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Legal Approaches to Artificial Intelligence Concept and Essence Definition

Enfoques legales del concepto de inteligencia artificial y la definición de esencia

Authors

Alexandra Yuryevna Bokovnya[1], Ildar Rustamovich Begishev[2], Zarina Ilduzovna Khisamova[3], Nelli Rashidovna Narimanova[4], Lyudmila Mikhailovna Sherbakova[5], *Anna Alexandrovna Minina*[6]

[1]*Faculty of Law, Department of Criminal Law, Kazan Federal University, Kazan, Russia (Russian Federation), kafedra.ksu@yandex.ru*

[2]*Kazan Innovative University named after V.G. Timiryasov, Kazan, Russia (Russian Federation), begishev@mail.ru*

[3]*Department of Planning and Coordination of Research Activities, Head, Research Department, Krasnodar University of the Ministry of Internal Affairs of the Russian Federation, Krasnodar, Russia (Russian Federation), alise89@inbox.ru.*

[4]*Department of Criminal Law and Procedure, Stavropol Institute of Cooperation (a branch of the Belgorod University of Cooperation, Economics and Law), Stavropol, Russia (Russian Federation), nelli-e@yandex.ru*

[5]*Faculty of Law, Department of Criminal law and Procedure, North-Caucasus Federal University Stavropol, Russia (Russian Federation), l.scherbakova@list.ru*

[6]*Department of Legal and Special Disciplines, Stavropol branch of RANEPA, Stavropol, Russia (Russian Federation), ann247@yandex.ru*

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Abstract

In this paper, it was tried to provide a comprehensive analysis of the term "artificial intelligence" and its essence definitions existing in the scientific literature. It is noted that nowadays, they developed several approaches to the interpretation of "artificial intelligence" definitions. At the same time, despite a wide range of studies on the interpretation, various areas of application, as well as the legal aspects of "artificial intelligence" concept, the unexplored horizons of this definition are quite wide. For this reason, the level of interest in the multidimensional consideration and analysis of the term "artificial intelligence" is quite high, which allows us to talk about fairly broad prospects for the development of legal approaches to its study. It is shown that the most convincing and consistent position of those scientists who are inclined to describe the concept under consideration by designating its essential properties and signs. These properties and signs of artificial intelligence include the ability to reason and control, legal understanding and legal awareness, learning and development, autonomy and decision making, etc.

Keywords: artificial intelligence, conscious-volitional behaviour, legal category, cognition, intelligence.

Resumen

En este trabajo, se intentó proporcionar un análisis integral del término "inteligencia artificial" y sus definiciones de esencia existentes en la literatura científica. Se observa que en la actualidad, desarrollaron varios enfoques para la interpretación de las definiciones de "inteligencia artificial". Al mismo tiempo, a pesar de una amplia gama de estudios sobre la interpretación, las diversas áreas de aplicación, así como los aspectos legales del concepto de "inteligencia artificial", los horizontes inexplorados de esta definición son bastante amplios. Por ello, el nivel de interés en la consideración y análisis multidimensional del término "inteligencia artificial" es bastante alto, lo que nos permite hablar de perspectivas bastante amplias para el desarrollo de enfoques jurídicos para su estudio. Se demuestra que la posición más convincente y consistente de aquellos científicos que se inclinan a describir el concepto en consideración designando sus propiedades y signos esenciales. Estas propiedades y signos de la inteligencia artificial incluyen la capacidad de razonar y controlar, la comprensión jurídica y la conciencia jurídica, el aprendizaje y el desarrollo, la autonomía y la toma de decisiones, etc.

Palabras clave: inteligencia artificial, comportamiento consciente-volitivo, categoría jurídica, cognición, inteligencia.

Introduction

During the modern period of modern history, the need to create artificial intelligence (hereinafter referred to as AI) is in the focus of the scientific community attention, while one cannot but say that interest in this phenomenon takes place both among the experts in technical science and humanities. Over a long period of time, a number of attempts were made to form an independently thinking and functioning system called AI and carrying out its activity together with human conscious activity.

