AI AND COPYRIGHTS: PERSPECTIVES ON INTELLECTUAL PROPERTY LAWS OF THE EU, THE US, AND VIETNAM

IA E DIREITOS AUTORAIS: PERSPECTIVAS SOBRE AS LEIS DE PROPRIEDADE INTELECTUAL DA UE, DOS EUA E DO VIETNÃ

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Abstract: More and more complex computer programs can create works that qualify for copyright protection if done by a human author. Who has ownership rights to the work created by artificial intelligence (AI) is still an open question. Given the large number of people involved in creating computer-programmed works in the new technology age, a clear regulatory framework is needed for which people qualify as work owners. The article analyzes two main aspects of copyright related to works by AI: (i) whether the work by AI is creative and (ii) the issue of allocation of ownership over AI-generated works. The allocation of ownership rights to works created by AI is analyzed by objects: programmers, users, co-owners of developers with users, and the AI system is in public ownership. The article also outlines the intellectual property laws of the EU, the United States, and Vietnam related to the protection of works created by AI. The article concludes on the need for safety for works created by AI.

Keywords: Artificial Intelligence. Copyright. Intellectual Property. Creativity. The EU. The US. Vietnam.

Resumo: Programas de computador cada vez mais complexos podem criar obras que se qualificam para proteção de direitos autorais se forem feitas por um autor humano. Quem detém os direitos de propriedade sobre o trabalho criado pela inteligência artificial (IA) ainda é uma questão em aberto. Dado o grande número de pessoas envolvidas na criação de obras programadas por computador na era da nova tecnologia, é necessário um quadro regulamentar claro para que as pessoas se qualifiquem como proprietários de obras. O artigo analisa dois aspectos principais dos direitos de autor relacionados com obras de IA: (i) se o trabalho de IA é criativo e (ii) a questão da atribuição de propriedade sobre obras geradas por IA. A atribuição de direitos de propriedade sobre obras criadas por IA é analisada por objetos: programadores, usuários, coproprietários de desenvolvedores com usuários, e o sistema de IA é de propriedade pública. O artigo também descreve as leis de propriedade intelectual da UE, dos Estados Unidos e do Vietname relacionadas com a proteção de obras criadas por IA. O artigo conclui sobre a necessidade de segurança para obras criadas por IA.

Palavras-chave: Inteligência Artificial. Direitos Autorais. Propriedade Intelectual. Criatividade. UE. EUA. Vietnã.

1. Introduction

Technology has played an essential role in the creative process for a long time. Since 1970, the computer, as a tool, has been able to create works of art even at a rudimentary level. However, the technological revolution nowadays requires people to rethink the interaction between machines and the process of creating work. Today, AI can create works of art with little or no human intervention. This means that, although programmers can set initial parameters, the computer program creates the work in a process similar to human thought processes. People. Once again, copyright law faces the big question raised by technology whether AI-generated works are protected by copyright and who owns the work created by AI.

The debate over who owns AI works has raged for over 50 years. In 1956, the United States Copyright Office denied registration for a song composed by a computer because it was not artificial (Bridy, 2016, 395–400). In 1980, the US Congress' Office of Technology Review acknowledged that "computer-aided creation significantly complicates determining originality and copyright. Thus, with advances in artificial intelligence, computer-aided designs, and computer-generated software, it becomes increasingly difficult to identify the creators who created it (US Congress, 1986, 69-73). That same year, the scholars also suggested that "when one thinks about the prevalence of using computer programs to create other works, one can see that the possibility of allocating ownership in computer-generated works is very high" (Samuelson, 1986, 1185-1187). To this day, scholars are still discussing how to allocate ownership of AI-generated work.

As can be seen, AI is limited in its programming scope. For AI to produce the desired results, the AI's functionality must be developed in a particular way, the data source must be carefully selected, and the AI's training must be directed so that the AI produces the results as expected. Creating works using AI requires intending to produce specific results and gathering all the resource elements necessary for that task. In other words, actors must actively invest in A for an AI system to operate until the output work (Kiseleva, 2018). This leads to the question of who should own AI works.

