

Legal Regime of Inventions Created by Artificial Intelligence

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Abstract

[Purpose] The purpose of this study is to examine the concept of artificial intelligence (AI) as an object of civil legal relations, with a specific focus on its status as an inventor. The study aims to define the characteristics of AI as an inventor, including its intangible nature, resemblance to the human brain, autonomy, data collection and processing capabilities, learning ability, and generation of novel results, particularly in the realm of inventions.

[Methodology/Approach/Design] The research employs a range of methodologies, including functional and logical analysis, deduction, induction, synthesis, and dogmatic approaches. It highlights the need for legal regulation concerning AI as an inventor, with particular attention given to the legal regime surrounding inventions created by AI.

[Findings] Based on the unique aspects of AI as an object of civil legal relations and its capacity to create inventions, the study proposes extending the existing legal and patent framework to address these relations with certain specificities. The conditions for patentability of AI-generated inventions should mirror those for human inventions, as they operate in the same technological field.

[Practical Implications] It is not recommended to grant AI the status of a legal entity. Instead, the study suggests indicating in the patent that the invention was created with the assistance of a specific AI, without conferring personal non-property rights to AI itself. Property rights to inventions generated by AI should be legally assigned to the user of the AI, unless agreed upon differently by the parties involved.

[Originality/Value] Given the advancements in AI technologies and their ability to create patentable inventions, there is an urgent need for comprehensive and effective legal regulation. Currently, such regulation is lacking at both the national and international levels, underscoring the significance and value of this study.

Keywords: Artificial Intelligence. Patentability Conditions. Rights to Inventions. Patent. Technological Revolution. Patent Law Regulation.

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INTRODUCTION

One of the current most relevant and controversial issues in the field of intellectual property is the use of artificial intelligence (AI) technologies and legal regimes. In patent law, in this context, the legal protection of inventions created by AI requires research and legislative decisions. This is determined by the fact that over the past decades, technological progress in the development of AI technology has accelerated and achieved significant results, which has contributed to its implementation in many areas of human life. Almost everyone uses AI assistants, and this trend is growing (PASHKOV et al., 2020). The capabilities of AI are already providing some advantages in terms of human performance, both quantitatively and qualitatively. Predictions that reflect our collective ambivalence about the future are based on AI (MAMMEN, 2022). Although AI technology is still going through its evolutionary development path and it is difficult to predict the changes it will bring to the technological progress of mankind, it is certainly a phenomenon that can start a new technological revolution. S. Hawking rightly noted: “Success in creating artificial intelligence will be the greatest event in human history. Unfortunately, it may also be the last, if we do not learn to avoid risks” (OBSERVER, 2015). Since humanity is facing a choice in the use of AI, it will be an “angel’s masterpiece” when people use AI technology correctly or a “devil’s hand” when people abuse it (YU et al., 2021).

The results generated by AI radically change the entire inventive process and affect the scope of patent law regulation, as the results achieved de facto meet the conditions of patentability applicable to inventions. As AI develops, inventions created with its help or autonomously, without human intervention, will gradually contribute to the degradation of human invention and displace it as such. This process is inevitable in a world where AI is developing as humans, limited by slow biological evolution, cannot compete with AI, and will be replaced by it (OBSERVER, 2015).

Even now the current patent system needs to adapt to the new factor of AI’s ability to create inventions. This is necessary to keep up with the latest developments in the field of these technologies (YANISKY-RAVID e LIU, 2018; NUSSIBALIYEVA et al., 2019). There is no legislative framework for the legal regulation of relations concerned with the use of AI, either at the national or international level. However, significant attempts are being made to ensure that such legal regulation will appear (scientific publications are being published, concepts of legal regulation of AI relations, and the legal framework for inventions created by AI. are being developed). At the rate at which AI is intertwined in our lives, it cannot be done otherwise, and legislation is simply

obliged to respond to this challenge, since if it does not, law as a social regulator will not fulfil its main instrumental function.

The author believes that each of the three elements – revolution, evolution, and hype - is present in people's response to artificial intelligence. Some view AI as a revolutionary technology, capable of transforming industries and society as we know it. Simultaneously, the author recognizes that AI is an evolutionary step in the field of computer science and technology. It builds upon previous advancements in machine learning and computational capabilities, representing a natural progression in the quest to develop intelligent systems. However, it should be acknowledged that there is a certain level of hype surrounding AI. Some claims, particularly those related to superintelligence and AI surpassing human capabilities, might be overblown. While AI has shown remarkable achievements in narrow domains, it still lacks the full cognitive abilities and consciousness associated with human intelligence.

