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The artificial intelligence: Prospects for development and problems of humanization

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Abstract. The research explores the main problems associated with the development and implementation of artificial intelligence technologies in human activities, as well as with the humanization of these technologies. In a broad sense, artificial intelligence is a set of algorithms and software systems that can solve some problems the way a person would do and differ in that they are amenable to learning. An analysis of the problems of introducing artificial intelligence technologies makes it possible to substantiate the main levers of state policy aimed at the development and integrated use of digital intelligent systems. The success of the introduction and dissemination of artificial intelligence technologies largely depends on the effectiveness of state regulation of this sphere, both at the state and supranational levels. The development of machine learning systems must necessarily include an ethical aspect and some restrictions, otherwise the rapid development of intelligent machines can lead to the collapse of human civilization. To avoid such a development of events, it is necessary to create a supranational system for regulating artificial intelligence. Thus, the object of study of this article is the use of artificial intelligence systems in various fields of human activity. The authors use content analysis, systemic, adaptive and synergistic methods. In addition, the authors apply modern statistics, empirical generalization and grouping.

Keywords: artificial intelligence, machine learning, digital economy, robots, AI market, humanization

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Искусственный интеллект: перспективы развития и проблемы гуманизации

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Аннотация. Исследуются основные проблемы, связанные с разработкой и внедрением технологий искусственного интеллекта в деятельность человека, а также гуманизацией этих технологий. В широком смысле искусственный интеллект — это набор алгоритмов и программных комплексов, способных решать некоторые задачи так, как это сделал бы человек, и отличающихся тем, что они поддаются обучению. Анализ проблем внедрения технологий искусственного интеллекта позволяет обосновать основные рычаги государственной политики, направленные на развитие и комплексное использование цифровых интеллектуальных систем. Успех внедрения и распространения технологий искусственного интеллекта во многом зависит от эффективности государственного регулирования данной сферы как на государственном, так и наднациональном уровне. Разработка систем машинного обучения обязательно должна включать в себя этический аспект и некоторые ограничения, иначе бурное развитие интеллектуальных машин может привести к краху человеческой цивилизации. Чтобы избежать такого развития событий, необходимо создать наднациональную систему регулирования искусственного интеллекта. Таким образом, объектом исследования данной статьи является применение систем искусственного интеллекта в различных сферах человеческой деятельности. Авторы используют контент-анализ, системные, адаптивные и синергетические методы. Кроме того, авторы применяют современную статистику, эмпирическое обобщение и группировку.

Ключевые слова: искусственный интеллект, машинное обучение, цифровая экономика, роботы, рынок искусственного интеллекта, гуманизация

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Introduction

Digitalization of all aspects of society continues to gain momentum. Many advanced technologies are already being used by people as a matter of course, without thinking about their nature, complexities, and problems to which they lead. However, many digital technologies are still at the very beginning of their development. This is directly related to such a phenomenon as artificial intelligence (Artificial intelligence — AI). The goal of AI development is to shape complex human behaviour into a form that can be processed by computation. This makes it possible to develop systems designed to perform complex processes and manipulations that are useful to humans.

The popularity of modern AI technologies is explained by the fact that without them the ever-growing amount of information can no longer be processed and effectively used. As a result, AI technologies are rapidly advancing, which in turn is accelerating the digital transformation of society (Fjelland, 2020).

However, the development of artificial intelligence technologies creates for society not only a comfortable environment for human existence, but also creates problems that require immediate solutions. One of them is the problem of humanization of AI technology.

Literature review

Theoretically, the issues of using AI are still poorly developed both in domestic and foreign economic science (Smirnov, Lukyanov, 2019). The origin of AI goes back to the 1950s, when computer science pioneer A. Turing (2016) published a paper speculating that one day machines will think like humans.

Representatives of philosophical science have been actively engaged in AI research since the 70's of the last century, who were looking for an answer to the question of the difference between machine and human intelligence: M.M. Botvinnik (1981), J. Haugeland (1981), J. Weizenbaum (1982), J. Moore (1985).

Currently, there are many approaches to the definition of artificial intelligence: I. Kalyaev (2020), A. Volchok (2021), R. Fjelland (2020). Many works are devoted to the problems of investing in the creation of artificial intelligence systems: K. Matveenkov (2022), E. Tretyakov (2020), E. Larichkin (2020) and others. They emphasize that digital technologies with network structures can transform the development of many sectors of the economy: A. Betke (2019), E. Popkova, A.V. Bogoviz, B.S. Sergi (2021), X. Li, J. He, Y. Huang, X. Liu, J. Dai (2022).