AI has been the subject of various scientific areas quite recently, which is why there is an insufficient definition of its structure (Bikeev et al., 2019), as well as the range of legal issues that are associated with it. Commentators have recognized that new and significant legal and ethical questions will arise from the preponderance of AI. The need for AI ethicists to help navigate where this technological advance may take us has been identified by some (Z. Khisamova et al., 2019; Z. I. Khisamova & Begishev, 2019b; Zarina I. Khisamova et al., 2019).

As a scientific area, AI gained importance after World War II. This happened thanks to the merits of scientists such as A. Turing, W. McCallock and W. Pitts.

Based on the conducted theoretical studies, as well as practical developments in the field of imitation of a number of simple intellectual functions, many scientists came to the conclusion that AI development is quite simple, and in the near future "thinking machines" will function next to a person.

Objective

The research presents a thorough study of the term "artificial intelligence" and the meanings of its concept, which exist in the scientific literature.

Material and Methods

Artificial intelligence is a modern technological discipline that explores and develops hypotheses, strategies, technologies, and application systems to replicate human intelligence's extension and expansion. The objective of artificial intelligence research is to allow machines to perform some complex tasks that involve the completion of intelligent humans. The article materials were the provisions of Russian legislation, as well as the results of theoretical studies in the field of artificial intelligence creation and application.

The methodological basis of the study is a set of scientific knowledge methods, including abstract-logical, dialectical method, the method of scientific generalization, content analysis, comparison and correlation analysis.

Results and Discussion

The founder of AI theory is an outstanding English mathematician, cryptographer, the member of the Royal Society of London A. Turing, who wrote the article "Computing machines and mind" and put forward the thesis that machines, as well as people, are able to use available information, as well as intelligence, to solve problems and make decisions (Turing, 1950). He was one of the first researchers who considered it is possible to create a full-fledged artificial imitation of human intelligence. Besides, he described a test that allows you to determine when machines will be able to equal a person (Rockwell, 2017). The indicated approach

proposed by the scientist was criticized by philosophers, but the methodology nevertheless predetermined the pragmatic approach used for AI so far.

American scientists - the neurophysiologist and one of the founders of cybernetics, W. McCallock (McCulloch, 2016) and neuro-linguist, logician and mathematician W. Pitts (Pitts, 1942) were the first who proposed a mathematical model artificial neural network in their joint scientific work "The logical calculus of ideas related to nervous activity" (McCulloch & Pitts, 1990). The results of this scientific research laid the foundations for the development of AI and the revolutionary idea of the human brain as a computer.

The term "Artificial Intelligence" (AI) was first proposed by an American computer scientist, THE member of the National Academy of Sciences of the United States of America, A. Turing Prize winner J. McCarthy at the Dartmouth Seminar - THE scientific conference on AI, organized in 1956 at the university of the same name. M. Minsky, K. Shannon, N. Rochester and other researchers were among the scientists who accepted the agreement on the approval of the new name for this field and agreed on the above term (McCarthy et al., 2006).

At the present stage, AI research is also far from complete. They still discuss the issue regarding the definition of "intelligence" concept, its composition, as well as the main mechanisms, are not clearly indicated. Research in the field of AI is being conducted quite actively, but there is no unequivocal judgment by researchers regarding the possibility of AI development capable of realizing the functions of human intelligence. Accordingly, the following issue remains open: whether machine-based imitation of human intelligence is possible.

It should be noted that the very concept of "artificial intelligence" has a significant number of definitions and interpretations in the literature. This state of affairs has led scientists to interpret the concept in different ways.

According to one of the definitions, AI is the science and technology that includes a set of tools that allow a computer, based on accumulated knowledge, to provide answers to questions and formulate expert conclusions on their basis, that is, to obtain knowledge not invested in it by developers (Yuri, 2020). In the framework of another definition, AI is a learning-capable mathematical model created according to the human brain (Doroganov & Baumgarten, 2013).

Other authors of AI define the ways a system is able to solve complex problems rationally or take appropriate actions to achieve their goals, regardless of conditions (Morhat, 2018). At the same time, the application scope of these systems, their field of activity (the outside world, the information and telecommunication network "Internet", a limited spatial area) are not specified. Besides, it is unlikely to determine "artificial intelligence" reasonably and so broadly. A similar level of abstraction will establish the properties of "artificial intelligence" in many household appliances, which clearly does not correspond to the essence of "artificial intelligence" described above.