THEORETICAL OVERVIEW

The absence of a legislative framework in the field of regulating AI inventions is not only a negative legal consequence in the form of the absence of an established legal regime for such inventions but also economic, social, and technological. This can cause both an outflow of investments in the development and use of AI, as there is no protection of development results, and stagnation in the development of technologies (WHITLOW, 2020; BARLYBAYEV et al., 2017). Prevention of such consequences in the field of AI and the creation of inventions with its help should be addressed by an effective public policy that would encourage and remove obstacles that hinder the development of AI. In Ukraine, following the developed concept of AI development, the main goal, in the field of legal regulation, is to protect the rights and freedoms of participants in relations, as well as to develop and use relevant technologies in compliance with ethical standards (VERKHOVNA RADA OF UKRAINE, 2020). This concerns, first, the observance of human rights in the information environment concerning the use of personal data, and respect for intellectual property rights.

Currently, the world is facing a situation in the field of patenting inventions created with the help of AI when the patent office usually refuses to grant patents for such inventions. A prominent example in recent years has been the patenting of inventions created by the AI Device for the Autonomous Bootstrapping of Unified Sentience (DABUS). In 2018-2019, the American inventor and developer of DABUS, S. Thaler, together with lawyer and professor of law R. Abbott filed patent applications with patent offices around the world, in which the DABUS AI was identified as the inventor. These patent applications concerned two

inventions, namely a food storage container based on recursive geometry and a signalling lamp (based on the “neutron light”) designed to alert on emergencies (WIPO, 2019). In 2019-2020, three patent offices, namely The United States Patent and Trademark Office (USPTO), the UK Intellectual Property Office (IPO), and the European Patent Office (EPO) rejected these patent applications, generally because, under the law, only an individual can be an inventor, however, the applications mention DABUS AI (UNITED STATES PATENT AND TRADEMARK OFFICE, 2019; IPO DECISION..., 2019; EUROPEAN PATENT OFFICE, 2020). In 2021, a patent for containers was granted for the first time in South Africa, although no substantive examination was carried out, the application only went through the formal procedures for granting a patent in the relevant jurisdiction (THE TIMES, 2021).

This shows that the global patent system is not ready to decide whether AI should be recognised as an inventor or not. The main reason is that the current legislation recognises only humans as inventors, but this does not mean that AI cannot be an inventor. At the time when most of the world’s patent laws were being formed, humans were the only inventors, and the world had no concept of what AI was, so it was logical that AI could not be invented. Currently, when AI begins to compete with humans in the field of invention, it is particularly unreasonable to prohibit AI from inventing based on a literal interpretation of texts (ABBOTT, 2016; BUIL et al., 2015). The patent system should respond to the challenges it faces and be adjusted to ensure that investments (both financial and intellectual) in scientific and technological progress are protected. At the same time, it is necessary to find the optimal approach and develop a general concept of the legal regime for inventions created by AI, so that the patent does not lose its significance, inventiveness is not levelled, and the sphere of relations is not left out of legal regulation.

MATERIALS AND METHODS

The study was conducted using various types of analysis methods. Thus, the functional analysis method was used to highlight the importance and role of AI in modern society and identify its main characteristic elements and principles. The logical analysis method was used to reveal the legal regulation of AI and to identify the patterns and principles that should be considered when drafting the relevant legislation.

The dogmatic method was used to define the legal regime of AI and to identify the key factors that should be considered concerning the legal regime of AI. The legal hermeneutic method provided an opportunity to review the legislative framework at the national and international levels and to carry out a

relevant analysis of the provisions. As such, the following legislation was considered: Convention on the Grant of European Patents (EUROPEAN PATENT OFFICE, 1973), Decision of IPO (INTELLECTUAL PROPERTY OFFICE, 2019), Decision of USPTO on Application No. 16/524,350 (UNITED STATES PATENT AND TRADEMARK OFFICE, 2019), European Ethical Charter on the use of Artificial Intelligence in judicial systems and their environment (EUROPEAN COMMISSION FOR THE EFFICIENCY OF JUSTICE, 2018), European Parliament resolution on intellectual property rights for the development of artificial intelligence technologies (2020), Law of Ukraine “On the Protection of Rights to Inventions and Utility Models” (VERKHOVNA RADA OF UKRAINE, 1994), Report with recommendations to the Commission on Civil Law Rules on Robotics (EUROPEAN PARLIAMENT, 2017), The concept of artificial intelligence development in Ukraine (VERKHOVNA RADA OF UKRAINE, 2020) and The Patent Office Annual Report and Accounts (INTELLECTUAL PROPERTY OFFICE, 2022). This method was also used to conduct a detailed analysis of the gaps in the current legislation regarding AI regulation. In particular, the formal legal method allows to identify ways to overcome them. The abstraction method was used to provide a more comprehensive overview of the current legislation issues as the right to an invention created with the help of AI.