Researchers working professionally in the field of ethics have only recently begun to show interest in the phenomenon of artificial intelligence: S. Sareen, A. Saltelli and K. Rommetveit (2020), M. Grimshaw (2017), J. Morimoto (2022). The Digital Ethics Laboratory at the University of Oxford was even opened. It should be emphasized that the understanding of the relevant issues takes place in conditions when the development of intellectual technologies (as well as digital technologies in general) has reached a level that significantly exceeds the level of thirty years ago. For example, A.V. Razin (2019) the problem of the ethics of artificial intelligence as a field that is not limited

to "the ethical rules for creating intelligent systems necessary for programming", but also includes the ethics of the technical systems of the future: I.V. Markova and D.A. Davydov (2019), R.G. Apresyan (2019).

Despite the variety of publications on various aspects of AI, questions about the humanization of AI systems remain open.

Methodology

To analyse the problems and prospects for the development of AI technologies, let us dwell on their content.

The term "artificial intelligence" itself has undergone a certain rethinking over time. In the early 1980s scientists Barr and Feigenbaum defined AI as a field of computer science that develops intelligent computer systems with capabilities that are traditionally associated with the human mind — language understanding, learning, the ability to reason, solve problems, says the National Strategy for the Development of Artificial Intelligence in Russia (2017)[1].

Referring to the modern interpretation of AI, Academician of the Russian Academy of Sciences, Chairman of the Council for the Priority of Scientific and Technological Development of the Russian Federation I. Kalyaev understands artificial intelligence as a special class of computer systems in which various solutions are found in the process of operation, as "direct" — calculations using mathematical formulas, and "reverse" — the construction of data processing algorithms (Kalyaev, Zaborovsky, 2019).

In the National Strategy for the Development of Artificial Intelligence in the Russian Federation for the period up to 2030, artificial intelligence is defined as a set of technological solutions that allow simulating human cognitive functions, obtaining results that are at least comparable to the results of human intellectual activity (Kalyaev, Zaborovsky, 2019).

In general, in the broadest sense, artificial intelligence is a set of algorithms and software systems that can solve some problems in the same way as a person would do (Kasparyants, 2022) and differ in that they can be trained.

Artificial intelligence uses a set of techniques in mathematics, biology, psychology, cybernetics, and other sciences, with the help of which technologies are created for writing "intelligent" programs and teaching computers to solve problems on their own

AI is based on technologies and processes, including natural language processing (NLP), computer vision (CV), data analysis (Data Science) — said in the National Strategy for the Development of Artificial Intelligence in Russia (2017)[2].

In this article, humanization in the broad sense of the word will be understood as a component of social life and worldview aimed at maximizing the potential of people, considering the unique characteristics of each person in the interests of the whole

[1] National Strategy for the Development of Artificial Intelligence in Russia (2017). Retrieved May 22, 2022, from https://www.tadviser.ru // index.php/

[2] Ibid.

society. Currently, in solving the humanitarian problems of society, AI technologies occupy a leading position from the point of view of optimists. Pessimistic futurists believe that machines capable of learning can lead to the creation of a super-intelligence that will subdue man.

This study analysed domestic and international institutional economic research on the development of artificial intelligence, as well as global macroeconomic trends in the AI market. The authors use content analysis, adaptive and synergetic approaches, and statistical analysis. In addition, the authors apply empirical generalization and grouping to ensure the reliability and representativeness of the results and draw valid conclusions.

Results

To create artificial intelligence, algorithms are used: machine learning (a computer can process data and make decisions), deep learning (artificial neural networks analyse huge amounts of information, determine patterns, model and process input and output signals), natural language processing and generation (data are converted into a natural language that a computer decrypts and gives to a person in the same understandable way) (Volchok, 2021).

AI affects almost all spheres of life. These technologies are used in medicine, healthy lifestyle, manufacturing, education, entertainment, online commerce, politics, etc.

AI can recognize faces, is able to create pictures, write music, create texts, play chess, imitate a person, etc. AI has great potential in medicine. Excel Medical has created the Wave Clinical Platform system, which can monitor the patient's performance and is able to determine the possible death of a person in 6 hours. And the Deep Face LIFT system (developed by scientists at the University of Massachusetts), based on micro mimics, can recognize how much a person is in pain and whether it really hurts or is it a simulation.