A number of researchers define "artificial intelligence" as a computerized system whose behaviour is associated with the presence of reason (Searle, 1980).

According to others, "artificial intelligence" is a system that is capable of solving certain problems posed to it and can perform certain actions to solve the abovementioned problems. Moreover, the conditions under which "artificial intelligence" operates are irrelevant.

R. Kurzweil believes that AI is the prerogative of machines that require the presence of intellectual abilities during their implementation by humans (Kurzweil et al., 1990). However, in this case, a textual construction causes uncertainty (they require the availability of intellectual abilities), since any, even the most elementary action per se can be regarded as the manifestation of intelligence.

P.G. Winston, in turn, considers AI a computing machine that has the ability to "do things that seem reasonable to people" (Winston & Brown, 1984). R. Bellmann considers "artificial intelligence" through the prism of "automation of actions" concept, the group of which includes "decision making, problem solution, and training" (Bellman, 1978). A. Andrew positions "artificial intelligence" as a computer that is capable of "intelligent behaviour" (Andrew, 1991). A similar point of view was expressed by J. Slagle, who believes that heuristic programming is the basis of "artificial intelligence" (Slagle, 1971). In general, we support these positions, but with the caveat, referring these definitions to the essence of a weak AI.

L.S. Bolotova defines "artificial intelligence" in the form of an artificial computer system capable of human intelligence simulation: such a system has the ability to receive, process and store information and knowledge, and is also able to carry out various actions on them, which represent thinking (Bolotova, 2012). We are inclined to regard this definition as very successful since it quite

accurately reflects the characteristics of human cognitive mechanisms.

The position by V.S. Doroganova and M.I. Baumgarten is also interesting, which indicates the following. “Artificial intelligence” is a mathematical model per se located in a specific technical device. The indicated model is a self-learning model of neural connections capable of perceiving the information of objective reality, processing it, and thus gain new knowledge not invested by developers (Nilsson, 2009), i.e. create the likeness of the human brain. Summarizing, we can say that, unlike the brain of a person of biological origin, AI is a cybernetic formation. Thus, there is a need to clarify some important differences that affect the ability of AI to conscious behaviour.

N. Nielson believes that “artificial intelligence” is an activity that makes computers reasonable. According to the author, “artificial intelligence” can be considered both an anthropogenic product capable of intellectual behaviour and a machine capable of performing such actions that usually require the presence of human intelligence (Nilsson & Nilsson, 1998).

Along with the term “artificial intelligence”, the concept of “artificial superintelligence” is also used. This term is found in the studies (Good, 1966; Bostrom, 2003; Yampolskiy, 2020). The first scientist believes that “artificial superintelligence” is able to surpass the intelligence of any most intelligent person several times. The second author notes that the “supermind” is an intellect that far surpasses the cognitive capabilities of a person in almost all areas. In his opinion, the “collective supermind” is positioned as an integral system, including a large number of lower-level intellects. The organization of the integral system under consideration is such that its performance significantly exceeds any other cognitive system.

Webster's new international English encyclopedic dictionary includes four definitions of the concept under consideration, in which "artificial intelligence":

- the idea that machines can be subjected to such an improvement that they will be able to perform the functions inherent in the human mind;
- a tool which allows expanding the capabilities of human intelligence through the use of a computer;
- a trend in computer science related to the development of computers that are capable of carrying out cognitive processes inherent in a man;
- the science of technical methods for more efficient use of computers based on advanced programming techniques (Stephenson Smith, 2003).

Also, a number of approaches to the definition of "artificial intelligence" takes place in the works by S. Russell and P. Norwig. In the first of these, the authors take human thinking as the basis, in accordance with which AI should be created and developed, acquiring the ability to think, learn, etc. The basis of the second approach is human behaviour. According to this approach, “artificial intelligence” must be capable of the actions the implementation of which requires reason. The basis of the third and fourth approaches is rational thinking and rational behaviour, respectively (Russell & Norvig, 2002).

E. Cheludakis considers “artificial intelligence” as a set of systems that are capable of perceiving the world around them, on the basis of which they can carry out a number of different actions independently and unpredictably (Chelioudakis, 2017).

