APPLICATION OF ARTIFICIAL INTELLIGENCE IN SCIENCE AND TECHNOLOGY

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Abstract. *Artificial intelligence (AI) is playing an increasingly important role in the modern world. It is capable of processing and analyzing huge amounts of data faster and more accurately than humans, making it an indispensable tool for many industries and sciences. In medicine, for example, AI can help diagnose diseases and develop personalized treatments. In finance, it is used to analyze market trends and forecast performance. And this is just the beginning - as technology advances, AI will play an even more significant role in our society.*

Keywords: *artificial intelligence, diagnostics, robotics, machine learning, theory of computing.*

Artificial intelligence (AI) is a branch of computer science that deals with cognitive tasks typically reserved for human intelligence, such as learning, problem solving, and pattern recognition. Artificial intelligence is often associated with robotics and science fiction, but in fact it has long gone beyond science fiction films. Today, artificial intelligence is part of advanced computer technologies. One of the outstanding scientists in this field is Professor Pedro Domingos. He identified five groups of scientists who contribute to the development of machine learning: symbolists, whose field originates in logic and philosophy; connectionists, who draw on neuroscience; evolutionists who develop methods of evolutionary biology; Bayesians, who apply mathematical statistics and probability theory; and analogues, whose research is based on psychology. In recent years, advances in statistical computing have led to further developments in artificial intelligence in a number of areas collectively referred to as “machine learning.” Likewise, advances in neural networks have led to the development of an additional field called deep learning. Machine learning and deep learning are two areas of computer technology that originated from the research of artificial intelligence.

Intelligence (lat. Intellectus - sensation, perception, understanding, understanding, concept, reason), or mind - the quality of the psyche, consisting of the ability to adapt to new situations, the ability to learn and remember based on experience, understand and apply abstract concepts and use one’s knowledge for environmental management.

Intelligence is the general ability to cognition and solve difficulties, which unites all human cognitive abilities - sensation, perception, memory, representation, thinking, imagination.

In the early 1980s. Computational scientists Barr and Fajgenbaum proposed the following definition of artificial intelligence (AI):

Later, a number of algorithms and software systems began to be classified as AI, the distinctive property of which is that they can solve some problems in the same way as a person thinking about their solution would do.

The main properties of AI are understanding language, learning and the ability to think and, importantly, act.

An AI complex of related technologies and processes that are developing qualitatively and rapidly, for example.

Natural language text processing
Machine learning
Expert systems
Virtual agents (chatbots and virtual assistants)
Recommendation systems