The deduction method allowed to characterise the state of AI legal regulation based on its main structural elements, principles of implementation and features. Moreover, the induction method was based on certain features of AI, which helped to determine the state of its legal regulation. The synthesis method was used to develop appropriate recommendations for their implementation in national legislation to overcome the main gaps. As such, logical and functional analysis methods were used to reveal the legal nature of AI and determine its features and principles of implementation. The formal legal and dogmatic methods allowed to analyse the legislative framework at the national and international levels. The abstraction, deduction, induction, and synthesis methods were used to carry out an in-depth analysis of relations related to AI and to determine the specifics of regulation of such relations in national legislation.

RESULTS

A Notion of Artificial Intelligence

The concept of AI was first discussed in depth in the 1950s. More than 70 years later AI technology is used both as an independent tool for achieving certain technological results and as an integral part of certain devices, programs, autonomous robots, cars, and aircraft. The creation of AI was driven by the need

to model the cognitive process of the human mind using technology. In particular, the state standards of Ukraine define AI as the ability of a system that processes various data to perform functions that are identical to human intelligence (BUDSTANDART, 1994). In this context, a similar definition is provided by the European Commission, which states that the notion of AI refers to systems that demonstrate intelligent behaviour by analysing the environment and acting with a certain degree of autonomy to achieve specific tasks and goals (AN OFFICIAL WEBSITE OF THE EUROPEAN UNION, 2018). Currently, AI covers a range of different technical disciplines, each of which is aimed at imitating a certain human ability, and each of which (or a combination of them) is the basis of technological machines/programmes (STEPHENS e BOND, 2018). Fundamentally, AI is an “electronic brain”, a prototype of the human brain in all its capabilities. In its current development, AI allows for transferring complex tasks that were previously assigned to humans (EUROPEAN COMMISSION FOR THE EFFICIENCY OF JUSTICE, 2018). However, AI should not become a complete substitute (equivalent) for the human mind, but rather a technological complement to it.

Considering AI technology from the perspective of a value-based approach, its capabilities create the following benefits for society. Firstly, AI is a value in itself – a good that is a technological asset for humanity in its evolutionary development. AI expands human capabilities and turns people into “cyborgs”. Humans are essentially cyborgs who accept and own technical prosthetics to enhance the capabilities of their hands, senses, and minds (LAWSON, 2017). Secondly, AI, in the field of patent legal relations, is a human tool that facilitates the creation of new inventions, and the search for technological solutions that, without its participation, would not have been achieved by humans or would have taken a very long time to achieve such results. AI can solve problems and possibly identify issues that are beyond human control and understanding (VERTINSKY e RICE, 2002). Thirdly, unlike humans, AI is not dependent on wages, working hours, mood, or need for rest. The current patent system, which is based on the concept of incentivising human inventors, loses its meaning for AI since it is a technology that is devoid of feelings and incentives.

In the Recommendations on Artificial Intelligence of the Organisation for Economic Co-operation and Development, an AI system is defined as a mechanical system that can make predictions, recommendations or decisions that affect a real or virtual environment on a given set of human-defined goals (OECD LEGAL INSTRUMENTS, 2019). The definition of AI is rather superficial and aims only to show the purpose of AI, not its essence as a phenomenon – a certain technology.

Most of the AI definitions and their features are reflected at the legislative level in state concepts related to the development of AI rather than in specific laws that define the legal regime of AI itself or the results created with it. This shows that the legislative framework in the field of AI is still in its early stages. There are many different definitions of AI which focus on different aspects of it. In The concept of AI development in Ukraine (2020) AI is defined as an organised set of information technologies that allow solving complex tasks by using a system of scientific research methods and algorithms that allow processing information received or independently created during its operation, as well as to use and create knowledge bases, decision-making, algorithms and determine ways to achieve tasks. From this definition, it follows that AI is an information technology that can achieve its goals using scientific research methods and information processing algorithms. The Expert Group on Artificial Intelligence of the European Commission suggests the AI system should be defined as a system of software programs developed by a human being, which, based on the set goal, acts in a physical or digital dimension, perceiving its environment by collecting data, interpreting the collected data, reasoning about processing or knowing specific information obtained from this data, and deciding on actions to be taken to achieve the set goal (AN OFFICIAL WEBSITE OF THE EUROPEAN UNION, 2019). This definition of AI does not differ significantly from the one in the Concept of Artificial Intelligence Development in Ukraine, except for the amendment that AI is the result of human mental activity and operates in the digital or physical dimension.

