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Some aspects of the application of copyright in the field of artificial intelligence

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Abstract

Artificial intelligence is currently being integrated into all areas of human activity. AI technologies are implemented based on computer systems that can be categorized under several types of intellectual property. Accordingly, this article examines various aspects of copyright application in the field of artificial intelligence within Russian, Kazakh, and international legislation. The study explores the legal status of computer systems and AI models. It also investigates the legality of using third-party digital materials, such as presentations, texts, photographs, illustrations, music, and videos available on the Internet, in the process of training AI models. The article addresses questions regarding the existence of copyright for AIgenerated works and the contributions to the creation of computer-generated works by various parties: the AI system programmer, the organization selling such systems, the system's user, and the individual refining the computer-generated work. The novelty of the research lies in the exploration of public opinion regarding different aspects of copyright application in the field of AI. The practical significance of this research is defined by its potential to assist in selecting optimal approaches for regulating copyright in the realm of artificial intelligence.

Keywords: AI computer systems, AI models, AI-generated works, Artificial intelligence, Copyright, Third-party digital materials.

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1. Introduction

In recent years, the transition to a digital economy and the digitalization of education have transformed artificial intelligence (AI) from a niche topic "for the few" into a subject "for everyone" [1, 2]. AI technologies are now applied across various domains, including sports, culture, finance, business, commerce, medicine, and many others [3, 4].

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Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Artificial intelligence has become an integral part of everyday life. Modern individuals encounter it when making payments through terminals in stores, playing music via smart speakers, using search engines like Yandex, Google, and Yahoo, and in numerous other commonplace scenarios.

The term "artificial intelligence" was first introduced in 1956 by John McCarthy, an American computer scientist, during a conference at Dartmouth College in the United States [5, 6]. Today, AI is defined as a set of technological solutions that simulate human cognitive functions to deliver results comparable to, or exceeding, those achieved through human intellectual activity when performing specific tasks [7].

AI technologies refer to innovations based on artificial intelligence [7]. Examples of such technologies include:

- Computer vision [8, 9];
- Natural language processing [10, 11];
- Image recognition, animation of drawings, speech synthesis, and music creation [1, 12];
- Intelligent decision support and expert systems [13, 14];
- And more [5, 15].

Artificial intelligence



- The functioning of artificial intelligence involves several stages [16]:
- Data collection from various sources, such as databases, the global Internet, or external sensors.
- Data processing for subsequent utilization.
- Training AI models using data to accomplish specific tasks, such as recognizing patterns or making predictions. AI systems analyze the data and identify underlying patterns.
- Model testing on new data after training. The model's efficiency and accuracy are assessed. If necessary, algorithms and training data are further adjusted and improved.
- Deployment of the optimized AI model for real-time use, such as classifying new data or making decisions in realworld scenarios.

Overall, artificial intelligence encompasses a broad range of technologies and computer systems that simulate human behavior and thinking. These systems are designed to make inferences, evaluate situations, make decisions, and generate outcomes by learning from large datasets and previously recognized patterns or examples [17-19].

Artificial Intelligence Models include a wide range of techniques and approaches designed to mimic human thought processes and perform tasks that would typically need human intervention [20].

2. Materials and Methods

Artificial intelligence (AI) models require preliminary configuration, which is achieved through the use of various algorithms and methods [21, 22].

- Machine Learning (ML), which includes:
- Supervised learning, where correct answers are known in advance;
- Unsupervised learning, where algorithms help explore data structures and identify significant patterns;
- Reinforcement learning, where positive reinforcement strengthens the model's learned behavior, while negative reinforcement encourages the model to modify its behavior.
- Deep learning, a subset of ML, involves the use of artificial neural networks capable of self-learning from large datasets.

Machine learning techniques encompass methods such as support vector machines, decision trees, Bayesian learning, k-means clustering, association rule learning, regression, and neural networks, among others [23].

Typical deep learning architectures include deep neural networks, convolutional neural networks, recurrent neural networks, and generative adversarial networks, among others [23].

Artificial Neural Networks (ANNs), a subset of machine learning, are loosely inspired by biological neural networks. They are generally described as collections of interconnected units, known as artificial neurons, organized into layers [23].

To accomplish assigned tasks, AI gradually learns by utilizing the information it gathers.

The foundation for training AI algorithms lies in labeled data. Such data can be generated, for instance, when a social media user posts a picture of a dog with the caption "This is my dog." High-quality training requires large datasets that are well-prepared and labeled in advance.

Currently, the global Internet holds a vast quantity of labeled content for training, available in text, image, and video formats. Simultaneously, advancements in technology have made it possible to process Big Data, often presented in tabular form [21, 22].