In banking, AI technologies make it possible to open accounts for individuals and legal entities with little or no involvement of employees; determine the terms of the loan for a particular borrower; predict risks; trade on the stock exchange, according to the authors of the review Artificial intelligence: essence, control systems, technology development (2022).

In retail, these technologies help to create a demographic profile of the buyer and offer the most suitable products, monitor the filling of shelves, optimize the delivery and purchase of goods, and simplify the work of accounting. There are many similar examples in other areas of economic activity.

Artificial intelligence technologies abroad are being developed by companies such as Google, OpenCog, Microsoft, China Institute of Artificial Brain, etc.

There are companies in Russia that promote AI-based solutions in their own business models: Sberbank, Mail.ru Group, Yandex, Kaspersky Lab (Artificial Intelligence, 2022), Sibur Corporation and Severstal.

The development of AI is proceeding at a rapid pace. This is evidenced by the data of the report of the Stanford Institute for Human-Centered Artificial Intelligence

(HAI) "Artificial Intelligence Index 2022". In particular, the report states that over the past 12 years, the total number of publications on AI in the world has grown from 162.5 thousand in 2010 to 334.5 thousand in 2021 (Kasparyants, 2022). In South Asia, the Middle East and North Africa, their number has increased by about 12 and 7 times, respectively. The number of patents filed related to AI technologies in 2021 was 30 times higher than in 2015 (growth rate was 76.9 %).

Artificial intelligence is becoming more accessible and efficient: since 2018, the cost of training an image classification system has decreased by 63.6 %, and training time has decreased by 94.4 % (Popanov, 2022).

Robotic arms are getting cheaper: AI Index research shows that the average price of robotic arms has decreased by 46.2 % over the past five years, from $42,000 per hand in 2017 to $22,600 in 2021. Research in the field of robotics is becoming more accessible, according to the authors of the Artificial Intelligence Index Report (2022).

There has been an increase in interest in the ethical issues of AI: since 2014, the amount of research on fairness and transparency in the field of AI has exploded (Sareen, Saltelli & Rommetveit, 2020).

The amount of investment in artificial intelligence is growing. In 2021, private investment was about $93.5 billion, more than double the total private investment in 2020, with the number of newly funded companies declining. Data management, processing and cloud technologies received the largest amount of private investment in 2021–2.6 times more than in 2020, followed by areas such as medicine, healthcare, and financial technology in terms of funding.

In 2021, the US led the world in both total private investment in AI and the number of newly funded companies. In 2020, one out of every five computer science Ph.D. students majored in artificial intelligence/machine learning, the most popular major in the last decade. An analysis of legislative documents on AI in 25 countries, presented in the "Artificial Intelligence Index 2022", shows that the number of bills containing positions on artificial intelligence has increased.

In general, according to the study, compared to 2021, AI is becoming more and more a real phenomenon that is actively integrating into the economy, affecting the direction of research and funding (Kasparyants, 2022). Based on the materials of the review, the United States ranks first in the development of AI technologies and China is developing these technologies at a very fast pace, catching up with the leading countries.

According to the plans, China should become the world leader in the field of artificial intelligence by 2030, although it already considers itself an artificial intelligence superpower on a par with the United States (Reshetnikova, 2021).

The results of a study conducted by K. Matveenkov on the main parameters of AI development show that it is still premature to talk about the superiority of China in this area. The United States retains leadership in terms of such criteria as the scale of participation of the private sector, the availability of hardware, the quality of patents, and the number of advanced specialists (Matveenkov, 2022). According to analysts, it will take about a decade for China to become a world leader in the field of AI.

Many discussions among scientists is caused by the problem of humanization of artificial intelligence technologies. An example of the use of these technologies for the benefit of a person is their use in environmental startups, where total digitalization has significant prospects.

In the oil and gas industry, digital twins of fields, plants, supply chains help to model processes and find the most effective solutions; robots, drones make it possible to use less human labor, and artificial intelligence allows you to remotely control equipment (Tretyakov, 2020).

Rosneft expects that because of the introduction of AI technologies, the energy efficiency of production processes will increase by 5 % and logistics costs will decrease by 5 % (Tretyakov, 2020).

Recently, the use of technologies such as Big Data, artificial intelligence (AI), Internet energy (IoE) are beginning to be widely used in startups. For example, in the energy consumption of utilities, the German startup Likewatt and the Spanish startup Resonanz have implemented Big Data technologies and AI algorithms for performance analysis, forecasting the state of the power system and pricing in different periods of time.

