

Definition of Artificial Intelligence for Legal Regulation

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ABSTRACT

Even though so-called "artificial intelligence" is nowadays taking more and more part in our lives, the legal regulation of it is developing quite slowly. To the author's opinion, one of the reasons hindering the law-making process is the absence of understanding the term itself. In the present article different existing definitions of "artificial intelligence" are examined in order to determine the best one. Upon the research completion the author has concluded that "artificial intelligence" is inappropriate and unsuitable notion, and the author suggests the term "intelligent software" for the group of technologies that is usually referred to as AI now. Such a term encompasses different types of algorithms, programs and methods used for data analysis and recognised as technologies that are able to behave "consciously": able to learn, self-improve, make decisions, etc. Artificial intelligence itself is only a mode of such intelligent software.

Keywords: artificial intelligence, intelligent software, definition of AI, legal notion of AI, legal regulation of

artificial intelligence, legal definition of intelligent software

1. INTRODUCTION

The concept of "artificial intelligence" (AI) is becoming real though it was quite fictional recently. It first appeared in 1956 when John McCarthy announced it during his conference speech [1, p. 4]. The term cropped up in different articles, essays, scientific researches, and new authors gave it new meaning. The influence of AI on law and reverse is crucial: law establishes the rules that can boost or stop further developing of technologies; AI is involved in different cases related to financial markets, social and political manipulations, law enforcement, transport, etc.

However, from now on, it is no more just a notion from theoretical mathematics or informatics – the technologies are developed, applied, and becoming part of our everyday lives. Lawmakers from all over the world and members of international organizations are discussing the topic pragmatically, not ephemerally, trying to answer the following: – what are these technologies, what are the principles that should be above their development and application, how should the law respond to the changing relationships. And the most resonant question – may artificial intelligence become the subject, not the object, of legal regulation?

All the above-mentioned problems, to the author's opinion, arise from the misunderstanding or even incomprehension of the notion and concept of artificial intelligence.

In the present article the author is going to analyse the existing concepts of "artificial intelligence" (hereinafter – "AI") and ascertain why they are only compromising and confusing the lawmakers. The goal posed is to advise on a concept that may resolve contradictions and help to develop working and applicable legal regulation of new digital technologies.

2. METHODOLOGY

As the present research is interdisciplinary, the author has addressed both general as well as private scientific methods. First and foremost, the conceptual framework should be clearly defined, and the main terms and definitions are to be set out. Integral approach to defining terminology was the leading principle during the present research: the author tried firstly to split up technical (as the term is complex one and includes many technical aspects) and legal opinions to the AI's notion and then to combine them in a most appropriate way with saving crucial and adding particular features to the final concepts.

A system approach affected to further development of terminology: in any conceptual framework concepts should belong to a concept uniting them. General methods of analysis, systematization, deduction, and induction were applied for making up and understanding existing definitions of artificial intelligence and for introducing a new term of intellectual software.

A comparative (and legal comparative as particular) methods helped to scrutinize similarities and differences in various approaches made up by scientists and lawmakers to formulate unique and universally applicable definitions.

The sociological method allowed to evaluate the factors that influence the behaviour of the subjects of the social relations in the field of development and application of smart software and technologies.

3. NOTION OF AI AND PROBLEMS WITH IT

After having analysed different sources, the author has concluded that there is no single notion of the term



"artificial intelligence" and the existing ones are not even similar in the most cases.

The inventor of the concept "AI" – John McCarthy – defined it as "the science and engineering of making intelligent machines". The "intelligence" itself is, in his opinion, "the computational part of the ability to achieve goals in the world" [2].

However, it should be noted that these definitions were coined more than half a century ago. Later the idea was forgotten and declared impossible and science-fictional (the so-called "AI winter"), then it came back alive after the commercial success of expert systems and agents. Science continued developing, other technologies and methods of their application appeared, the abilities to imitate certain functions of the human brain broadened. These factors led to the situation when scientists realized that it was impossible to define everything that happens in the field of knowledge under consideration in one term; the terms "weak" and "strong" artificial intelligence appeared, which did not solve the emerging terminological problems, but only worsened further confusion in concepts.

"Weak" artificial intelligence has come to be understood as technologies that are limited to one function and one task. "Strong" artificial intelligence is a real or theoretical technology (a program, a combination of software and hardware) that reaches or exceeds the level of human intellectual abilities and is able to apply its abilities to any type and type of tasks [3].

