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The Development of Artificial Intelligence and Generative Models as a Modern Cross-disciplinary Civilizational Challenge at the Beginning of the 21st Century

Abstract. *This article attempts to analyze the role and place of generative algorithms and artificial intelligence in modern society, and to identify and predict possible problems and prospects, while suggesting various ways to solve them. The focus is made on the key stages of neural networks development and current international and governmental policy in the field of development and regulation of this branch of knowledge.*

Keywords: *artificial intelligence; machine learning; higher education; technological progress; algorithms; educational environment; neural network development; Chat-GPT.*

Currently, the topic of the development of generative algorithms and artificial intelligence is becoming more and more relevant every day. In the second half of 2022 the global technology community was stirred up by the announcement of the company “OpenAI”. We are talking about the release of “ChatGPT”, or rather about the version of “GPT 3.5”. Following this event, a number of well-known companies, including Microsoft and Baidu, made a statement about the development of alternative chatbots based on artificial intelligence, and soon some students managed to defend their final qualifying papers written with the help of the chatbot mentioned earlier.

All this could not remain without attention for long, and the highest officials of the Russian Federation soon made relevant statements. The Minister of Science and Higher Education V. N. Falkov stated: “There should be no negative consequences for a university graduate who wrote a diploma using the ChatGPT bot” [18]. The leader of the New People party A. G. Nechaev spoke out against the ban of neural networks for schoolchildren and students. Instead, he offered to teach young people promising and highly paid professions [12], the university itself also gave comments in connection with the incident: “The RSUH responded to the incident with a proposal to restrict access to the chatbot “ChatGPT” in educational organizations. The university considered that such a practice could negatively affect the learning process” [15].

These quotes indicate that today there are radically opposite judgments. The active discussion of this topic creates a precedent both for researchers and specialists in the field of artificial intelligence and machine learning, and for “negligent” students using various services for writing academic papers and bypassing the relevant checks. Summarizing, it is worth highlighting the following aspect: “the growing information openness of the higher education system, the powerful reputational influence of “world universities” and various communication platforms used both for the direct provision of educational services and the formation of network communities, the promotion of certain “civic initiatives” [1, p. 11], has an impact on the vector of development of the educational and technological sphere. The stated problems obviously require more detailed study and analysis. To do this, it is necessary to refer to the sources where we will briefly trace the genesis of AI (artificial intelligence) and especially focus on the impact of generative technologies on modern education. The concepts (Narrow AI & AGI (“general artificial intelligence”) – evolution from a limited AI, unable to solve problems without human participation, to virtually complete autonomy and solving any problems [5, p. 41] – arise in the primary way.

Back in 1950, one of the apologists of computing, Alan Turing, wrote an article entitled “Can a machine think?”. In this paper the scientist described an algorithm by which it will be possible to determine the stage at which the line between a machine and a person will be “erased”. The official definition of artificial intelligence appeared in 1956. At a seminar held in the USA, John McCarthy formulated the following definition: “Artificial intelligence is the property of artificial intelligent systems to perform creative functions that are traditionally considered the prerogative of man” [20, p. 47]. In 1960 the Soviet Union began to carry out work in the field of artificial intelligence and computers. So D. A. Pospelov was at the head

of two international projects, namely (“LIVS” – logical information computing system) and (“PAMIR” – Parallel architecture. Microelectronics. Intelligent solver). At the final stage, on September 10, 1986, the Scientific Council on Artificial Intelligence was established at the Presidium of the USSR Academy of Sciences, which was chaired by G. S. Pospelov. In the future this scientific council played a significant role in the development of artificial intelligence in the USSR and Russia.

The most important stage in the modern history of the development of generative algorithms and neural networks in Russia was the meeting on the development of the digital economy, held on May 30, 2019, chaired by Vladimir Putin. During the meeting, it was decided to prepare a federal program and allocate about 90 billion rubles for its implementation. On October 10, 2019, Vladimir Putin approved the national strategy for the development of artificial intelligence in Russia until 2030, and in 2020 the national project “Artificial Intelligence” was approved. It is worth noting that in 2020 the second technological conference on artificial intelligence (“AI Journey”) was held, which entered the top 3 similar events in the world. The conference was attended by more than 20 thousand people from 80 countries in the online format [10]. It is also worth mentioning the domestic neural network “Balaboba”, created by Yandex on the language model “YaLM” (Yet another Language Model). The tasks of this neural network is to generate each subsequent word in a sentence – “to make the text coherent and grammatically correct, during training, the model evaluates each predicted word” [4], on June 23, 2022, Yandex published “YaLM 100B” in the public domain – this is the first case publications of the GPT-like network are publicly available, however, thanks to this, researchers from different countries can use this product and develop their own developments [19].

