

One Flew Over... AI's Nest

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AI means, of course, Artificial Intelligence.

Today we are surrounded by this term. It is all around us. And so is the reality linked to it.

For now, it is said that AI helps humanity. A lot.

But there are many questions and papers claiming that AI could replace us. I cite only one analysis from the

fantastic monography in *Encyclopedia Britannica* (1). Under the concept "**artificial general intelligence (AGI), or strong AI – that is, artificial intelligence that aims to duplicate human intellectual abilities**" (1), the analysis demonstrates that today there is a real possibility of building a completely human-like robot. At that moment, AI will stop being helpful. From a competitor, AI could become a replacer. And this is dangerous.

Let us first take a definition! Artificial Intelligence is a "machine which can reason, learn and act in a way that normally requires human intelligence" (2).

A short flew over history can go to Antiquity and Middle Age, including ancient legends such as that of Talos, the guardian of Crete. Or remembering the works of Gottfried Leibniz, Thomas Hobbes and René Descartes, who explored the possibility that all rational thought could be made as systematic as algebra or geometry (3).

Before and during the Second World War, intelligent machines – and many examples come from England – helped to decrypt German messages. The name of Alan Turing was closely linked to this (3). Later on, Turing invented what is today called Turing Test or The Imitation

Game by which the answers of a machine to questions put by a man, compared to answers given by another man, could demonstrate that the machine was "thinking" (4).

In the history of science, there are tens or hundreds of elements that could be defined as parcels of AI (3) and it is impossible to give hierarchical examples.

But 1956 is officially considered the birth of AI, which was preceded by important achievements such as cybernetics and early neural networks.

The Dartmouth Summer Research Project on Artificial Intelligence was a 1956 summer workshop that took place in the campus of Dartmouth College, USA, with the participation of about 20 important scientists, mostly mathematicians. The workshop lasted eight weeks. Discussion included computers, natural language processing, neural networks, theory of computation, abstraction and creativity. All these are even today relevant for the field of AI.

This Summer Workshop of 1956 is credited to validate the term of "**artificial intelligence**" (5).

For today, four stages of development of AI are identified, as briefly described below.

1) **Reactive machines** – Based on programs, these machines can give answers. Such a machine defeated Garry Kasparov in chess match. Of course, it was the first time when a machine defeated a man in this game (1997).

2) **Limited memory** – This memory can be continuously improved by a training model such as artificial neural network.

3) **Theory of mind** – It does not entirely exist yet. But parts of it are already used, such as making decisions like a human or remembering emotions and reacting as such.

4) **Self aware** – It means that the machine is aware of its own existence. This does not exist yet. But when it will

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become a reality, the danger that such a machine could compete or even replace humans would be huge.

The main mechanisms by which AI works include **neural networks** by which units are interconnected, like neurons, **machine learning**, by which the machine may find hidden insights while doing data analysis without being programmed for this, **deep learning**, by using huge neural networks with many layers of processing units and learn with its self prior judgements, **language processing**, **computer vision**, by which a computer may recognize faces and other images, **graphical processing units**, **internet of things**, by which an enormous amount of data may be put together, and **advanced algorithms**, by which events can be predicted.

The main sectors into which AI is implied nowadays include health care, life sciences, manufacturing, retail, banking, and the public sector.

Of course, for our Journal we are mainly interested to **the use of AI in health care**. There are many papers describing how AI helps clinical medicine. Some authors even consider that *“there is virtually no area in medicine and care delivery that is not already being touched by AI”* (6). We selected just a very few examples (6-15).

Artificial intelligence may develop its help by analysing large data of clinical and laboratory databases, which are so large that they cannot be checked and interpreted by humans. Therefore, AI machine may develop useful clinical conclusions, using, for instance, machine learning and deep learning for this and empowering team work (7-9).

Artificial intelligence machines may interpret images in all fields of medicine, giving suggestions for diagnosis which

is unavailable by normal examination. Diagnosing cancer and monitoring its progression can benefit the most from AI (10, 13). Examples in cardiology demonstrate that, in examining a simple electrocardiogram in sinus rhythm, complex new data about either the dysfunction of the heart or risk of dangerous future arrhythmia may be obtained via AI (14, 15).

During epidemics, like the Covid-19 one, AI assisted the surveillance and, consequently, the real effect of the very necessary new interventions (11).

Most complex tasks are solved in general health care administration (6). A chatbot technology develops a query, usually initiated by a human, and the answer is continued with a conversation with new queries and new answers. The process continues until solving the problem which generated the query (12).

The discussion of checking how AI is used in medicine today could cover hundreds of days and thousands of pages.

When checking the title given to this paper, one could easily go to the famous Milos Forman's film, *One Flew Over the Cuckoo's Nest*, which won five Oscars. Based on Ken Kesey's novel published in 1962, the film and the novel refer to a world in which humans are no more normal.

We may not even think that the evolution of AI in medicine and human science is an abnormality. But the enormous change of our world produced by AI gives sometimes the feeling that something strange is surrounding us.

Fortunately, I am convinced that this is a “good stranger”. □

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