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ШТУЧНИЙ ІНТЕЛЕКТ І МАЙБУТНЄ ЛЮДСЬКОЇ ПРАЦІ[1]

(Огляд книги "Gaming IA" Джорджа Ґілдера.
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Подано огляд книжки "Gaming AI" відомого американського автора, економіста і співзасновника Discovery Institute, Джорджа Ґілдера, в якій він доводить, що Штучний Інтелект (ШІ) не може мислити, як людина, але може змінювати умови праці і саму працю людини, її заняття. Тому він очікує, що у майбутньому ШІ контролюватиметься людиною у тих видах роботи, які є рутинними й механічними, а також допомагатиме їй у творчій роботі та навіть створювати нові творчі заняття.

Ключові слова: *Джордж Ґілдер, штучний інтелект, мислення, праця, заняття, творчість.*

ARTIFICAL INTELLIGENCE AND FUTURE OF HUMAN JOBS

(Review of George Gilder's book "Gaming AI".
Seattle: Discovery Institute Press, 2020)

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A review of the book "Gaming AI" by the famous American author, economist and co-founder of the Discovery Institute, George Gilder, in which he argues that Artificial Intelligence (AI) cannot think like a man, but can change conditions of a human jobs. Therefore, he expects that in the future AI will be controlled by a man in those types of jobs that are routine and mechanical, as well as help him/her in creativeness.

Keywords: *George Gilder, Artificial Intelligence, thinking, work, job, creativity.*

[1] Огляд книги Джорджа Ґілдера готувався під науковим керівництвом і редакцією доцента кафедри філософії Національного університету "Львівська політехніка" Андрія Кадикала.

"Gaming AI" by George Gilder is an excellent example of the contemporary book, which brings up such an important question as "the role of artificial intelligence in the modern world and its influence on the future of humanity." The author tries to highlight the milestones in AI creation. Moreover, another plotline is a search for any proof whether machine or human brain is more advanced. The book takes a special place among similar literature because of its description of AI development, supportive facts, well-organized arguments, and explanations. George Gilder dives deeply into the world of AI to provide information about problems people are debating for many years.

In the first chapter, "Beginnings at Bletchley Park," George Gilder talks about the first steps toward creating Artificial Intelligence (AI). In this part of the book, the author writes about the legendary computer titan Alan Turing. This man led the team, which specialized in creating computers for codebreaking or decoding hidden messages exchanged between enemies during World War II.

Later Turning was a head of a group that worked on the design of a computer called Colossus. This device instantly cracked the codes of Nazi cryptographers. Those Turning's inventions were invaluable during the war.

Furthermore, those computers were extremely useful after World War II. The success of Colossus became an impetus for even more powerful computers and general-purpose processors. At that time, it seemed challenging to develop a machine that could outperform humans in playing chess. And yet, a real breakthrough happened when the even more complex cheese game Go was computerized.

After these fantastic innovations, many specialists from different fields started debating about the future of humanity when people would be replaced at their workplace with advanced AI. One of those professionals was Israeli historian Yuval Noah Harari. He presented his opinion in [Harari 2017], where he explains that self-driving transport, social networks, and cyborgian superhumans together comprise a transcendent artificial mind. Harari explained that in this way, human beings would be left with nothing to do but to reach eternal life and pleasure, to become new human gods (*homo deus*).

Turning and his successors, like the inventor of the prevailing information theory model, Claude Shannon, compared those computers with the human brain. To be more precise, they thought that they had been "building" artificial human brains. To support this argument, George Gilder provides Shannon's quote: "I think a man is a machine of a very complex sort, different from a computer, i. e. different in organization. But it could be easily reproduced – it has about 10 billion nerve cells… and if you model each one of these with electronic equipment, it will act like a human brain. If you take [chess master Bobby] Fischer`s head and make a model of that, it would play like Fischer."

This kind of approach Gilder named "materialist superstition" of computer science. Computer theorists are inclined to believe that the human brain is nothing but a "meat machine."

At the same time, a company like Google and authoritative people like Elon Musk and the late Stephen Hawking believe that "keeping a machine mind under control is still unsolvable problem". Humanity still needs to find a way how its inferior intelligence can govern this perfected AI.

The progress was swift. Turing machine became a cutting-edge technology at that time. It was so general in purpose that it could be programmed to execute any digital algorithm. Turing machine could process any problem, even image rendering. A modern version of the Turing machine is RISC machines (reduced instructions set computers). Nearly all smartphones run on RISC machines, which can't help but impress.

In the second chapter, "Beginnings at Bletchley Park", the author describes such phenomenon known as the "von Neumann bottleneck" and its impact on AI's development.

The whole world knows about von Neumann's computer architecture. To simplify, nearly every computer, laptop, smartphone, tablet, and similar machine work based on this type of computer architecture. The main problem of the von Neumann bottleneck is that the computer cannot process commands and data simultaneously. Today this problem (von Neumann bottleneck) is known as "NUMA" – non-uniformed memory access.

It means there is a limitation for the machine compared to the human brain. As discovered – the brain is nine orders of magnitude (a billion times) more energy efficient than a computer. When the machine defeats a human while playing Go, the man is using only twelve or fourteen watts of power, while the computer needs the gigawatt clouds of Google data centers around the globe.

After scientists had faced all the problems with computer memory access, machine snowlines, they came back to the idea of comparing the human brain and artificial intelligence.

A real breakthrough was made by psychology professor – Frank Rosenblatt. The man built the first crude graphic processor, the processor of all of the industry's data center "neural networks". His "perceptron" was built based on the principle of mammals' brain functioning – neural networks. Rosenblatt commented: "It can tell the difference between a dog and a cat".