American start-up Elektrik Green uses clean hydrogen to charge fuel cell vehicles. This technology combines energy conversion, energy storage, control, monitoring and charging software in one installation. And Indian startup Greenleap Robotics offers an autonomous cleaning robot for solar panels.

Russian startup OpenRecycle offers a digital solution for the recycling of secondary raw materials. He developed a telegram bot that helps with the separate collection of waste. After receiving the name or photo of the type of waste, the bot will indicate the nearest collection point for such waste (Larichkin, 2020).

Since 2017, the UN has been hosting the annual Artificial Intelligence for Good Summit, dedicated to harnessing the potential of artificial intelligence to improve the lives of people around the world. As Anna Bethke, AI for Society Project Manager at Intel, notes, "AI hardware and software technologies are being used to positively impact human conditions, animals or the planet — and they cover, if not all, then most of the goals of sustainable development. Development (SDG) of the United Nations. The range of potential projects continues to grow as the AI community expands our technical capabilities and better understands the challenges" (Betke, 2019). AI applications discussed on the forum include areas such as social engineering, education quality, language translation, healthcare, crime detection, child abuse, and many others.

As Frederick Werner, Head of Strategic Engagement, ITU Standards Sector, notes: "I see the speed and scope of AI's impact on healthcare. With AI, mobile phones can be used to detect conditions such as skin cancer or diabetes. There is already an application that can perform analysis suspicious skin lesions and warn the user to see a dermatologist. It is not only about using these applications in developing countries where there are not enough doctors. It will also be useful in developed countries such as the United Kingdom, where, in order to get an appointment to a specialist, it may take up to a year" (Sahota, Ashley, 2019).

The use of AI improves productivity compared to other technologies in almost all industries and makes a significant contribution to the GDP of countries. To confirm this, we present some quantitative data that determine the importance of this rapidly developing industry:

- forecasts of the share of AI in China's GDP by 2030 are 26.1 %, North America 14.5 %, the UAE — 13.6 %;
- in business, AI is already beginning to be considered in terms of revenue and income categories: in industrial production, AI can increase gross value added by about 372 trillion rubles, by 2035, the growth in wholesale and retail trade will be about 205 trillion rubles, in the information and communications industry about 93 trillion rubles;
- the impact of AI on economic growth in various industries by 2035 will range from 1.6 % to 4.8 %.

The global revenue of the artificial intelligence market, which includes segments of software, hardware and services, in 2020 amounted to about 281.4 billion US dollars. It is estimated that in the same year, the segment of software for artificial intelligence brought 88 % of the total revenue of the artificial intelligence market, amounting to 247.7 billion US dollars. In 2021, the global artificial intelligence market increased even more in terms of revenue, reaching 327.5 billion US dollars (Figure 1).

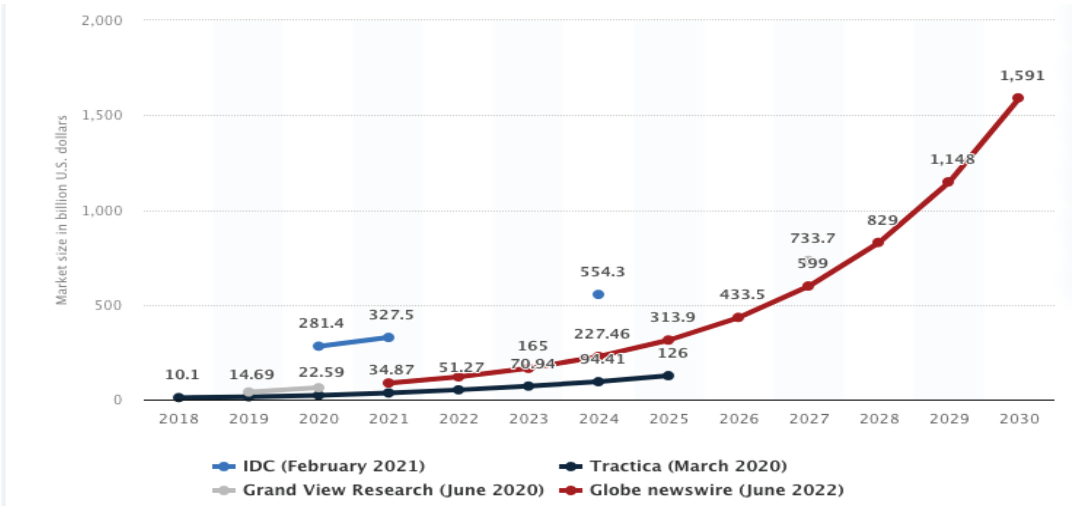

Figure 1. Comparison of the market size and revenues from artificial intelligence worldwide in the period from 2018 to 2030, in billions of US dollars

