

Theoretical And Technological Aspects Of Intelligent Systems: Problems Of Artificial Intelligence

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Summary

The article discusses approaches to the definition and understanding of artificial intelligence, research directions in the field of artificial intelligence; artificial intelligence in the anthropological dimension; the importance of the systems approach as a methodological basis for the design of intelligent systems; structural and functional components of intelligent systems; intelligent systems in the technological aspect; problems and prospects of relations in the system "man - intellectual system".

Key words:

information technology, intelligent systems, Artificial Intelligence, technological aspects.

1. Introduction

The idea of artificial intelligence originated and found its reflection in the works of ancient Greek philosophers. Aristotle defined the laws of irrefutable reasoning: the law (prohibitions) of contradiction, the law of the excluded third. The law of [prohibition of] contradiction sounds like this: "it is impossible to exist and not to exist together", or "it is impossible to speak correctly, together affirming and denying something." Aristotle formulated the laws that determine the rational part of thinking, and also developed an unformalized system of syllogisms to test the correctness of reasoning. The system made it possible to come to logical conclusions mechanically, in the presence of the initially existing prerequisites[1].

In the 21st century, intelligent systems are actively dynamically enter a person's life. Intelligent systems are applied a person in all spheres of his life, while significantly changing his living conditions. It is impossible to imagine a person outside technosphere, the decisive factor of which is human activity, and the world

of technology created by man is a necessary condition for life.

If in the 30s of the XX century. A. Turing introduced the world to an abstract computing machine to formalize the concept of an algorithm, then after a few decades, intelligent systems have become an integral part the lives of most people. Intelligent systems based on modern technologies (sensory, informational, genetic, nano-, biotechnology) not only change the world around a person, but also make corrections in nature for a person, ensuring the development of his adaptive abilities to changing living conditions, open up new opportunities for full-fledged, comfortable living by a person of his own life.

Intelligent systems belong to the category of information computing systems with the necessary knowledge base, an algorithm of actions, intellectual support (software and instrumentation, algorithmic and mathematical support), as a result of which the system is able to work without the help of a specialist operator responsible for making decisions about an action. A distinctive feature of intelligent systems is the presence of a database necessary for solving problems of various kinds of complexity - selection, acceptance, execution of decisions.

Currently, the group of W. Bainbridge (USA) substantiated the need for interdisciplinary research, integration of technologies - NBIC convergence, which sets a new vector of scientific and technological development of society [1-3].

However, many researchers - psychologists, educators - note that the introduction of intelligent systems also has negative characteristics (for example, cyber dependence), under the influence of intelligent systems, a different type of personality is formed - a person of the cyber world, a person of the network community, alienated

from the real world, living in a virtual world. Intelligent systems have given rise to such problems as the problem of the security of a person's private life, the problem of ensuring his information security.

Based on the above, we can conclude about the relevance of the study of theoretical and technological aspects of intelligent systems [4].

In order to understand the essence of the problem under study, it is necessary to update knowledge in the field of philosophy, systems theory, artificial intelligence and intelligent systems, which constitutes the theoretical and practical content of the research topic. In this regard, the interest in the works of philosophers and scientists who have contributed to the understanding of the above-named phenomena is justified. In understanding the essence of the problem under study, the works of philosophers are important - Aristotle, G. Leibniz, R. Descartes, I. Kant, G. Hegel, etc.

The purpose of the article is to analyze the theoretical and technological aspects of intelligent systems.

2. Theoretical Consideration

At present, scientists have actualized the problem of integrating technologies, directions of their development, otherwise NBIC-convergence, designated by the group of W. Bainbridge (USA) in 2003. NBIC-convergence is a synthesis of information, cognitive, nano-, biotechnologies, which today vector of scientific, technical, socio-economic development of society.

NBIC convergence fixes attention on the most important feature of the development of scientific and technical knowledge, which manifests itself in interdisciplinarity, interaction, interconnection, complexity of methods for studying the brain, intelligence, the main of which is the method of computer modeling. Information technologies act in this case as metatechnologies, algorithmic design, development of other technologies[7]. The technologies developed by man not only change the world around man, but also make corrections to nature for man, ensure greater adaptability of people to their modern living conditions. Achievements of science, technologization of human life determine new approaches in the system of relationships "person-environment", open previously unknown opportunities and ways not so much of survival, but of full, high-quality, comfortable living by a person of his own life, changes living conditions of homo sapiens.

