

Can Artificial Intelligence (AI) Function as a Human Brain?

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Introduction and Research question. -

Artificial Intelligence (AI) should be defined according to its goals, it's the field that aims at building. There are 2 dimensions to it, one is to match human performance, another is to build systems that reason/think, or rather systems that act. (*Professor Amit power point presentation 3rd class slide 11*).

In 1950 Alan Turing wrote a paper titled "Computing Machinery and Intelligence" where he asked: Can machines think. He argued that if the machine could successfully pretend to be human to a knowledgeable observer, then you certainly should consider it intelligent. (*McCarthy, 2004*)

John Mc Carthy known as the father of AI, elaborated a phrase "Study of Artificial Intelligence". Defining AI as "The Science and Engineering of making intelligent machines". (*Mc Carthy, 1955*)

The research question of the present paper: Can AI function as a Human Brain? Seems philosophical but it's a question that many have been asking themselves. If AI can be viewed as: "The capability of a machine to act on its own making more intelligent decisions than human beings", Or, "AI is the capability of a machine to act on its own with conscience making the most intelligent decision ".

To be able to understand the research question we need to include elements of a human brain that I think are very important and they are: Intelligence and Conscience. Regarding this we can say, Intelligence is the capacity to Reason, Plan, solve problems, think abstractly, comprehend ideas, use language, learn among other things. I have seen in my research that AI can have one or more of these abilities. But about conscience that's something am not even going to try to define in this short paper. Also, AI has not yet been able to reproduce human conscience on a machine.

Problem Space: AI and its relationship to the human brain

Humans are constantly surrounded by data; their survival depends on their capability to understand and evaluate their observations of the external environment. They formulate and extract knowledge from received information by transforming the data into specific patterns and models. To this end, a number of biological processes and aspects of the brain are involved (*Hernandez, 2010*).

The problem space of this paper “AI and its relationship to the human brain”, First: what is a human brain “Neurons are the computational building blocks of the brain. Until today the full scope of our brain and how it functions is not fully understood. Simulating the cognitive abilities of the human brain has been the goal of artificial intelligence (AI) (*Segey, 2020, 3*)

According to this we can't really understand the relationship between AI and the human brain because we don't yet fully understand the human brain by itself, so we try to explain it only with the information we have today about the human brain. (*Rodrigues,2001*)

Types of Artificial Intelligence. -

ML (Machine learning) study of computer algorithms that can improve automatically through experience and by the use of data. Builds a model based on sample data (known as training data) in order to make predictions or decisions without being explicitly programmed to do so. DP (Deep Learning) Machine learning methods based on artificial neural networks with representation learning. Representation learning is a set of techniques that allows a system to automatically discover the representations needed for feature detection or classification from raw data. (*Professor Amit power point presentation 3rd class slide 12*).

Weak AI VS Strong AI. Strong AI aims to create intelligent machines that are indistinguishable from the human mind. Over time, it would develop a human-like self-aware consciousness. It has the ability to solve problems, learn, and plan for the future. Would have to learn through input and experiences constantly progressing and advancing its abilities over time. It can perform a variety of functions, eventually teaching itself to solve new problems. Now, many use the Turing test to evaluate its intelligence.

Weak AI focuses on performing a specific task for example answering questions based on user input or playing chess. It can perform one type of task, but not both. examples: virtual assistants, like Siri. (*Professor Amit power point presentation 3rd class slide 13*).

We can't talk about weak and strong AI without mentioning John Searle and his Chinese room argument. For him, the computer processing a story about a restaurant visit is just a Chinese symbol manipulator blindly applying uncomprehended rules to uncomprehended text. What is missing, Searle says, is the presence of intentional states. (*Searle, 1980*).

The Chinese Room Argument is sometimes misinterpreted. It is sometimes said that the argument is supposed to show that *computers can't think*. That is not the point of the argument at all. If a computer is defined as anything that can carry out computations, then every normal human being is a computer. The point is not that computers cannot think. The point is rather that computation as standardly defined in terms of the manipulation of formal symbols is not by itself constitutive of, nor sufficient for, thinking.