Source: Statista. Retrieved August 8, 2022, from https://www.statista.com/statistics/941835/artificial-intelligence-market-size-revenue-comparisons/

Despite advances in the development of AI technologies, their capabilities are still limited. This is since machines can learn from the data provided, and if there are inaccuracies in them, the final result may be incorrect; in addition, the actions of the machine are limited, as a rule, to some specific type of activity; there are no autonomous intelligent systems, the operation of the machine requires resources and professionals (Volchok, 2021).

Along with the understanding of the advantages of artificial intelligence, there are also fears associated with the growth of the threats that it poses in terms of justice and ethics. So, in China, the authorities use facial recognition systems for total surveillance of citizens; ranking people according to the behaviour approved by the authorities (Grimshaw, 2017).

People have a fear that artificial intelligence and robots will force them out of many professions, and the uncontrolled development of AI will devalue human labour, needs and emotions, cause a total crisis in the economy, and as a result, people will lose control over these technologies (Intelligence without limits: who wants to regulate AI and why? 2022). In many studies you can read that the development of artificial intelligence technologies will lead to a reduction in jobs (from 20 to 70 %).

Such fears have not yet been substantiated. In fact, the threat is not technology, but people who can use it ineptly or incorrectly. Although, indeed, ethical issues cannot be neglected.

Currently, more than 100 independent documents in the field of AI ethics have been adopted in the world at different levels, concerning the protection of the rights and interests of people, ensuring security when interacting with AI technologies.

In the EU, the GDPR regulation has been in force since 2018 regarding the protection of personal data, in 2019 the Ethical AI Guidelines were published, and in 2020 the Scorecard for reliable AI was published. In the US, there are no general regulations defining the foundations of AI ethics yet. In China, since 2022, all local companies (Alibaba, Tencent, etc.) are required to provide customers with the opportunity not to use AI advice (Intelligence without limits: who wants to regulate AI and why, 2022).

On the one hand, any restrictions in the field of AI significantly hinder its development. On the other hand, the need for regulation is obvious. Researchers from the Max Planck Institute have proposed the following ways to minimize the possible risks of using AI:

1. Restrict access of super-strong AI to the Internet and program it with ethical restrictions.

2. Create special algorithms that will keep AI from harming a person.

But such an algorithm can limit not only AI, but also itself. There are no opportunities to create it yet (Intelligence without limits: who wants to regulate AI and why, 2022).

As for Russia, according to the Stanford University AI Index 2022, Russia has become a leader in the number of regulations in the field of artificial intelligence, second only to the United States (Intelligence without limits: who wants to regulate AI and why, 2022).

In the White Paper of High Technologies, published in 2022 by the Russian Ministry of Economic Development, together with HSE scientists and industry leaders, artificial intelligence is listed among the ten most advanced technologies. Experts argue that the development of AI in our country is in line with global trends both at the level of fundamental research and in the field of practical application.

In October 2021, the country adopted the Code of AI Ethics. According to a study by TAdviser and Rostelecom, 85 % of Russian companies already use AI solutions in business (Khvatkov, 2021). According to researchers, by 2020 the Russian AI market has more than doubled compared to 2019. Its volume was estimated at $58.3 billion (0.5 % of the global market).

The Autonomous non-profit organization "Digital Economy" has been created in the country, which ensures the interaction of the main AI stakeholders — the state, business, and science.

For the further development of the AI market, Russia has a backlog — good laboratories at universities, AI courses are held; Skillbox, together with Moscow State University, created the Artificial Intelligence Agency, which is engaged in corporate training, Sberbank launched the Academy of Artificial Intelligence for school students (Khvatkov, 2021).

However, there is no legislative regulation of AI in the country. The AI market is the realm of large companies, with which small and medium-sized businesses cannot compete. This is an oligopoly market (Yandex, Mail.ru and Sberbank dominate in Russia, Facebook, Google and Amazon dominate the global market). Under such conditions, the state should intervene and provide conditions for the normal development of the artificial intelligence market.

The country has developed a federal project "Artificial Intelligence", for which 86.5 billion rubles have been allocated from budgetary and non-budgetary sources. It's not that much. To become a leader, Russia will need to increase funding by 5–10 times (Artificial intelligence in Russia. Industry status and forecasts, 2022).