Considering the above-mentioned, it is possible to distinguish the following features inherent to AI:

- **AI is a Certain Intangible Good in the Field of Digital Technologies Created by Man, Not Nature.** Given that humanity has learnt to satisfy its needs and interests with the help of AI, it is a benefit (economic aspect) and, accordingly, an object of civil legal relations (legal aspect). As an object of civil legal relations, AI belongs to the objects of intellectual property law, and given its certain similarity to a computer program, its legal protection should be based on similar legal means (BORYSOVA et al., 2019).
- **The Prototype of the Human Brain is the “Electronic Brain”.** AI is a digital technology that uses a combination of methods (machine learning, neural networks, deep learning) to perform tasks that require human intelligence and is a prototype of the human brain – the “electronic brain”. However, unlike humans, AI cannot comprehend and understand. Systems that are now commonly

referred to as AI do not have their intelligence, which is large because they are based on data templates and rules for processing that were set by humans (SURDEN, 2019). The inability of AI to comprehend the results of data requires the establishment of algorithms for value and moral guidelines, which are certain “red lines” that cannot be crossed, which generally constitute ethical norms.

- **Autonomy.** AI is characterised as an autonomous digital technology that can independently perform tasks based on its intended purpose without human intervention following a given algorithm. This feature is conditional and depends on the level of human intervention in AI. Moreover, unlike humans, AI cannot independently evaluate the result obtained, as it cannot comprehend and understand. Instead of AI, this is done by humans.
- **Data Collection and Processing.** AI can collect and process information by interacting with the external environment, which is then used to achieve the task at hand.
- **Learning Ability.** Unlike a computer program, AI can learn from the data it receives, thereby improving its efficiency, which forms the experience of AI.
- **Result.** AI can create qualitatively new results because of data collection, processing, and the ability to learn from the data obtained. In addition, AI can choose the best outcome from alternative options. One of the types of results that can be created by AI technology is technical solutions – inventions.

To understand the possibility of realization of legal regime of inventions created by AI it is necessary to refer to international experience. Dreamwriter is an automated news writing program based on data and algorithms developed by Tencent in 2015. Dreamwriter wrote a financial report on August 20, 2018, including the Shanghai index for that day, currency exchange and capital flows. An article published on the Tencent Securities website stated that “the article was automatically written by Tencent Robot Dreamwriter”. Later, Shanghai Yingxun Technology copied it to its website. The Nanshan District People’s Court stated that the defendant, Shanghai Yingxun Technology Company, had infringed Tencent's copyright and should be held civilly liable (DAI e JIN, 2023).

Law firm Baker & Hostetler has announced that it is hiring ROSS AI to handle bankruptcy cases, a task previously handled by nearly 50 lawyers. Developed on IBM’s Watson cognitive computer, ROSS AI will monitor the law and legal situation around the clock, read and understand language, hypothesize,

research and then generate responses with proper references and citations, learn from experience, and more. Scientists from the University College London and the University of Sheffield have created a “computer judge” that predicts judgments of the European Court of Human Rights with an accuracy of 79% (RADUTNYI, 2018).

For example, the European Patent Office (EPO) (2020) issued guidelines to clarify the patentability of AI-generated inventions. These guidelines provided insights into how the EPO assesses inventions involving AI and clarified the role of the human inventor or developer in the inventive process. At the same time, the United States Patent and Trademark Office (USPTO) had begun examining patent applications related to AI-generated inventions and issued some patents for such inventions. While the USPTO had not made any significant changes to patent law specifically for AI, its actions showed a willingness to handle AI-related patent applications.

In 2019, the Intellectual Property Office of Singapore (IPOS) launched the “Artificial Intelligence for Industry Transformation (AI for IT)” program, aimed at encouraging the use of AI in various industries, including intellectual property management. This initiative highlighted Singapore’s commitment to fostering innovation in the field of AI. In turn, World Intellectual Property Organization (WIPO) continued its discussions on the implications of AI on intellectual property rights and hosted conferences and forums to bring together global stakeholders. The organization worked to create awareness and understanding of the challenges and opportunities related to AI-generated inventions.

To summarize the above, the author combined the AI statements in Table 1.