A second misunderstanding is that machines cannot think. Again, this is a misunderstanding. The brain is a machine. If a machine is defined as a physical system capable of performing certain functions, then there is no question that the brain is a machine. And since brains can think, it follows immediately that some machines can think. A third misunderstanding is it is impossible to build a thinking machine. But this is not claimed by the Chinese Room Argument. On the contrary, we know that thinking is caused by neurobiological processes in the brain, and since the brain is a machine, there is no obstacle in principle to building a machine capable of thinking. What the Chinese Room Argument shows is that this project cannot succeed solely by building a machine that implements a certain sort of computer program. One can no more create consciousness and thought by running a computer simulation of consciousness and thought, than one can build a flying machine simply by building a computer that can simulate flight. Computer simulations of thought are no more actually thinking than computer simulations of flight are actually flying or computer simulations of rainstorms are actually raining. The brain is above all a causal mechanism and anything that thinks must be able to duplicate and not merely simulate the causal powers of the causal mechanism. The mere manipulation of formal symbols is not sufficient for this. (*Scholarpedia, online*).

While ML and AI approaches have generally been premised on duplicating brain and cognitive functions, their varied suitability for different kinds of problems means that no one model is adequate for all problems. (*Newton, 2020*)

Future technologies that will advance AI

Although this point can be considered as a new paper in itself. I thought it was important to mention on this short paper in the sense that in my opinion these future technologies that I will speak about can help me solve my research question, because they will advance AI to a point we can yet comprehend. But I'll just limit myself to mention them and not explain them since that is not the purpose of this sort investigation.

So, the only future technology that in my opinion can be a changer for AI is called "Quantum Computing". Quantum Computing is a possible future for computer science after we've reached the limits of digital binary computers. Quantum computing can give a big computational upgrade to Machine learning and AI problems. *(Woodie, 2021)*

We are starting to evolve beyond classical computing into a new data era called quantum computing. It is envisioned that quantum computing will accelerate us into the future by impacting the landscape of AI and data analytics. Quantum computing power and speed will help us solve some of the biggest and most complex challenges we face as humans. *(Brooks, 2021)*

It's important regarding this new technology a quantum algorithm and program is independent of the need for quantum computer hardware. Already, quantum programming systems exist, including quantum instruction sets; quantum software development kits; and quantum programming languages. When designing a quantum hybrid coprocessor, many of the engineering challenges can be handled by a digital computer. *(Treleaven, 2021)*

It is also important to mention regarding this new technology that will change AI, that Quantum computing will also integrate other technologies to AI, like

nanotechnology and nanoscience. *“Nanoscience and nanotechnology are the study and application of extremely small things and can be used across all the other science fields, such as chemistry, biology, physics, materials science, and engineering.”* (<https://www.nano.gov/nanotech-101/what/definition>)

Professor Ben-Israel explains regarding this new technology and its relationship with AI: *“One of the conditions for progress in AI capabilities is an increase in computing power, and one of the ways of increasing computing power is with the help of capabilities obtained through quantum science. There is therefore contact between them; one does not come instead of the other”.* (Globes, 2018)

Security issues with future AI

It is important to consider in this research paper as one of the additional questions: What are the security implications of future AI technologies? Security in today's information infrastructure relies on a cryptography. Future technologies that will be used in AI will have a major impact on cryptography. Quantum computing as we mentioned in this paper will have the ability to overcome encryption. (*National Academies of Sciences, 2018*).

Conclusions. -

We need to ask ourselves: Will the risks to security these new AI technologies have outweighed the benefits we can obtain from them? New Technologies like Quantum computing will advance AI, New AI technology will break our current encryption system creating a new balance of power. This implies a very high risk in many sectors like Cybersecurity among others.

Once quantum computing is being used it is very probable that machines will be able not only to think as a human brain but maybe even better than a human brain. But less not forget that the question of will they also have a conscience still remains unsolved.

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