At the same time the robotics' sphere was evolving and it caused another miscomprehension: terms "robots" and "artificial intelligence" were used interchangeably and became to be understood as something similar and inseparable [4]. To the author's opinion, it should be kept in mind that the fact that the researches in the fields of robotics and artificial intelligence are often held at the same time by the same scientists and usually they should be done that way, does not lead to the fusion of the terms. For example, specific standards and documents contain the definition of the term "robot" - the ISO standards [5], UNESCO documents [6], national acts, etc. All of them focus on the point that a robot is a mechanism, a device that is to some extension autonomous and is able to conduct some actions. Despite the terminological confusion about the notion of "AI", most people involved agree that AI is a program, a software, or a combination of algorithms. It means that a robot can be equipped with some AI technology but is not the same thing.

Another term that is messed up/confused with AI is "neural networks" or, frequently speaking, artificial neural networks (ANN). They are essentially a mathematical model – a way of data processing and making decisions based on it using machine learning methods. An artificial neural network is not an independent program. The ANN can be used as a basis for the functioning of intelligent software. The principle of ANN's construction is inspired by biological neural networks [7]; its system consists of connected and interacting processors (artificial neurons), each of which performs its own small part in the overall data analysis process [8].

Artificial neural networks and AI are connected to another term - machine learning. Machine learning can be understood as a group of methods that allow the program to analyse data in order to make decisions. It includes three main methods (which are also called machine learning types): supervised learning [9], unsupervised learning [10], and reinforcement learning [11]. Each of them has its own characteristics. The author puts a special emphasis that it is the use of machine learning methods that allows software to become "intelligent", since they reproduce reasonable human activity: collecting and analysing incoming information, drawing conclusions, building subsequent decisions based on previously adopted ones, searching for patterns between data, etc.

Nonetheless, machine learning is only a group of methods for developing "artificial intelligence" and is not the latter. Returning to AI itself some scientific and legislative approaches should be analysed. The author did not attempt to examine all the definitions and it should not have been done in fact – each specialist and lawmaker gives its own explanation and almost all of them are not actually definitions but descriptions.

As regards science, some authors suggest claiming AI as a computerized system that is able conduct as if it has mind [12]. The others allege it a system that rationally solves the tasks [13]. Another opinion is that "artificial intelligence" is a field of knowledge rather than a system or technology.

Furthermore, although the terms "weak" and "strong" (or "general") artificial intelligence are broadly known (at least in technical sciences), advised legal definitions do not contain these differences despite the fact that social science should base its concepts on existing approaches in this field. Especially considering the fact that general and weak AIs probably should be differently regarded by the law. The concept of "general intelligence" was advanced by the psychologist Charles Spearman in 1904 - it determines cognitive performance in addition to narrow task-specific abilities [14]. In other words, general intelligence is, in the opinion of those scientists who agree with the theory, the ability to perform different tasks, resolve problems stemming from distinct areas of life, make decisions in the variety of fields, etc. People, as claimed, have general intelligence, which is more than could be said for existing programs and machines. Today's AI is not able to performs different tasks - it is made to operate only in one field (selfdriving car, cooking robot, etc.).

Moreover, most scientific definitions are construed as a listing of essential, to the authors' opinions, characteristics of an artificial intelligence. Such a technique is not a logical error and has the right to exist as a content of any concept is a feature set indeed. Such a definition, however, does not resolve a problem that it has to deal with – answer the question of what the term means, explain its meaning.

In addition, these definitions often only add to the confusion, since they combine both programs and cyberphysical systems, and use the phrase "cybernetic systems" either separated by commas or as synonyms, which is not true from the point of view of science and technology.

Official legal approaches are not the same in different jurisdictions as well.

In documents that are drafted or have already been issued by the US Congress, artificial intelligence is defined through a number of its features , which, from the author's point of view, does not comply with the rules of legal technique, which the US adheres to quite clearly (it is enough to study the definitions in other acts, for example, on Autonomous vehicles). Given the latter fact, we can assume that "artificial intelligence" is not defined, but only its properties are listed for the purposes of further legal regulation.

In Japan, e.g., the law defines technology related to artificial intelligence - it is intended for the implementation of intellectual functions: learning, reasoning, and judgment, implemented using artificial means [15].

Since October 2019, the Russian Federation has an official definition of artificial intelligence, given in the Strategy for the development of artificial intelligence in Russia until 2030 [16]. According to it, AI is a set of technological solutions that allows to simulate human cognitive functions (including self-learning and search for solutions without a pre-set algorithm) and get results that are comparable, at least, with the results of human intellectual activity when performing specific tasks. The complex of technological solutions includes information and communication infrastructure, software (including those that use machine learning methods), processes and services for data processing and solution search. The definition seems to be generally successful, but it does not stand up to further analysis. It does not give an unambiguous interpretation of what kind of object is described: the wording "including self-learning and search for solutions without a pre-set algorithm" suggests that we are talking exclusively about the so-called "strong" artificial intelligence, but further the text of the Strategy refutes this; it contains subjective judgments ("at least") and combines both the hardware complex and the software itself, and even more procedures and services for data processing and finding solutions. In addition, it should be noted that the text of the Strategy itself indicates that the terms and definitions given in this document are used only in the Strategy itself. Consequently, the act does not claim to provide a legal concept for all further regulation.