Modern technologies sensory, informational, genetic, nano-, biotechnology, the development of artificial intelligence systems, etc.) provide a person with tools for transforming the nature of the person himself, his adaptation mechanisms. The study of biological systems has brought the development of nanostructures to a different level, that is, objects of nanoscale and mutually

located (for example, DNA). Nanotechnology in medicine provides in the future the possibility of controlling molecular-level processes in living organisms [5].

The development of cognitology in conjunction with information, nano-, biotechnology, scientists interpret as a point of growth, a breakthrough in science. This area of research significantly expands the possibilities in the study of the brain, neurons, neuro-silicone interfaces "brain-computer". Research results open up prospects for connecting a computer to the human brain, without using traditionally sensory channels [6].

The use of various types of modern technologies, as a result, transforms the physicality of a person. Considering the problems of artificial intelligence from this perspective provides its anthropological dimension.

With the help of technical, artificially created devices, a person solves the problems of survival, adaptation to the living environment, improving the quality of life, but at the same time the artificial world is also subject to constant modifications, therefore the processes of improvement of both man and technology are interconnected, interdependent, interdependent. Artificial intelligence and intelligent systems have a multifaceted effect on a person, moreover, the influence has - a techno-, bio-, social nature. As a result of the active introduction of technologies into the life of a modern person, the problem of the prospects of the technogenic vector of human development naturally rises, and possible options for the interaction of man and technology are being investigated:

- transformation of the intelligence bio-carrier - the human brain of the head;
- erasing the differences between man and computer, Homo Computer;
- regeneration, renewal of the functions of the brain in the process of its evolution;
- strengthening of the duality of nature and the formation of biotechnogenic man;
- the growing influence of technogenic components based on advanced artificial intelligence;
- "splicing" with the machine through the introduction of mechanical, electronic (microchips that control the functions of the body), technical elements and systems in human organs;
- improvement of human adaptive mechanisms necessary in the conditions of technological progress;
- the biological nature of man is supplemented or replaced by an artificial one;
- deployment of eco-civilization;
- posthuman stage of civilization with cyborgs.
- creation of inorganic carriers of intelligence [8].

J. Naisbitt writes about the problems arising in humans with the use of new technologies. The developed countries, where the problem of humanism, acceptance and rejection of modern technologies, which, according to J. Naisbitt,

unceremoniously invade the lives of people, separating them, has been classified as a zone poisoned by technology.

The practical aspects of technologization, their analysis, allowed Byrd Kiwi to identify the problem associated with the human right to choose modern technologies and the way to use them in their own life.

The problem of human interaction with the products of artificial intellectualization is particularly relevant. E. Toffler in his works "Futuroshok", "Third Wave" substantiated the high dynamics of changes in all parameters of human life due to the development of information technologies [10].

But, having spawned artificial intelligence, man was puzzled by the search for ways to exist in the technological world.

Robotization is becoming one of the ways of human existence. "Robot" means humanlike, with possible resemblance to humans, but fundamentally necessary intellectual similarities. An interesting historical fact. In 1928, engineer Richards (England) constructed a mechanical human robot, which he named "Eric". Robot Eric knew how to move, talk, answering more than fifty questions. The robot was made of aluminum, with the letters "R.U.R." engraved on its chest, meaning "Rossumovi Univerzální Roboti", which means "Rossum universal robots". This was the name of the play by K. Chapek (1920), with which, as many researchers believe, the word "robot" began to gain popularity. The finale of the play - robots attacked people and destroyed them, taking the place of people on Earth [11].

In the development of robotics, as evidenced by research results, the emphasis is not on external similarity, but on intellectual similarity with its constant expansion and deepening of the ability to make decisions taking into account the set of information and methods of action. A robot is understood as a machine with many functions similar to human behavior and thinking. Therefore, the material shell, configuration, forms are secondary to content, determined by content and planned functions. Experts in the field of robotics believe that the dynamics of robotization directly depends on the achievements of science, technology, their technological component. Depending on the functions performed, expert robots, information robots, a robotic manipulator, mobile (with the functions of movement in space) robots and others have been created. Today robots are widely represented in various spheres of human life. These are: industrial, transport, military, medical (for example, the PUMA-560 robot operating on the brain), household, biorobots, research robots. A robot as a machine with many processors can and is called upon to perform individual actions better and better than a person, but it is only a transformer of data (knowledge, actions, etc.) embedded in it by a person.