The United States also has a long-standing interest and high activity in the field of machine learning and neural network development. Thus, the American research laboratory “OpenAI”, which was organized in 2015, attracted huge attention and interest from not only technology giants, but also from users. The reason for this was the creation of a generative language model “ChatGPT” in the version “GPT 3.5”, the company also released a generator of digital images created at the request of the user “DALL-E”. In 2023 Microsoft announced promising multi-year contracts and an investment in Open AI, simultaneously integrating a chatbot into its Bing search service [11].

At the same time, Google, fearing a technological breakthrough of its direct competitor, announced a similar solution, namely the launch of an application built on artificial intelligence “Bard”, limited access to it was introduced in March 2023 [14]. However, this story cannot be put to an end, since after a short OpenAI recently announced GPT-4, and Microsoft has already partially integrated the aforementioned component into its services. It should be noted that in 2019-2020, “artificial intelligence was named the highest national technological priority and the highest budget priority for all authorities of the United States” [13].

Such a review in the civilizational context is impossible without including the position of the PRC on this issue. Thus, a number of analytical materials indicate an increase in funding for research in the field of artificial intelligence [3, p. 22]. At the same time, in 2020,

China banned the free export of AI-related technologies, and in 2022 introduced mandatory labeling of audio-text materials, in which generative algorithms were directly used [16].

Thus, scientific interest in generative algorithms and artificial intelligence arises at a time when the subject of social relations is already realizing today that he is not eternal and not perfect. At the same time, it is appropriate to make the following generalization: “The new media context and new media environments have brought to life a new media reality in which new cultural codes, new tasks and solutions are born” [2, p. 20]. At the same time, interest in artificial intelligence is due to the global transformation of society and the transition to a new technological order. At the same time, speaking about civilizational challenges and the development of a wide variety of complex information systems today, we can describe the corresponding processes of AI development and integration as the passage of a sequence of bifurcation points, and right now in each of which, in some way, spontaneously or consciously, the choice of the further path of system development is predicted and then implemented in practice [7, p. 4].

At the same time, these processes affect not only one specific sphere of life, they become key components in the development of other industries. In particular, we are talking about the educational environment, which has already been forced to change significantly to meet the demands of society, ensuring the continuity of education despite the COVID-19 pandemic. By analogy with information systems, which in turn should be plastic, the educational environment has transformed and become flexible for social needs.

By plasticity, we mean the ability of the system to adapt to user requests and integrate the necessary innovations for its system development. At the same time, we should not forget that in the modern world practically no system process is complete without a political and economic component. The corresponding AI technologies are able to act as a leitmotif and engine of technological progress, however, generative algorithms have a dialectical vulnerability. As such, there is also a human factor, namely, the potential abuse of such tools can pursue a variety of goals. Note that “the Chinese leadership has banned local applications and web services from sending their users to ChatGPT, fearing for their safety” [8]. Today it is worth fearing not only for the safety of users, but also for the uniqueness of text works performed by various subjects of social relations in different fields using AI. The above facts already require the development of an up-to-date set of tools to determine the authorship of the created text material.

The question of generative language models arises in a special way. For example, it will be possible to determine the authorship of a text or its uniqueness using the machine learning system “Anti-Plagiarism”, which will have access to the recently published “YaLM 100B” and, accordingly, gradually learn, understanding the logic of the original text generation. However, using only the YaLM 100B database, it is not possible to solve this problem, since the largest technology companies are developing new tools for using generative algorithms and they probably will not publish them in the public domain, at least for commercial reasons.

At the moment, there are already online services for determining the authorship of the text [6]. Showing in some cases a good result in the field of identifying text written by artificial intelligence, they face considerable difficulties with appropriate verification. To date, developers and users have learned how to train it by setting new text generation algorithms that allow you to bypass the current existing authorship verification modules. At the same time, it should not be excluded that in the future it will be possible to determine the authorship of the text, taking into account all the above-mentioned features. Such a problem directly affects the intellectual security of the country, taking into account the development of neural networks, provided that this problem does not receive a qualitatively new solution.

Already today, a new understanding of the promising potential of AI technologies is gradually being formed. First of all, it is worth paying attention to the field of education and healthcare, thanks to the combination of a developer + artificial intelligence + a qualified healthcare specialist, it is possible to diagnose at an early stage and start the process of treating various diseases. Within the framework of scientific laboratories of higher educational institutions, it is already possible to create expert systems for the diagnosis of diseases in animals and humans [17]. Of course, promising AI technologies will be used in the field of security, this includes both the economic and defense spheres, since they largely ensure the sovereignty of the state.

Summing up, it is worth saying that the field of research of generative algorithms, the place of their application and the dynamics with which they develop is impressive. In the current conditions, it is necessary to note the special role and responsibility of developers in generating new ideas, technologies and methods of their application, since a new stage of technological progress of our civilization and the development of previously unexplored territories of fundamental and applied knowledge depends without exaggeration on the above-mentioned prospects for the development of AI.

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