The EU's High-Level Expert Group on Artificial Intelligence proposed the following definition of AI [17]: it is a system that demonstrates intelligent behaviour by analysing the environment and taking actions - with some degree of autonomy - to achieve specific goals. AI-based systems can be purely software-based, operating in a virtual world (for example, voice assistants, image analysis software, search engines, speech and face recognition systems), or AI can be embedded in hardware devices (for example, advanced robots, automated vehicles, drones, or IoT applications).

Thus, the author makes a clear conclusion that in modern science, the conceptual and categorical apparatus of the issue under study is not formed. In various scientific works, there are completely different definitions, and the authorities of different countries and international organisations also do not give an unambiguous interpretation of the concepts, which, however, are actively used in the development of strategic, program and regulatory documents. In addition, even quite successful formulations found among various publications in authors or in acts of authorities do not meet the general rules of logic, do not eliminate the problem of ambiguous interpretation of terms, and do not solve the problem of increasing confusion in concepts. The need to develop a unified approach to the conceptual and categorical apparatus is obvious. Based on all the above, the author suggests the new conceptual and categorical apparatus for the considered field of knowledge.

4. INTELLIGENT SOFTWARE – THE SOLUTION FOR LEGAL REGULATION

The term "artificial intelligence" does not fit the role of a category, its essence and content cannot reflect the entire set of features that are usually attributed to it. In addition, following the laws of logic in general and the rules of legal technique in particular, we come to the conclusion that it is necessary to understand artificial intelligence as a unique entity, and not to assign a lot of interpretations to the term, in other words, to put it as a category.

Following this logic, the author believes that the allocation of the category "intelligent software" would be correct and accurate. The author suggests defining this term as a set of programs, procedures, rules and relevant documentation of information processing systems that are capable of independent data processing and analysis and decisionmaking based on the conclusions obtained, aimed at achieving the goal.

This definition is based on the description provided for the term "software" in the standard of the International organization for standardization ISO/IEC 2382:2015 [18], adding features of intelligent behaviour. The latter are the result of analysing the ideas of scientists from different fields about how and what activities a computer program performs or can perform.

Such a term contains unambiguously interpreted elements, which do not allow for double interpretation; however, it is quite specific and accurately gives an idea of the content and scope of the proposed category. For such a category, it is not difficult to identify the set of its concepts. In addition, the wording is designed in such a way that the list will not be exhaustive and can be supplemented with other realworld items if they are created/developed or in any way belong to the designated category. In the context of the development of technical sciences and technologies in general, this approach seems to be optimal.

An additional feature of this category is that it allows you to clearly and unambiguously divide the results of the development of science and technology that are located next to each other: hardware complexes, software, methods and methods of creating programs, and so on.

Moreover, in a definition the authors tried to avoid unclear and hardly understandable terms such as "conscious", "human-like", "comprehension", etc. These words cannot be explained nowadays; they are ephemeral and abstract: we still do not understand what a brain is, how does it work, why are we (as a humankind) conscious and animals, e.g., are not conscious enough. In the author's humble opinion, new criteria of evaluating consciousness and awareness of any beings should be invented (however, it is not the issue of the present article).

Artificial intelligence is definitely a type, or it is better to say - generation or level, of intelligent software. The parallels can be found in autonomous vehicles standardisation (not ignoring the fact that autonomous vehicles are intelligent vehicles as well). In SAE standard "Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles" [19] all of them are divided into 5 levels according to their capabilities and autonomy. In the intelligent software's classification AI will be the max level, which degree of autonomy is so high that it is able to independently learn and retrain, as well as make informed decisions based on conclusions from previous experience, and when interacting with the environment. In other words, artificial intelligence is only such software, the level of intelligence of which allows us to talk about the absolute autonomy and independence of the machine.

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5. CONCLUSION

The term "intelligent software" solves both legal and social problems with the notion of artificial intelligence. As a legal category it may be used for further classification of smart programs, which itself will provide the appropriate basis considering differences and specific features in their legal regulation.

Divided according to level of autonomy and independence, the regulation of intelligent software can be developed coherently and systematically. Artificial intelligence as the highest level of such software will be granted its own laws (and maybe even e-personality, from the author's perspective).

Social problems with acceptance of new technologies are being solved as well: term "artificial intelligence" is usually associated by common people with fictional theories and stories of a machines enslaving humanity. If you use another notion (especially because it is more appropriate), people will more likely and faster get used to smart software all around them and accept real artificial intelligence when it is invented.

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