The extent to which humans contribute to creating AI works will be necessary to determine whether they are protected by copyright and who owns them. Machine learning

and deep learning algorithms can analyze and process input data many times before giving correct results, so how they are programmed will produce unexpected results for humans (Wachowicz & Lukas Ruthes Gonçalves, 2019, 68). That is, AI can create a work that humans only know precisely about this work once it is created. This implies that machine learning and deep learning algorithms can bring creativity to the work. This raises the question of the necessity of copyright protection for works created entirely or mainly by AI.

There are at least six possibilities for allocating ownership, including the owner of the AI system, the programmer (Samuelson, 1986, 1185-1187), the AI user (Breyer, 1970, 284–293), both the programmer and user who are the co-owners author (Breyer, 1970, 284–293), the AI system itself (Liebesman, 2010), or no one has ownership rights (Daniel, 2018, 145-173). The degree of autonomy of AI is increasing concerning human intervention. This explains why finding the proper legal rules for how AI works is complicated.

2. AI and characteristics affecting copyright law
AI Overview

To date, there is no universally accepted definition of AI. At the same time, it is not easy to determine when a system becomes a collection of components of AI. One of the methods defined in the 1960s was the Turing test. This test claims that if a computer can mimic human reactions for a certain period, it can be said that the computer is an artificial intelligence system (Veiksa, 2021). The idea that computers can learn and improve independently, independent of human intervention, stemming from Samuel's research, has become central to AI research and development (Stuart et al., 2016, 27). A human behavior". According to Tatiana Synodinou, AI is a system capable of automatically "generating ideas and to generate new forms of expression through the use of software that mimics the configuration of human neural networks" (Otero & Quintais, 2018, 15). A human behavior". This includes problems with visual perception, speech recognition, decision-making, translating between languages, and generating new results.

AI refers to systems that display intelligent behavior by analyzing their environment and taking actions, with some degree of autonomy, to achieve specific goals. Based on AI, systems can be completely software-based, operating in the virtual world (e.g., voice assistants, image analysis software, search engines, speech, and facial recognition systems).

AI can also be embedded in hardware devices (e.g., advanced robots, self-driving cars, drones, or Internet of Things applications) (European Commission, 2018, 237). AI systems can present themselves in very different ways, as some are narrower, and there are also more general AI systems (European Commission, 2019, 5).

Essential elements of an AI system

An AI system is generally composed of three essential elements:

Firstly, the algorithm is the first element that forms the basis of any AI program, the soul of the AI system (Lehr & Ohm, 2017, 653). An algorithm is "…any set of mathematical instructions for manipulating data or inferring through problems" (FINN, 2017, 17). Algorithms can exist without necessarily being linked to a computer or electronic device. For example, a cake recipe can be considered an algorithm in the physical world, as it is a series of instructions to achieve a specific goal (making cakes). Algorithms are one of the three essential elements that make up the operation of an AI system. An algorithm is a set of instructions that transforms a given input value into an output. This is done through lines of code that perform specific actions when applied to a particular computer. Such lines of code essentially form a computer program, also known as software. This type of software can be programmed in many ways to perform different functions. Machine learning software is one of the primary methods by which AI applications are created. Machine learning attempts to teach a program a trick in such detail that "even primitive animals can do it" (The Economist, 2015).

One of the most critical decisions programmers make in designing and building algorithms is choosing the most appropriate model based on the desired output. There are many models; the programmer will define the objective function and then set the parameters (Lehr & Ohm, 2017, 669-702). Next, the programmer selects the data sets to train the algorithm, including decisions on dividing the data for training and testing purposes. The size of the data and representativeness significantly affect the accuracy of the algorithm's predictions and the usefulness of the outputs. Ultimately, the programmer decides how and to what extent to adjust parameters and data before deciding that the algorithm is ready to "go live" (Lehr & Ohm, 2017, 669-702). Only after all those decisions have been made is the algorithm set to produce an output of its own.