Later Ray Kurzweil fulfilled Rosenblatt's idea of adding layers to the invention. It helped the machine to work faster and process data on a whole different level.

Kurzweil explains the main idea of the multilayered process in his book "How to Create a Mind": A hierarchical machine learner will recognize letters at one level, words at another, phrases at another, and on up the scale to paragraphs and deeper meanings. Now it is also known as "Deep Learning".

As a result of these improvements, machines can execute logic billions of times faster than human brains. Because of it, some computers can function as transducers, sensing sounds, brightness, frequencies, and pressures far beyond the capacities of eyes and ears, and skin. The simplest example would be modern smartphones where it regulates the screen's brightness based on the user's surroundings. Now we witness something that was beyond imaginable just half a century ago – 3D printers. "This can translate the digital codes of AI into physical shapes and chemical reactions".

But no matter how incredible it sounds, there is still one serious problem within AI and computers in general. As Caltech engineer and physicist Carver Mead puts it: "In the end, everything gets chocked off by the wires".

There is still much to consider comparing AI and the human brain. "The human mind doesn't agglomerate in data centers. It is localized and dispersed in billions of minds around the globe". The latest AI and machine learning movement is only the newest force to deny this reality.

Further through the text, George Gilder elaborates more on the topic of AI. As understood from *Gaming AI,* computers are networks of connected wires, and human brains are networks of connected neurites. But if we assume that the human brain's connectome is some map of all the links among all its neurons, the cybernetic connectome of human society might be a map of all the links across the internet.

Lately, this information about interconnection was handy for some scientists, so they started working on something that could connect all the computers and collect information from all of them.

All the world's information now can be transformed into an electronic form which means data could be shared easily with the speed of the light (or as close to this speed as possible), and the only thing the human eye could notice would be a resonant sphere of light. Nowadays, because of such an incredible idea, we have the internet. Many professionals are still working on constant improvement of the speed of data flow. So today, we are witnessing 4G and 5G internet, which is an incredible speed for receiving or exchanging information worldwide.

Even with such incredible innovations, there is no limit to humans' desire for progress. As Gilder gives an example in his book: "In the 2020s, Kevin Kelly of *Wired* consummates perhaps the grandest model of this transcendental computer. He projects the existing internet into a cornucopian future of four-dimensional artificial intelligence. The machine will gain a body, with every screen an eye and a portal to the AI cloud".

As Kelly's idea of this incredible AI becomes a reality today, the computer scientists believe that his cosmic computer will also provide an unimpeachable past through cryptographic blockchains. It starts with money and transactions, but later on, a blockchain can certify facts, contracts, documents, and accounts needed to warrant the veracity security of the past.

It is hard to believe that this connectome of wires and switches was a human creation. If the internet can be integrated into one global system processing all global data, it will indeed outperform the unconnected and dispersed billions of human brains for many purposes.

But even though it seems that humanity loses it to AI, there are still many enigmas, which stay unsolved. For example, there is only one biological connectome that has been mapped in detail. This was the millimeter-long roundworm. As it appears, the results of this examination left the scientists with even more questions than before. So there is no particular answer to the question of how the connectome of biological organisms works. "The enigma of nematodes only intimates the far more baffling complexity of human brains".

In conclusion, there is an idea of technological singularity. In simple words, it means self-improving machines or AIs. An example chosen by the author is Gödel`s machine.

As mentioned before, there would be no limits for AIs, which can improve themselves, but it is not particularly true. The reason for this is simple little-understood assumptions common in the artificial intelligence movement, which prevent from ideal singularity scenario.

Those assumptions are [Gilder G. *Gaming AI,* p.50]:

– *The Modeling Assumption:* A computer can deterministically model brain.

– *The Big Data Assumption:* The bigger the dataset, the better. No diminishing returns to big data.

– *The Binary Reality Assumption:* Reliable links exist between maps and territories, computational symbols, and their objects.

– *The Ergodicity Assumption:* In the world, the same inputs always produce the same outputs.

– *The Locality Assumption:* Actions of human agents reflect only immediate physical forces impinging directly on them.

– *The Digital Time Assumption:* Time is objective and measured by discrete increments.

An excellent example of the implication of these assumptions is the game of Go.

Talking about nowadays inventions and developing AIs, it is possible to mention self-driven cars. The machine cannot only rely on the accuracy of maps that govern it. It cannot assume that the map from the past is valid at the moment. Instead, the machine has to receive information from the world at present and "decide" where to go or what to do. There are always many things to consider whether an animal crosses the road, a fog, blizzard, or ice patches. Moreover, there are many other human-driven vehicles on the road.

To achieve congruence, you can either change the mechanism of recognizing the world, which is not an easy task or change the territory.

The Chinese, who lead the field, try to accommodate the territory – building a new virtual railroad. It is important to mention that this is slightly different from the initial idea of singularitarians – vehicles independent of human guidance or control.

Nevertheless, to deal with the world, self-driven cars need to achieve much more than this. They need to throw away the AI assumptions. They need to acquire faster and more sensitive four-dimensional visional systems.

Today the AIs are not even close to outperforming humanity. "The best, most subtle analog computer remains the human brain. AI poses no threat to it whatsoever" [Gilder 2020: 53].

REFERENCES

Gilder, G. (2020). *Gaming AI.* Seattle: Discovery Institute Press.

Harari, Y. N. (2017). *Homo Deus: A Brief History of Tomorrow.* New York: Harper Collins Publishers.