Characteristics of Artificial Intelligence	Explanation
Learning Ability	AI systems can learn from data and experiences to improve their performance over time. Machine learning techniques, such as supervised learning, unsupervised learning, and reinforcement learning, enable AI to acquire new knowledge and adapt to changing circumstances.
Reasoning and Problem Solving	AI can use logical reasoning and problem-solving algorithms to analyze complex situations, evaluate possible solutions, and make informed decisions.

<p>Natural Language Processing</p>	<p>AI can understand and process human language, allowing for interactions through speech or text. Natural language processing (NLP) enables AI to perform tasks like speech recognition, language translation, and sentiment analysis.</p>
<p>Computer Vision</p>	<p>AI systems can interpret and understand visual information from images and videos. Computer vision technologies enable AI to recognize objects, faces, and patterns, making it valuable in various applications, such as image recognition and autonomous vehicles.</p>
<p>Robotics and Automation</p>	<p>AI can be integrated into robots and automation systems to perform tasks in physical environments. AI-powered robots can navigate complex spaces, manipulate objects, and carry out repetitive or dangerous tasks with precision and efficiency.</p>
<p>Neural Networks</p>	<p>AI utilizes artificial neural networks inspired by the structure of the human brain. Deep learning, a subset of machine learning, employs neural networks with multiple layers to process large amounts of data and extract intricate patterns and features.</p>
<p>Adaptability and Generalization</p>	<p>AI systems can apply knowledge gained from one domain to solve problems in a different context. This adaptability allows AI to tackle diverse tasks efficiently and effectively, making it versatile and adaptable to various real-world scenarios.</p>
<p>Real-Time Decision Making</p>	<p>AI can process and analyze vast amounts of data quickly, enabling real-time decision-making in various applications, such as financial trading, fraud detection, and traffic control.</p>
<p>Autonomy</p>	<p>AI systems can operate autonomously with limited human intervention. This autonomy allows AI to perform tasks and make decisions independently, as seen in autonomous vehicles and smart assistants.</p>

Continuous Improvement	AI can continuously learn and improve from new data and experiences. Ongoing training and fine-tuning enable AI to enhance its accuracy and performance over time.
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Table 1 - Characteristics of Artificial Intelligence

Patentability of Inventions Created by Artificial Intelligence

The formation of the legal regime for the protection of inventions created by AI depends on the specifics of the object – the invention – and the relations between the subjects. The closest existing legal regime that can be applied to inventions created by AI is the patent regime of legal protection, as it is the most appropriate for these relations. The only, albeit key, distinguishing feature of the relations concerning inventions created by AI from the relations protected by classical patent law is that the inventor is AI, not a human. The main question when extending the classical patent protection regime to AI inventions is whether the patent regime can be applied in full or with any exceptions and peculiarities.

Following paragraph 4 of Article 1 of the Law of Ukraine “On the Protection of Rights to Inventions and Utility Models” (VERKHOVNA RADA OF UKRAINE, 1994), an invention is the result of the intellectual, creative activity of a person in any field of technology. However, not every result is considered an invention by patent law or a mathematical method. In terms of extending the patent protection regime to inventions created by AI, this exception is crucial. This is largely determined by the inventive process of AI based on mathematical methods. This excludes the possibility of recognising the results of AI as inventions under classical patent protection. For AI inventions to be protected by patent law, mathematical methods must be patentable subject matter under the law. A mathematical method can be recognised as patentable subject matter when it is used as part of an AI system if it contributes to an additional “technical effect” (EUROPEAN PARLIAMENT, 2020). It is the presence of an additional “technical effect” that is the key criterion for a mathematical method as the subject matter of patentability of inventions created by AI. If a mathematical method does not create a “technical effect” when creating inventions, it cannot fall under the concept of an invention as created by AI.

A certain result in the field of technology, in addition to being a patentable good, must also meet the conditions of patentability. For man-made inventions, classical patent protection requires that three conditions of patentability are met: novelty, inventive step and industrial applicability. In this case, the question arises: should inventions created by AI meet these three conditions? Obviously, yes. Inventions created by both humans and AI belong to the same field – technology – and there is no reason to impose different patentability conditions

for the same invention because it was invented by technology rather than by humans. In addition, the conditions of patentability are requirements for the object – the invention – and not for the person who invented it – the inventor.