However, machine learning is not the end of AI algorithms. Today, deep learning algorithms are one of the newest and most used types of AI. This algorithm is inspired by

the workings of the human brain and is based on an "artificial neural network" consisting of different connections and layers of data (Copeland, 2016). Through deep learning algorithms, AI can recognize scenarios complex for the human brain to detect. This process allows AI to be more efficient than machine learning.

Second, the hardware to run the application. Despite their extraordinary potential, AI algorithms can only function independently with enough machines to operate them. Hardware is where the computing speed of machines running AI applications comes in. There have been comparisons of AI needing hardware computing power like airplanes needing horsepower (Wachowicz & Gonçalves, 2019, 63). AI applications depend primarily on developing hardware systems – computers used to run various types of AI programs. Hardware must be capable and fast enough to process the required data and perform complex calculations to produce a satisfactory result from the input value (Wachowicz & Gonçalves, 2019, 57).

Third, data input information. Information data is any symbol (image, sound) that needs to be interpreted to become information, and the function of an AI application is to convert a given input value. Big Data is "representations of information characterized by their large volume, speed, and variety, which require specific technologies and analytical methods to transform them into value" (Andrea et al., 2015).

The roles of algorithms, hardware, and inputs are evaluated differently over time. During the 60-year history of computer science, from about 1950 to about 2010, algorithms have been emphasized and taken as the main object of research (Russell & Norvig, 2014, 27). However, recent research in AI shows that for many problems, it makes more sense to care about the input data. The growth of the Internet has allowed every user to create data and information such as photos, documents, and videos, which can be grouped into large data sets for analysis using specialized software. Today's world wide web is not simply a medium where only one party produces the content, and the other passively receives it. Instead, the website system is an interactive means of communication. Since the Internet is a space of many forms of communication, information of all kinds circulates in this medium. This data is combined into the input value of Big Data in AI software (Wachowicz & Gonçalves, 2019, 68). Therefore, at the present stage, input data is considered an essential element in the development of AI.

The creativity of works created by AI

Nowadays, more and more scholars assert the parallelism between AI research and human brain research (McCarthy, 2007, 1174–1182). AI attempts to imitate natural human intelligence through which machines can learn, perceive, process, compose, decide, and provide output (FINN, 2017, 17). Creativity is not a fixed concept that can be answered yes or no to the question "*Is AI creative?*" or "*Is AI smart?*" (McCarthy, 2007, 1174–1182). It is generally accepted that if a computer can react as a human would, within a reasonable amount of time, that computer is AI. That computer system can perform tasks that usually require human intelligence, such as visual perception, speech recognition, and decision-making (Veiksa, 2021).

Artificial intelligence is a way to imitate intelligence because the algorithm system is designed based on the arrangement of human neurons (G Rossi & Buscema, 2008). The AI system uses two neural networks designed from algorithms called generators and discriminators to generate work (Dworetzky, 2018). Data is transferred from one layer of neurons to another from a given input to provide an output. Each layer has a function triggered to update the data before passing it on next class. Such a model can predict, classify, or initialize information. Information can be propagated back from this layer of neurons back to the previous layer to modify the weights of neurons from the last layer to the first layer to generate outputs. have the correct values.

The operation of AI is said to have "*intelligence*" based on the following characteristics (Russell & Novig, 2016, 27) :

First, AI can simulate actions like humans. AI has a natural language processing system, automatic inference, and machine learning. These are systems that help AI take action to achieve a specific goal.

Second, the ability to think like humans, capable of rational thinking. AI developers focus on humans thinking to think (introspection, psychology, brain imaging). The architecture of the AI system is built based on the human thinking system so that the AI can think and create like humans. AI imitates human thinking based on logical reasoning. This logical reasoning helps the AI do the right thing in every situation.

Third, AI produces results as humans do. To do this, AI can learn from existing values, drawing inspiration from existing creations. To do so, the AI system is designed to be able to "criticize" itself, thereby helping to improve its creations in a better way through the operation of the system of tests.