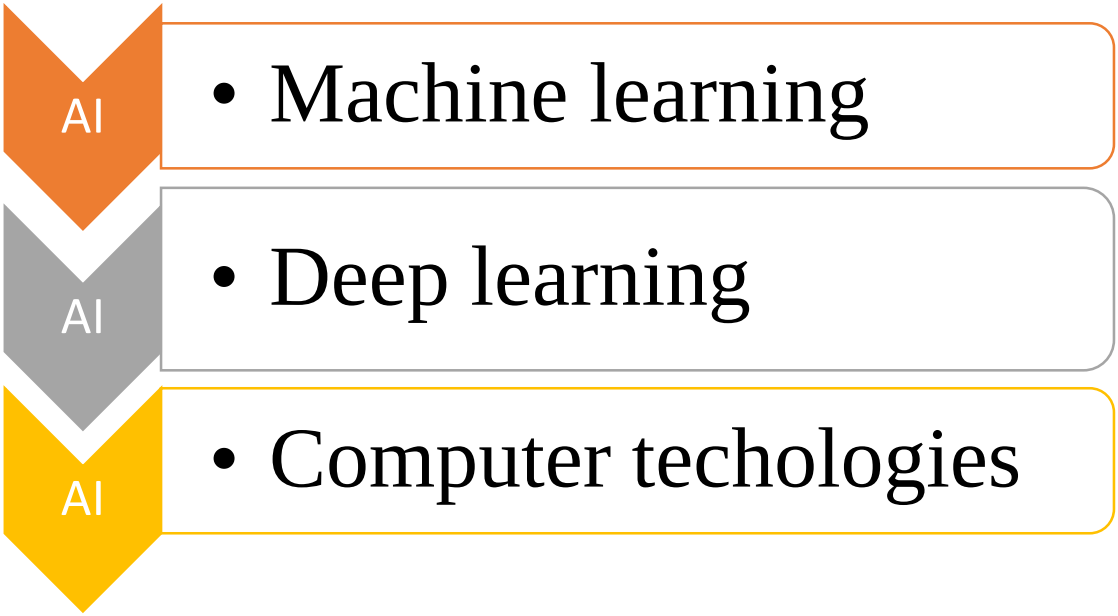

Figure 1. Artificial intelligence divisions

In general, a lot of new technologies have appeared on the "hype curve" of artificial intelligence, and a significant proportion of them are marked with blue circles, indicating that Gartner hopes that they will soon reach a productivity plateau. Moreover, many of them received a forecast of "two to five years before implementation," while still climbing to the peak of hope. However, as analysts simultaneously note, not all new technologies have clear applications and can benefit businesses. And we must try to take a realistic approach to forecasts and analysis of implementation prospects. One way or another, analysts advise companies that want to keep up with the times to at least prepare a financial and economic justification for the implementation of AI. And those who have already carried out initial implementations should think about scaling projects.

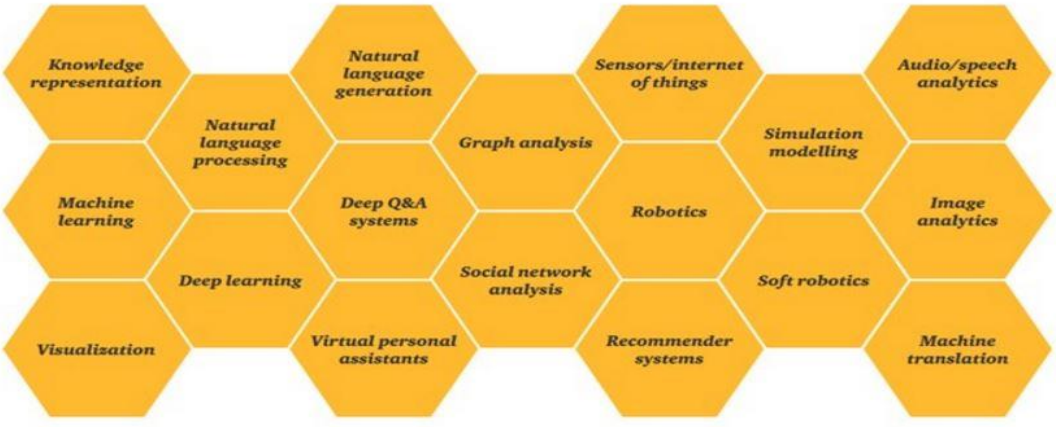

Figure 2. Methods of analysis. Machine learning

Broadly speaking, these approaches are divided into “guided” and “voluntary” learning. In the first case, data with a given result is used, and in the second, without it.

Blue chip AI.