Even if the same conditions of patentability apply to inventions created by AI as to inventions created by humans, another question arises whether the standards of patentability should remain the same or be revised. In the age of smart machines, there is a problem of too many inventions, which requires new ways to test valuable, useful inventions. A higher utility threshold can serve a gatekeeper role when it is extremely easy to generate new ideas and more difficult to generate useful ideas (VERTINSKY e RICE, 2002). On the other hand, the issue of raising the patentability standards for AI inventions would allow for a balance between human and AI inventions, thus preserving the innovative potential of humans rather than technology. However, the introduction of higher standards for AI inventions to ensure a balance between human and AI inventions, rather than eliminate inventions of little use, is a dangerous process for all inventions. The specificity of the technology sector in which inventions are made is that it is impossible to invent what has been invented before. Accordingly, it may turn out that an invention invented by AI, which cannot be patented due to high patentability standards, could be patented if the inventor were a human. As a result, this may result in the inability to secure legal protection for certain inventions or falsification of information about the actual inventor.

If the standard of patentability of inventions is set rather low, this may result in many new inventions, but few useful ones that will be patented. In this case, the protection (patenting) of inventions that are useful and innovative may face the problem of obtaining many licences to use the inventions, which may be a problem that will “close the door” to the world of innovation for them. All this requires finding an ideal compromise of the patentability standard, which would ensure normal innovative development of technologies regardless of whether the inventor was human or AI. It cannot be excluded that in the future, the level of technology will reach such a development that most inventions will be created by AI itself, and the role of a person in this process will change from an inventor to an operator or other participant other than an inventor.

One of the important steps in the process of patenting inventions created by AI is to assess whether the result in the field of technology created by AI meets the conditions of patentability of the invention. A certain result in the field of technology is checked for compliance with the conditions of patentability of the invention by a person who is a specialist in this field. The level of technology development, with the help of AI, already allows for faster and more complete processing of a large amount of information to conclude that the result in the field of technology meets the conditions of patentability of the invention. However, AI

is currently unable to replace a human specialist in performing a qualitative examination of the patentability of an invention and making a fair decision. Given that the assessment of the patentability of an invention, although based on certain methods, is admittedly a rather subjective phenomenon and requires human involvement. On the other hand, such human involvement may call into question the validity of the relevant conclusions. Currently, AI technologies are only effective assistants to the relevant specialist, helping to better assess the entire range of information. In the future, AI will undoubtedly be increasingly involved in the process of assessing the patentability of inventions, and humanity may reach a point where human specialists will be replaced by AI technology.

Implementing the legal regime for AI-generated inventions presents numerous challenges and concerns that must be addressed. These include determining ownership and authorship, addressing patent eligibility, establishing liability and accountability, ensuring transparency and explainability, mitigating data bias and unintended inventions, achieving international harmonization, considering ethical implications, adapting to technological advancements, managing implementation costs, and resolving jurisdictional complexities. Striking the right balance is essential to foster innovation while safeguarding the rights and interests of all stakeholders.

Also, it's important to note that the practical implications of the legal regime for AI-generated inventions, particularly in terms of determining liability, are far-reaching and require careful consideration. Clear guidelines on ownership and responsibility are necessary to establish who should be held liable - whether it's the AI developer, the organization deploying the AI, the end-user, or the AI itself. As AI technology advances, evolving legal precedents and judgments will shape liability standards, requiring continuous evaluation and updates to keep pace with the ever-changing landscape. Addressing international jurisdictional complexity, ensuring compliance, and considering ethical concerns are also vital to foster responsible AI innovation and protecting all stakeholders involved.

Rights to Inventions Created by Artificial Intelligence

The compliance of the result in the field of technology created by AI with the conditions of patentability of an invention requires the identification of the inventor and his legal status. When deciding on the issue of authorship of inventions created by AI, two aspects should be clearly distinguished: first, whether AI is and should be an inventor; second, who should own the property rights to the invention created by AI.

It would be correct and logical to assume that AI is an inventor if it has created it. However, the Paris Convention for the Protection of Industrial Property as of 20.03.1883 does not explicitly define who an inventor is, but the context of the words/phrases used in the Convention – “person”, “citizen of a country of the

Union” – suggests that an inventor is a human being. Article 60 of the Convention on the Grant of European Patents (EUROPEAN PATENT OFFICE, 1973) states that the right to a European patent is vested in the inventor or their assignee, i.e., a person, not AI technology. Paragraph 13 of Article 1 of the Law of Ukraine “On the Protection of Rights to Inventions and Utility Models” (VERKHOVNA RADA OF UKRAINE, 1994) defines an inventor as a person who has created an invention through intellectual and creative activity. International and national legislation does not consider AI to be an inventor, which does not give the right to consider it an inventor from a legal point of view, but not from a factual one. The world must come to terms with the reality that AI can invent, and therefore not only humans can be inventors.