To stimulate the development of AI in 2022, the Government of the Russian Federation has tripled financial support for developers of AI systems. It is expected that by 2024 about 1,200 companies working in the field of artificial intelligence will receive a total of more than 17 billion rubles, including non-budgetary funds from industrial customers.

As part of the federal project "Artificial Intelligence until 2024", financial support will continue to be provided to six artificial intelligence research centers established in 2021: based at Skoltech, Innopolis University, ITMO, HSE, Moscow Institute of Physics and Technology, and the Institute for System Programming of the Russian Academy of Sciences. Research centres in the field of AI should become points of growth for science and technology.

The country also developed an action plan for the implementation of AI in the regions (development of data sets for AI training; development of computing resources; creation of regional research and production consortiums for AI testing). It is extremely in demand, because, according to experts, an analysis of international and Russian experience shows that the introduction of AI usually leads to faster implementation, improving the quality of industry projects by five to seven times, emphasized in the National Strategy for the Development of Artificial Intelligence in Russia (2017)[3].

[3] National Strategy for the Development of Artificial Intelligence in Russia (2017). Retrieved May 22, 2022, from https://www.tadviser.ru // index.php/

Unfortunately, in the spring of 2022, many government and commercial projects using artificial intelligence were suspended due to the imposition of sanctions by Western countries that restrict access to relevant technologies. As a result, investment in AI is likely to decline and competition between participants will intensify.

Discussion and Conclusion

The past two years have demonstrated the power of exponential technologies such as artificial intelligence (AI), automation and hybrid cloud to accelerate digital transformation as companies sought to better serve their customers and find new sources of profit arising from the pandemic. Today, new imperatives such as sustainability and security are paramount for business leaders, and at the same time, these leaders must address new geopolitical and market challenges that affect their supply chains, revenues and costs.

Artificial intelligence technology is currently on the verge of transforming all sectors, just like the electric power industry 100 years ago. According to some estimates, between now and 2030, this will ensure global GDP growth of more than $ 13 trillion. “Although AI is already a value for leading technology companies such as Google, Baidu, Microsoft and Facebook, most of the ways to use AI will go beyond the software industry” — this is how Andrew Ng in his recent speech assesses the AI market.

In general, AI technologies, according to many foreign scientists and researchers, will revolutionize the life of the entire society, if not lead to the complete destruction of humanity, as others believe. A survey of thousands of prominent experts conducted by the Pew Research Centre showed that 63 % of respondents hope for a better outcome, but almost a third fear that AI will lead to job losses, excessive surveillance, and other troubles (Mack, 2019).

Positive-minded foreign academic scientists and researchers believe that AI can eliminate poverty, improve disease prevention, provide quality education to residents of all countries and continents, improve efficiency in many areas of economic activity, ensure the continuity and synchronism of social interaction at work, at school, in family, etc. By 2030, people will be more productive and interact more, and decision-making will improve. As a result, AI can be aimed at creating a happy society (Mack, 2019).

Sceptics believe that AI and machine learning can be used to achieve even greater concentration of wealth and power in the hands of a few, to develop even more terrible weapons. These technologies will create conditions for hidden discrimination and arbitrariness. A lot of fakes will appear, which will not be easy to distinguish from reality.

Yes, we should agree that in every phenomenon there are positive and negative sides. There are bound to be people who are prone to abuse. But we are talking about people, not technology. Moreover, abuses and other vices of civilization appeared even in the absence of AI technologies. The task is to consider the possible negative

manifestations of the use of AI and ensure their appropriate legislative regulation. In this sense, the role of the state as a regulatory body increases many times over. International harmonization of norms and rules for the use of AI technologies will also be important.

It should be noted that the innovative activity of recent years has led to the rapid development of high technologies, including AI technologies.

Artificial intelligence algorithms are applicable in various fields. They speed up business processes, allow you to perform work in difficult and extreme conditions, increase labour productivity, free a person from routine, uncreative work. However, AI cannot replace a person due to its narrow specialization and dependence on people (Gorodnova, 2021).

AI technologies will continue to develop. Some jobs will be serviced exclusively by robots, but at the same time, completely new jobs will appear, and professions for people that involve them performing new creative tasks. As a result, the future of production is seen as a tandem of man and robot based on their partnership.

Experts believe that AI technologies have a larger impact than electricity or fire. We can agree with the researchers that the next technological revolution will be based on AI. In any case, the development of high technologies in the future is the desire to achieve sustainable economic growth and ensure national security.

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