AI analyzes information by extracting it from existing datasets, which are constantly updated. As a result, AI can provide accurate answers, identify patterns, predict future outcomes (even for tasks involving numerous parameters), and generate realistic content, producing results that closely resemble human creations [21, 22].

However, this approach is not without flaws. AI may make mistakes, for example, when trained on incorrect examples or when a task has multiple potential solutions, yet the AI offers only one solution, which might not be optimal.

Additionally, since AI lacks human emotions, it makes decisions purely based on the data available for analysis, which could lead to fundamentally incorrect decisions in some cases.

In this context, AI can be understood as technologies that enable computers and software to simulate human intellectual activities, draw conclusions, and deliver specific results based on previously reviewed examples. To achieve this, AI models employ machine learning and deep learning algorithms, as well as neural network architectures.

Based on this foundation, the paper will explore certain aspects of applying copyright in the field of artificial intelligence.

3. Discussion

First aspect. Legal status of artificial intelligence computer systems. The use of artificial intelligence technologies is based on computers and software. The source code of a program is considered intellectual property. The copyright of the developer of the computer program is legally protected through licenses. Thus, four types of licenses regulating the use of computer programs [24] can be applied to artificial intelligence computer systems:

- 1. Proprietary or commercial licenses. Paid commercial software products are created by manufacturers to generate profit through user usage. Each copy of a program with a commercial license requires payment to the copyright holder. The source code of such programs is closed. In addition to paid software, there is free software: Freeware, Shareware, Adware, Demo, Freemium, Open-source, and Free Software.
- 2. Conditional free licenses. Programs with such licenses provide the user with either a trial version or a trial period of use. For example, the user may have limited launches or not all features of the program. After trying the program, the user must either purchase a commercial license or uninstall the program from their computer.
- 3. Free licenses. These are proprietary licenses that can be terminated by the developers at any time. Programs under such licenses are usually free to use, but with certain conditions. For example, users may need to register on a specific website or avoid using the program for commercial purposes, i.e., for profit. The source code of such programs is typically hidden.
- 4. Free license. Users' rights to Free Software (unlimited installation and launch; free use, study, distribution, and modification) are legally protected through free software licenses. Modern free software licenses: GPL, LGPL (<u>https://www.fsf.org</u>), BSD (<u>https://www.bsd.org</u>), MIT (<u>https://tlo.mit.edu</u>), MPL (<u>https://foundation.mozilla.org/en/who-we-are/licensing</u>), Apache License (<u>https://www.apache.org/licenses</u>). While they have several differences, they all grant the user the right to use the software for any purpose, distribute it freely, modify it (except for the title), and distribute modified copies.

Second aspect. Legal status of artificial intelligence models. The software used for training falls under copyright protection. The training protocols for artificial intelligence models are patentable processes [25]. However, the AI models themselves are not considered software and do not contain source code, so software licenses do not regulate their copyrights. The free exchange of digital content is regulated by the international group of open licenses, Creative Commons (<u>https://creativecommons.org</u>). These licenses describe the conditions of use for presentations, texts, photos, drawings, music, and video materials to which they apply. However, it is impossible to treat an artificial intelligence model as digital content.

According to Article 1349 "Objects of Patent Rights" of the Civil Code of the Russian Federation, a utility model can be patented as an invention [26]. However, a utility model, as defined in the Civil Code, refers only to a technical solution related to a device. Thus, it can be argued that the legal status of artificial intelligence models is undefined in current legislation.

Third aspect. Legality of using third-party digital materials: presentations, texts, photos, drawings, music, and video materials available on the Internet, in the training process of artificial intelligence models. Artificial intelligence models that mimic human behavior and thinking are trained using algorithms and techniques to optimize their performance and achieve desired results. During the training process of these models, third-party digital materials may be used. Author James Vincent claims: "The question arises because of the way generative AI systems are trained. Like most machine learning software, they work by identifying and replicating patterns in data. But because these programs are used to generate code, text, music, and art, that data is itself created by humans, scraped from the web, and copyright protected in one way or another. ... Generative AI models are trained on copyright-protected data – is that legal?" [27]. Clearly, the use of third-party

digital materials such as presentations, texts, photos, drawings, music, and video materials in the training of artificial intelligence models should be regulated by the Creative Commons international open licenses group.