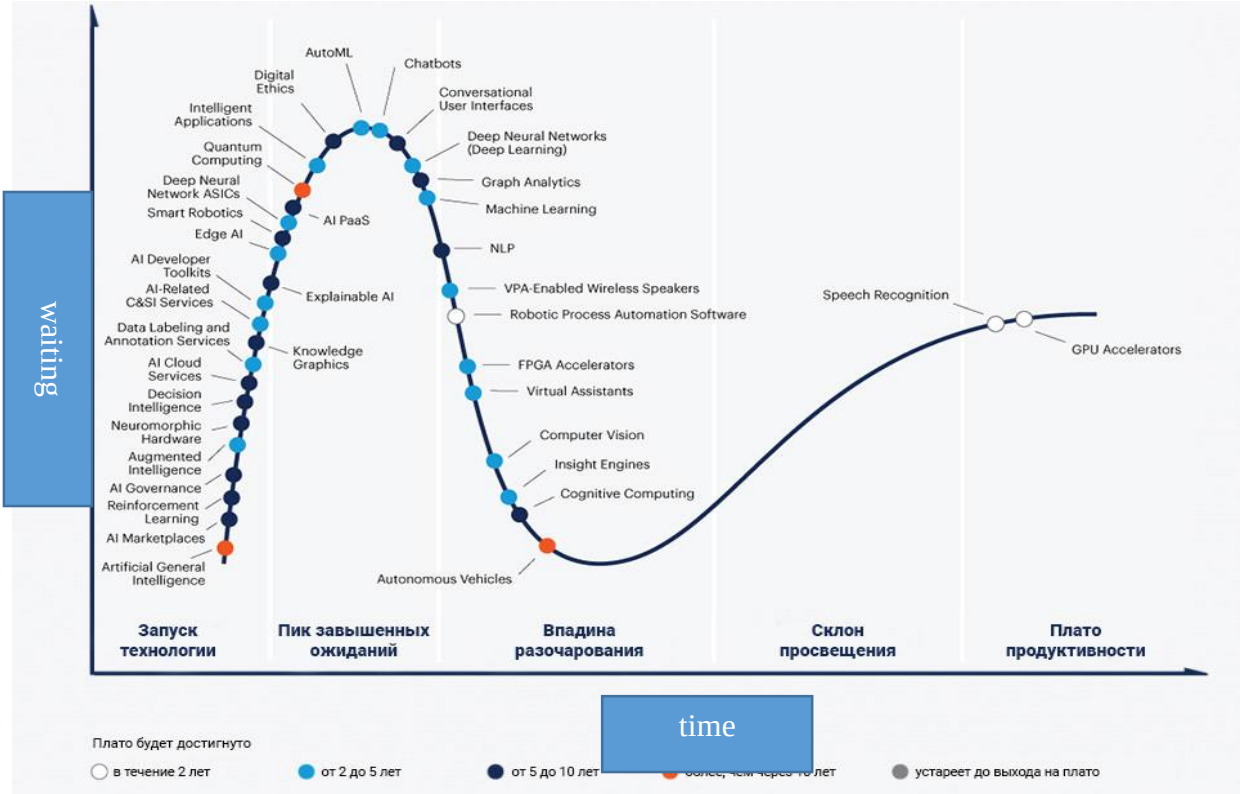

Figure 3. Gartner curve for artificial intelligence

Every day, companies produce data for machine learning and deep learning systems, and as the volume of data increases, AI becomes smarter and develops faster and faster. Data is pulled from repositories such as Amazon Redshift, collected using crowdsourcing platforms such as Mechanical Turk, or dynamically loaded using Kinesis Streams. In addition, with the development of the Internet of Things and sensor technologies, data that was previously virtually untapped is now available for analysis, and its volume is increasing exponentially.

Machine learning usually refers to analysis methods based on Bayesian theory that are used for pattern recognition and learning. At the heart of machine learning is a set of algorithms that use provided data to learn and make predictions, optimize a utility function under uncertainty, recognize hidden structures in data, and classify data into concise descriptions. Machine learning is often used in cases where the use of precise software algorithms does not provide sufficient flexibility or is ineffective. Conventional computer code processes input data according to an algorithm designed by the developer and returns an appropriate response. A machine learning system analyzes input data to find patterns and creates statistical code (machine learning model) that returns the “correct output” based on previous input data (as well as output data in the case of supervised learning). The accuracy of a machine learning model largely depends on the quality and quantity of data accumulated over time.

Using quality data, the model can analyze multidimensional problems with billions of possible options and find the optimal function that, given the input data, will predict the correct value. Typically, machine learning models predict the answer with statistical confidence and are quite reliable. Such evaluation metrics should be considered when deciding whether to use machine learning models or any individual forecasting.

Using machine learning in science and technology

Machine learning is often used to predict outcomes based on historical data. For example, students can use machine learning to predict the volume of laboratory research or the amount of data they need to fill out tables, graphs or coursework in which data analysis appears that affects the improvement of the level of quality of products, services or other characteristics in the coming quarter. based on information about the demographic situation or evaluate which ones to become most loyal to based on projected data. Such forecasts allow you to make more effective decisions, improve product quality and reduce costs.

Successful implementation of machine learning technologies consists of several steps. First of all, it is necessary to determine what problem the system should solve, i.e. what forecasts can be useful for students or the department as a whole. Then you need to collect historical data based on indicators (data, research, etc.). This data will be used to build a machine learning model. The machine learning model will then make predictions that can be used to make more informed decisions. In conclusion, it can be noted that artificial intelligence is playing an increasingly important role in the modern world, and its potential is still far from being reached. However, it is necessary to take into account the ethical and social aspects of its use in order to ensure the security and protection of data, as well as to minimize possible negative consequences. It is also important to develop education and training in the field of AI to ensure the sustainable development of this technology.

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