The danger that scientists warn about is sometimes associated with an easy readiness of people to become biorobots, to lose the specificity of homo sapiens to have a body identical to a person, only instead of a brain there is a factory microprocessor. The widespread development of biotechnology and, on their basis, the improvement of human nature has, in our opinion, a contradictory character. On the one hand, it is thanks to biotechnology that the human body receives compensatory capabilities with existing psychophysiological problems. On the other hand, belonging to homo sapiens requires constant improvement, and the attitude to "live easier", it is clear, like robots, leads to the loss achieved by man throughout the history of existence [12].

NBIC convergence sets the anthropological vector for the development of science and technology associated with changes in the qualitative characteristics of human life - improving health, increasing life expectancy, increasing the level of vitality, etc.

NBIC convergence contributes to the departure from the knowledge of the world from the standpoint of classical rationality, from understanding the natural and the artificial, living and inanimate as opposite phenomena to substantiate the mobility of differences, boundaries.

Russell S., Norvig P., discussing the prospects for research in the field of artificial intelligence, pay attention to the ethical component:

- intelligent machines will be used for good or for evil;
- the responsibility of scientists, developers of artificial intelligence for the results of the applicability of their inventions and discoveries;
- the problem of the breadth of influence of artificial intelligence on life in general and success in human life;
- the problem of improving the quality of everyday life of broad strata of the world's population on the basis of the use of artificial intelligence, similar to the effect that communication means - cellular, Internet - had on a person;
- the problem of using personal intellectual assistants in home and office conditions and monitoring the quality of everyday life, its economic component;
- the emergence of artificial intelligence is an order of magnitude higher than human intelligence leads to the problem of the future of human civilization;
- a threat to life, the problem of human survival, his self-determination and freedom.

Russell S., Norvig P., examining the trends in the development of artificial intelligence, pay attention to the similarity of scenarios for the development of artificial intelligence with other radical discoveries, for example, engineering, telephony, printing, etc. The scenario is more pessimistic than optimistic, as in scientific - science fiction novels. Perhaps, according to Russell S. and Norvig P., this makes it possible to unfold a more exciting, exciting,

intense plot, where obvious negative consequences that outweigh the possible constructive, but not obvious to the contemporary, options for the development of events [13,14].

M. Castells believes that there are no spatial and temporal boundaries for an information resource, thanks to a sharp leap in the development and application of network structures in the daily life of a modern person, the logic of the network extends to all spheres of life - culture, production, communications, education, etc.

The problem of temporal tension, constant lack of time is acute. T.H. Eriksen writes about this. He believes that modern, on the one hand, time-saving technologies (e-mail, cellular communications, etc.), on the other hand, the density of life, lack of time, the lack of the ability to comprehend what is happening.

It should be concluded that the problem of the influence of artificial intelligence on human life has not yet been sufficiently studied, moreover, it requires deep philosophical understanding.

Conclusions

In the article, research was carried out on philosophical concepts, theories of artificial intelligence, approaches to the definition and understanding of artificial intelligence. to conclude that there is no consensus on what "artificial intelligence" is, since there is no clear fixation of the characteristics of the human mind, an unambiguous understanding of natural intelligence, which also gives rise to the problem definitions of artificial intelligence.

Despite the difference in approaches, one can also distinguish common features that are characteristic of many approaches. The common thing is that artificial intelligence is a system that imitates the process of solving by a person various tasks of his life, the performance of intellectual functions of a person, capable of solving tasks of different levels of complexity in a similar way, but differently than a person.

The main directions of artificial intelligence were studied; their essential characteristics were revealed:

- heuristic (informational) - the development of programs for intelligent systems that solve computational problems;
- bionic - the study of the processes of human mental activity in solving problems, the construction of a network of artificial neurons inherent in the human nervous system;
- evolutionary - the creation, "cultivation" of intellectual programs capable of self-learning.

It has been established that the vector of research in the field of artificial intelligence is aimed at developing methods of formalization, generalization, classification, knowledge representation; study and formalization of reasoning, their modeling; the study of communication, the specifics of the dialogue between the intellectual system and the person;

development of algorithms for the operation of computer technology and training of intelligent systems.

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