Fourth aspect. The question arises about the copyright ownership of presentations, texts, drawings, music, and video materials created using artificial intelligence systems. According to the Civil Code of the Russian Federation and the laws of the Republic of Kazakhstan, the author of an intellectual work is considered to be an individual, a natural person, whose creative labor resulted in the creation of such work [26, 28]. Since artificial intelligence is not a human and AI systems do not engage in creativity, but work based on algorithms, they cannot be granted copyright. At this stage, in Russia, artificial intelligence serves as a tool for creating copyrighted works [3]. The legal systems of Germany and Spain [29, 30] also recognize only intellectual creations of humans as copyright-protected works. Consequently, they deny copyright protection to AI systems that generate computer works. Japan's Copyright Law [31] defines copyright-protected works in literature, scientific, artistic, and musical fields as works in which thoughts or feelings are expressed creatively. This is generally interpreted by courts as a direct requirement that the author of copyright-protected works must be a human. Thus, it can be argued that, at present, only human-created works are protected by copyright. Artificial intelligence has not yet developed to the point where it can be granted copyright.

Fifth aspect. The question of copyright ownership for works created by artificial intelligence systems. In the Resolution of the Plenary Session of the Supreme Court of the Russian Federation dated April 23, 2019, No. 10 [32], it is stated that the creative nature of a work's creation does not depend on whether the work was created manually by the author or with the use of technical means. Thus, new presentations, texts, photos, drawings, music, and video materials created by AI systems may be either compilations of existing data or the product of human thought and creativity, where artificial intelligence serves as a tool in the creative process.

In the first case, copyright will not exist for the computer-generated work; in the second case, the copyright for the computer-generated work will belong to the human creator. When creating a work using AI systems, human involvement can be minimal. For example, a brief text request is formulated, and a few buttons are pressed. The person does not write the text themselves or draw the image themselves. Can such a person be considered the author of the works generated by AI systems (neural networks)? Which individual's contribution should be recognized in the creation of computer-generated works under copyright law: the AI system programmer, the organization (company owner) selling such AI systems, or the user of the system? The UK Copyright, Designs and Patents Act [33] states that the author of literary, musical, or artistic works created using a computer is the person who took the necessary steps to create that work.

Sixth aspect. The results generated by artificial intelligence systems often fall short of the desired outcome and require further refinement [34, 35]. For example, an image generated by a modern neural network might require changes to the composition, corrections to the hands, redrawing the fingers and eyes of a person, or alterations to the fabric pattern, and so on. Some paid AI programs, such as Midjourney (midjourney.com), allow users to select specific parts of the generated image and regenerate them until the result is as close as possible to the desired outcome. However, most AI systems (neural networks) do not provide users with such capabilities. It is evident that such changes made to an image by a human constitute their creative contribution to the creation of a computer-generated work, and the extent of this contribution should be determined based on the amount of effort the person puts into it. According to the legislation of the Russian Federation and the Republic of Kazakhstan, post-processing must have a creative nature; otherwise, the derivative work will not be a subject of copyright protection [26, 28]. The aspects of applying copyright in the field of artificial intelligence currently remain more theoretical. However, it is clear that, in the near future, there will be a need to choose optimal options for regulating copyright in the field of artificial intelligence and to develop practical solutions for determining the correct authorship of works.

4. Results

4.1. Internet Survey

To study public opinion on various aspects of copyright application in the field of artificial intelligence, an anonymous survey was conducted. For the survey, a questionnaire was developed and hosted online on Google Forms, a service for conducting user surveys based on Google Marketing Platform (<u>https://docs.google.com/forms/d/e/1FAIpQLSf-w0tebm5fwcCE2KFvbJTpp2PR7UAASKItVJAxhEkmVOzxqQ/viewform</u>).

A total of 67 people participated in the survey. To present the demographic composition of the respondents more clearly, the results are shown in Table 1 and Figure 2.

 Table 1.

 Composition of Respondents Who Participated in the Survey

Composition	Quantity (%)
Total respondents	100
Male respondents	39.4
Female respondents	60.6
Under 30 years old	79.4
30-40 years old	7.6
41-50 years old	7.6
Over 50 years old	5.4
Less than 1 year of work experience	56.2
1 to 5 years of work experience	15.6
More than 5 years of work experience	28.2





Qualitative Analysis of the Composition of Respondents Who Participated in the Survey.

As seen, 39.4% of the respondents were male, and 60.6% were female. The majority of respondents (79.4%) were young people under the age of 30, 7.6% were between 30-40 years old, 7.6% were between 41-50 years old, and 5.4% were older than 50 years. Among the respondents, 56.2% had less than 1 year of work experience, 15.6% had 1 to 5 years of work experience, and 28.2% had more than 5 years of work experience.

To provide a clearer representation, the results of the survey are shown in Table 2.

Table 2.

Survey Results on Various Aspects of Copyright Application in the Field of Artificial Intelligence.

1) Do you use presentations, texts, drawings, or videos automatically generated by artificial intelligence (neural networks) in your work, hobbies, or creative activities?