When recognising AI as an inventor, it is important to assess whether the right to an invention will bring any benefits to the patent system (WORLD ECONOMIC FORUM, 2018). From the point of view of the existing legal doctrine, the recognition of AI as an inventor requires its recognition as a subject, since the object, which is AI technology, cannot be an inventor and be granted rights. There are currently suggestions, although they are purely hypothetical, to qualify AI as a new form of legal entity (EUROPEAN PARLIAMENT, 2017). Granting AI, the status of a legal entity will allow it to be recognised as an inventor, grant it the rights of an inventor, and impose liability for inventions. However, is this step necessary and justified from a practical point of view, given the financial costs of implementing and maintaining the AI-legal entity construct? It is unjustified, as there is still a specific person behind AI. It is more justified to treat AI technology as an object (good) and to distribute the rights to an invention created by AI among the persons behind the AI that created the invention (programmer, a user of AI). AI invents because it is told to invent and the machine will not be offended by how its inventions are used (ABBOTT, 2016).

Two types of rights may be established for an invention as an object of patent legal relations: personal non-property rights and property rights of the inventor. A personal non-property right is, first and foremost, the right to be recognised as the creator of an invention. Granting the status of an inventor to, for example, a programmer who created AI or a user of AI who created an invention is incorrect and will not be consistent with reality. If AI created an invention, then it is the inventor, and to legally grant the status of the inventor to a person (in fact, to assign such status to) who is not an inventor will devalue the value of the human inventive activity. As R. Abbott points out, the designation of AI as an inventor is not a matter of granting rights to machines, but a matter of protecting the moral rights of traditional inventors (humans), as well as the integrity of the patent system (WIPO, 2019). In this case, the fairest way is to reject the concept of AI as a legal entity, as it would be to indicate in the inventor column of the patent

that “the invention was created using the relevant AI technology” without granting personal non-property rights to the inventor. This will make it possible not to distort reality and not to grant the status of an inventor to someone who is not an inventor, to legally confirm the fact of who created a certain invention, and to ensure recognition and investment attractiveness for the programmer/company that created or used such AI (GINTERS, 2019).

At the same time, the distribution of property rights to an invention created by AI can be resolved in two ways: either to grant property rights to the invention to AI, subject to the implementation of the concept of a legal entity or to grant them to persons involved in the invention. Such persons may include a programmer/company that created AI or a user of AI. It is inappropriate not to grant property rights to an invention to any person involved in the invention, since they are not the inventor. The creation of AI and the invention of AI itself is usually an investment project that requires a significant amount of money and labour, and the assignment of property rights to the invention to the relevant person is a kind of dividend from the investments (both financial and intellectual) made in technology innovation.

If a programmer has created an AI technology that creates inventions, the AI has created the invention, and therefore the programmer is the logical owner of the property rights to such an invention. However, a programmer, if they are also not a user of AI that creates inventions, only creates AI technology itself. It would be more correct to grant property rights to an invention created by AI to the user (e.g., an engineer) of such AI (this may be the programmer himself) who defined the idea of an invention for AI and subsequently recognised that what was created was an invention. Recognition of the user of AI as the first owner of property rights to an invention created by AI should be a general rule of dispositive nature. It cannot be ruled out that the parties (e.g., the user and the programmer) may agree otherwise in a contractual manner. The creation of an invention by AI is a rather complicated and cumbersome process that involves, in addition to AI, people who work together to lay down all the necessary prerequisites for AI technology to create such an invention. As a rule, in research laboratories and corporations that use AI to create inventions, the interaction between a programmer and a user (the same engineer) is an integral part of success in achieving a patentable invention.

DISCUSSION

The 21st century is characterised by the rapid development of digital technology. This is related to the development of AI and robotics, which are constantly being implemented and used in the life of humanity around the world.

Currently, AI is increasingly penetrating various areas of human life, ranging from medicine and industry to law enforcement and education. At the same time, there are several issues and problems related to the use of AI that require legal regulation. Following a report by the UK Intellectual Property Office, the number of applications related to the use of AI increased by 400% between 2010 and 2020 (INTELLECTUAL PROPERTY OFFICE, 2022). Instead, as noted by S. O'Sullivan et al. (2019), the number of patent plan applications in the United States doubled between 2002 and 2018. This raises the question of the relevance of legal regulation of inventions created by AI.

The problem of AI legal regulation and the creation of a specialised regulatory framework lies in the legal nature of this object. It is worth noting possible approaches to the legal regulation of AI. Following M.C. Buiten (2019), it is possible to distinguish the possibility of creating a general legal regime that will apply to all similar systems. This framework would contain basic requirements for the implementation of security and other important aspects of the use and development of such systems. As part of this approach, detailed requirements for the use of AI in specific areas (copyright, patent law) should be developed.

