learn like a human. People who work in this area try to make computers 'smart'. The goal is to design a computer program that performs tasks quicker and more efficiently than the human brain. Examples of AI in our world today include Siri on iPhone, Face ID on an iPhone, social media personalizing adds to meets your interests, Amazon's Alexa, Vacuum robots, and Tesla Electronic Cars (no driver needed). In 2022, OpenAI released ChatGPT which made AI accessible to millions of individuals, corporations, educators, researchers, and therapists (Hua et al., 2024).

What can a machine do?

- Play board games.
- Work on mathematical proofs.
- Plan and schedule events and appointments.
- Identify objects in images.
- Handle and manipulate objects.
- Generate speech from text.
- Walk.

AI has by now succeeded in doing essentially everything that requires 'thinking' but has failed to do most of what people and animals do 'without thinking' – that, somehow is much harder!

AI Bias & Fake News

Websites and social media accounts that we all to use collect data about us. Machines can be taught to use data to show us advertisements and products that we might be interested in. These can be obtained via websites visited, search history, places visited, routes we have taken, photographs of people we know, purchase history, phone contacts, and the calls we made. It is possible to opt out of data collection, but it is not always easy and not every web site is transparent regarding privacy rules. For example, Google makes considerable sums from controlling the adverts you might see on lots of web sites. Also, if I ask Google – 'Where is the best restaurant in Cambridge', the answer provided would be a biased one. Recently we have seen a growth in Fake News and Deepfake, a type of synthetic media that uses artificial intelligence to manipulate or generate visual and audio content. 74% on average across 29 countries think artificial intelligence is making it easier to generate very realistic fake news stories and images.

Application of AI

In the next 30 years, we shall see a continued growth in the applications of AI tools in relation to healthcare, automobile, finance, surveillance, social media, entertainment, education, space exploration, gaming, robotics, agriculture and e-commerce. Some of the applications may well have a positive impact, such as in healthcare for assisting doctors, and in education for automating grading systems. However, some may have a negative impact such as social manipulation and further autonomous weapons in war.

Moral & Ethical issues

We also need to be mindful of moral issues and ethical issues.

Applications of AI	Moral considerations
Self-driving cars	Who is responsible for an accident?
Medical diagnosis	How are decisions explained/trusted?
Approving loan & mortgage applications	How are decisions explained/justified?
Automation	How will humans handle lower demands for labour?

The situation regarding regulating AI and its associated ethical issues is still ongoing. However, for the most part, the universities and companies that create AI systems have been left to regulate themselves, although there are now further developments in the fields of bioethics and medical ethics, which have considerable influence on decisions about the development and applications of technologies. Another interesting point, was that Pope Francis in a sermon, said that he would baptize Martians if they arrived on earth and wanted to be baptized. Would he baptize robots?

Should We Be Worried About The Future Of Humanity?

Dave Waters states that artificial intelligence is an infant at best. Once it becomes a teenager and believes it is smarter than its parents, will AI rebel? Bill Gates maintains that humans should be worried about the threat posed by artificial intelligence. Elon Musk, founder of the Tesla and SpaceX companies, said that artificial intelligence is probably our biggest existential threat, and that with artificial intelligence we are summoning the demon. Stephen Hawking felt that the development of full artificial intelligence could spell the end of humanity. Speaking at the launch of the £10million Leverhulme Centre for the Future of Intelligence in 2016, he stated that the rise of AI would transform every aspect of our lives and was a global event on a par with the industrial revolution. He went on to say that alongside the benefits, AI will also bring dangers, like powerful autonomous weapons, or new ways for the few to oppress many. Finally, according to

Gray Scott, once AI become self-aware, the cognitive hierarchy will be transformed forever, where we humans are no longer the dominant species.

Ivan Soltesz, Professor of Neurosurgery and Neurosciences, states that AI is eventually going to be able to do everything that humans can do, and that this will happen faster than we think. There is no reason AI could not learn, for instance, dark humor, or one-shot learning (as opposed to learning based on lots of repetitions of individual “cat versus dog” examples). Also, conscious, or not, it could also learn to “deliberately” act “silly” to hide the machine behind the mask and appear childlike, and so on. Soltesz further adds, my hope for what I admit is my otherwise dark vision of our future is the fact that we as humans have had nukes for decades but so far have resisted blowing up the world, so maybe humans will agree to limit AI applications in a practical and effective way. (see: Goldman, 2023).

Points for class discussion

1. Can computers be more intelligent than humans?
2. Can a computer have independent thoughts?
3. Have we become too reliant on computers and technology?
4. Do you think AI will rule the world? (why/why not? How do you feel about this?)
5. Are you worried about the future?

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