4) Will artificial intelligence models be considered intellectual property objects, since they are not software themselves and, therefore, do not contain source code?

5) Should the conditions for the use of third-party digital materials posted on the global Internet, as described in international open licenses like Creative Commons, be applied during the training of artificial intelligence models?



6) Can works created by artificial intelligence systems be considered free from copyright since they are not created by a human author?



7) Is the programmer of an artificial intelligence system considered the author of a computer work produced with its help?



8) Is the author of a work created with artificial intelligence systems the organization that sells such systems?



9) Is the user of an artificial intelligence system, who issued the command to create a work using it, considered the author of the resulting computer work?



10) Results obtained with the help of artificial intelligence (neural networks) often require further refinement. Will post-processing performed by a human be considered their authorship contribution to the creation of a computer work?



5. Conclusion

- 1. As we can see, most respondents use artificial intelligence (neural networks) in their work, hobbies, or creative activities (19.7% use it constantly, 34.8% use it quite often). Respondents create presentations, texts, drawings, or video materials. 31.8% use artificial intelligence (neural networks) occasionally, and 13.6% do not use it.
- 2. Artificial intelligence technologies are implemented on computer systems. Most respondents consider artificial intelligence to be an intellectual computer program (28.8% answered yes, 47% answered "more yes than no"). 16.7% answered "more no than yes", 3% answered no, and 4.5% found it difficult to answer. It is known that the source code of a program is an intellectual property object, and the copyright of the software developer is legally protected through licenses. Therefore, software licenses such as proprietary or commercial licenses; shareware licenses; free licenses; and free software licenses can be applied to regulate the use of artificial intelligence computer systems. The opinions of respondents on whether free licenses intended for software can be applied to artificial intelligence programs were divided. 18.2% answered yes, 28.8% answered "more yes than no." 15.2% answered "more no than yes", 9.1% answered no, and 28.8% found it difficult to answer.
- 3. The legal status of artificial intelligence models is not defined by law. They are neither software nor digital content, whose use is regulated by software licenses and the group of international open licenses such as Creative Commons; nor are they technical solutions for utility models that can be patented as inventions. Most respondents believed that, despite the fact that artificial intelligence models are not software and therefore do not contain source code, the models are intellectual property. 21.2% answered yes, 36.4% answered "more yes than no." 22.7% answered "more no than yes," 10.6% answered no, and 9.1% found it difficult to answer.
- 4. The vast majority of respondents believe that the use of third-party digital materials, such as presentations, texts, photos, drawings, or video materials placed on the global internet in the process of training artificial intelligence models should be regulated by the conditions described in international open licenses like Creative Commons. 25.8% answered yes, 40.9% answered "more yes than no." 9.1% answered "more no than yes," 6% answered no, and 18.2% found it difficult to answer.
- 5. Currently, copyright protects works created by humans. Artificial intelligence has not yet developed to the point where it can be granted copyright. The majority of respondents believed that computer works created by artificial intelligence systems are free from copyright since they are not created by a human author. 27.3% answered yes, 31.8% answered "more yes than no." 16.7% answered "more no than yes", 19.7% answered no, and 4.5% found it difficult to answer.
- 6. Works created by artificial intelligence computer systems can either be compilations of existing data or products of thought and creativity. In the first case, copyright will not apply to the computer work. In the second case, the question arises as to whose authorship contribution in creating the computer work should be recognized by copyright law: the programmer of the artificial intelligence system, the organization (owner of the company) selling such computer systems, or the user of this system. Opinions were divided on whether the programmer of the artificial intelligence system is the author of the computer work created with its help. 15.2% answered yes, 22.7% answered "more yes than no." 30.3% answered "more no than yes," 22.7% answered no, and 9.1% found it difficult to answer. Most respondents believe that organizations selling artificial intelligence systems are not the authors of works created with the help of these computer systems. 15.2% answered yes, 12.1% answered "more yes than no." 34.8% answered "more no than yes," 27.3% answered no, and 10.6% found it difficult to answer. Most respondents believe that the author of the computer work. 21.5% answered yes, 36.9% answered "more yes than no." 21.5% answered "more no than yes," 13.8% answered no, and 6.3% found it difficult to answer.
- 7. Results obtained using artificial intelligence computer systems (neural networks) often fall short of expectations and require further refinement. The vast majority of respondents believe that post-processing carried out by a human

constitutes their authorship contribution to the creation of the computer work. 43.9% answered yes, 33.3% answered

"more yes than no." 10.6% answered "more no than yes," 4.5% answered no, and 7.6% found it difficult to answer. Thus, the considered aspects of applying copyright in the field of artificial intelligence suggest that the development and introduction of new copyright norms in this area, aligned with current realities, are necessary.

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