In general, digital technologies remove the traditional boundaries between knowledge and technology, facilitating the penetration of innovations into new, more complex areas of technology (TEMIRBEKOV et al., 2016). New objects are emerging under the influence of digital technologies, such as cryptocurrencies, tokens, AI, and robotic devices. They are involved in commercial turnover. New types of services are also emerging, such as cloud computing and services, digital technology platforms, and smart contracts, as well as a new virtual environment and communication, which is being formed in the form of social networks and digital technology aggregator platforms (CHERNIAVSKYI et al., 2023).

In the legal sphere, AI is perceived as a product of creative activity that should be protected as an object of intellectual property (YAROSHENKO et al., 2019). Following D. Gruson et al. (2019), it can be considered software that can be protected by copyright. M.R. Carrillo (2020) states that legal science is currently seeking a certain balance in the distribution of responsibility between participants related to autonomous AI systems. It is worth agreeing with the author's position and noting that it is very important for the innovation industry to consider the moral and legal norms that influence the development of technologies. However, the legal aspect does not coincide with the speed of development and implementation of these technologies in the world (KOSTRUBA e LUKIANOV, 2019).

As noted by A. Taeiagh (2021), AI is a system that demonstrates intelligent behaviour by analysing the environment and taking appropriate action

with a certain degree of autonomy to achieve certain goals. It should be added that AI systems can be software-based and operate in the virtual world, i.e., search engines, and voice assistants, as well as be built into hardware, such as autonomous vehicles, modern robots, and drones. The peculiarity of these systems is that they can create new objects, including technical ones, that are not inferior to those created by humans (BARLYBAYEV e SHARIPBAY, 2015). They can also be sold by putting them up for sale at an auction or exhibition.

In 2021, the Directive on an Ethical Approach to the Development of Artificial Intelligence (EUROPEAN COMMISSION, 2021) was published. The main provisions of this act are focused on the fact that AI should be created to support the subjectivity of the human plan and systems and the results of their activities should be focused on serving humanity and the common good of society to help improve the conditions of existence. This is confirmed by the consolidation of the principles of AI. Thus, two principals have been identified. The first one is that to increase the level of trust in AI technologies and realise their full potential, it is necessary to put people at the centre of the use of AI. The second principle states that AI systems must be safe, stable, and reliable throughout the entire period of their use and not carry any adverse risks. Following B.C. Stahl et al. (2022), these recommendations for the consolidation of principles in the European Union are not binding, but they are intended to form a common approach to the interpretation of the protection mechanism and the relevant criteria for the performance of AI in different jurisdictions. It is worth agreeing with the authors' position and adding that this makes it possible to regulate the mechanism of AI use, in patent relations, more accurately and meaningfully.

Given the objective inability of AI to be an inventor, the question arises as to whether an individual can have rights to an invention created by or with the help of AI. On the one hand, the rights may belong to the developer (programmer) of AI, but the problem will be that the idea was to create AI by the programmer, not to create new inventions. On the other hand, rights may be granted to a user or other person using AI as software to create new inventions accordingly. This issue is not currently regulated by the current legislation, which necessitates the introduction of amendments to national legislation to regulate the rights to inventions created using AI.

CONCLUSION

This research argues that artificial intelligence as an inventor is characterised by the following features: an intangible good in the field of digital technologies created by man, not nature, a prototype of the human brain – an

“electronic brain”, autonomy, the ability to collect and process data, the ability to learn, and the creation of a qualitative new result (in particular, inventions). Given its certain similarity to a computer program, the legal regime of AI should be based on similar legal means.

For inventions created by AI, based on the nature of the relationship, the most rational would be to apply a patent legal regime with certain peculiarities. The conditions for the patentability of AI inventions should be like those for human inventions since they are created in the same field – technology. Being a good object, it is not advisable to grant AI the status of a legal entity to secure the rights of an inventor. Given that AI is the actual inventor of an invention, it should be indicated in the patent as such without granting it personal non-property rights. Property rights to inventions created by AI must, under the law, be assigned to the user of AI that created the invention, unless otherwise agreed by the parties. The institution of patent law is a piece of paper that records the evolution of human development in its technological progress, which records (protects) what can cure diseases and what can kill people.

The novelty of this study lies in its exploration of the characteristics and legal implications of artificial intelligence (AI) as an inventor. The research identifies specific features that define AI as an intangible creation in the realm of digital technologies, resembling a prototype of the human brain, possessing autonomy, data processing capabilities, learning ability, and the capacity to produce qualitative new results, including inventions.

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