M. Delvo believes that the unit of “artificial intelligence” is a cybernetic object, which is characterized by the indicated intellect acquiring autonomy through the sensors making the exchange with the environment. The indicated object can analyze the obtained data and operate with it. It is capable of self-learning, has physical support, and is also capable of its behaviour adaptation to the environment (Delvaux, 2016).

There is a wider classification. Thus, according to the report of the Cybercrime Observatory at Australian National University, artificial intelligence is divided into three categories: Weak AI, Medium AI, and Strong AI (Broadhurst et al., 2017).

According to the arguments of Australian scientists, the first two elements of the abovementioned classification have a limited set of functions and a strictly defined purpose. Their focus is to obtain, accumulate and search for information based on user requests. In the abovementioned report, such types of AI are represented by many objects that a person uses everywhere (for example, the voice assistants of digital devices). The distinction between Weak AI and Medium AI is based on human interaction effectiveness, the speed of decision-making and communication comfort.

It should be noted that Strong AI has significant differences, which is capable of self-learning and autonomous, conscious-volitional behaviour. The indicated ability, in our opinion, can become the most important sign, since the possibility of self-

learning involves independent, autonomous identification of new knowledge based on the ability to perceive, process, accumulate and use information from the outside world.

The issue regarding the decision-making mechanism of "artificial intelligence" is also interesting. The specified mechanism was justified by M.T. Jones, who believes that AI initially perceives the random current solution without its effectiveness evaluation to find an optimal solution, after which it studies the primary random solution to determine its effectiveness to solve the problem. The result is the original solution, devoid of the primary flaws (Jones, 2004).

Until recently, there was no definition of the term "artificial intelligence" in the current Russian legislation. Now this concept is enshrined in the National Strategy for the Development of Artificial Intelligence during the period up to 2030 and is defined as "a complex of technological solutions that allow human cognitive function simulation (including self-learning and finding solutions without a predetermined algorithm) and obtaining results that are comparable with specific task performance, with the results of human intellectual activity at least" (Dneprovskaya & Abramitov, 2020; Sukhodolov et al., 2020).

The analysis of the quoted definition allows us to identify the following essential properties and the signs of AI:
1. imitation of human cognitive functions;
2. self-education;
3. search for solutions without a predetermined algorithm;
4. comparability of AI and people intellectual activity results.

It should be noted that the National Strategy emphasizes that "a complex of technological solutions includes information and telecommunication infrastructure, software (including the ones which use machine learning methods), processes and services for data processing".

A similar definition of AI is provided in the legal scientific literature. So, researchers argue that AI is an "autonomous intelligent system with the ability to conscious volitional behaviour, self-learning and self-control, simulating the activity of neural networks and synapses of the human brain through the accumulation, study and use of information, which has a material expression in technical devices - AI units" (Begishev et al., 2020).

Conclusion

In general, based on the generalization of the abovementioned definitions, it is possible to ascertain the consensus reached regarding the ability of AI to self-learning, acting without a pre-established algorithm, and to decision-making autonomy.

Thus, nowadays, several approaches to the interpretation of "artificial intelligence" definition have been developed. At the same time, despite a wide range of studies on the interpretation, various areas of application, as well as the legal aspects of "artificial intelligence" concept, the unexplored horizons of this definition are quite wide. For this reason, the level of interest in the multidimensional consideration and analysis of the term "artificial intelligence" is quite high, which allows us to talk about fairly broad prospects for legal approach development to its study.

Thus, it can be said with sufficient certainty that there are many ways to describe AI: by action mechanism, the basic principles of work, the spectrum of tasks to be solved, etc. However, in our opinion, the most convincing and consistent position of those scientists who are inclined to describe the AI phenomenon by its essential properties and sign designation (the ability to reason and control, legal understanding and legal awareness, training and development, the autonomy of activity and decision making, etc.).

Moreover, all these properties and signs determine significant difficulties in the criminological forecasting of AI behaviour to one degree or another, which seems especially significant from the point of view of legal science, since it allows us to consider AI as a full-fledged subject of legal relations (I. R. Begishev, 2020; Ildar R. Begishev & Khisamova, 2018; Z. I. Khisamova & Begishev, 2019a).

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