From a human perspective, AI is creative. Looking at the four elements of a creative process in general, AI can respond to these elements in the following ways:

First, about the creative agent, AI can also play the role of a creative agent (Glaveanu & Kaufman, 2019, 250–260). Here, technology mediates the human world. Humans experience the world through technology. That means the technology can perform specific actions; for example, AI allows scientists to analyze large data sets. To do this, AI must be a cognitive engine (an agent that autonomously pursues a goal) (Haleys, 2017, 31–32). AI is a technology that can make decisions and change the processes in which it participates. In other words, intelligent systems can use only a tiny amount of experience and predict what will happen in many different situations (Mazzone & Elgammal, 2019). AI is a creative agent capable of perceiving the environment and taking action.

Second, about the creative process. Today, AI can be used in the creative process in different ways and at different stages in tasks requiring divergent and convergent thinking. Humans and AI can take on separate and complementary roles in co-creation (Kantosalo & Toivonen, 2016, 77-84). For example, AI can inspire human interaction during sketching tasks (Lin, 2020, 892). Besides, recent advances in AI technology have allowed AI to learn from other AIs (Knight, 2017). The AI machine learning system focuses on developing computer programs by experience. When a machine changes one of its programs or data sets, it learns and improves performance further in its subsequent operations.

Third, about the results of the creative process. The creativity of AI is often judged by the results it produces. AI-generated results have the following advantages: (i) AI-generated content can be more high-quality, accurate, and informative than human-generated content. This is because AI models can learn from large amounts of data and identify patterns that are invisible to humans; (ii) More diverse content: AI models can generate a variety of content, including text, images, and videos; (iii) AI models can create personalized content based on individual user preferences (Davenport & Mittal, 2022).

Fourth, in the field of creativity. AI is developed according to specific domains because it "must be trained using data whose statistics and characteristics are typical of the particular application domain under consideration" (Anantrasirichai & Bull, 2022).

Even so, the ability of AI in the creative process is very different from that of humans. People mobilize their skills into a creative process in a flexible and culturally appropriate space. Although AI can simulate some of these skills, it cannot incorporate

creative skills as humans can (Hertzmann, 2018). Current AI lacks identity and emotion and does not reflect "human life experience" (Mazzone & Elgammal, 2019).

3. Distribution of property rights to works created by AI
Allocate ownership to AI system owners

The theory of "work made for hire" is relatively interpreted to mean that an employer will use the services of workers to achieve a specific goal, here is to create work. In this case, the owner of the work is the employer, not the employee, even though the worker is the work's creator. Applying this relative interpretation to the AI creation process, an AI machine can be considered an employee (worker). And then, a programmer or owner of an AI machine will be the employer, by themselves, using the service of the AI device to create work. This new interpretation of the "work made for hire" doctrine could demonstrate the need for the future development of AI by incentivizing copyright protection for AI developers. Thus, the key to this application is to see AI as a worker, an employee, operating at the request of its hirer, the employer. The output generated by AI can be considered work within the "work made for hire."

AI is limited in its programming scope. For AI to produce the desired results, the AI's functionality must be developed in a specific way, the data source must be selected carefully, and the AI training must be directed so that the AI produces the expected results. Creating works using AI requires intending to produce specific results and gathering all the resource elements necessary for that task. In other words, the actor who takes the initiative and bears the main investment risk is seen as an employer who makes the results of using AI possible [54]. This solution will help solve the problem of Copyright of AI-generated works. One can consider the concept of AI as an employee, producing work for the employer.

This idea was first born in 2017 by Schlomit Yanisky-Ravid in an award-winning paper related to intellectual property (Yanisky-Ravid, 2017). According to the preceding, AI systems should be considered "working for the user" and not working independently as an "individual" (Yanisky-Ravid, 2017). The "work made for hire" doctrine applied to AI systems may be considered unready but not impossible. This theory is consistent with the concept that AI creates work and that AI users and its creators will have "ownership and liability about the work" ((Yanisky-Ravid, 2017). This solution will fill the legal gap that exists today regarding AI-generated works. Concepts such as "employer" and "employee" should be considered relatively within the scope of this doctrine.

The doctrine of "work made for hire" raises the question of whom the law will consider the person who arranges for the work to be created. Among the many difficulties that arise when AI and humans are involved in creating a work of art, the question of who owns the work is central. It can be any of the following: (i) The person who created the software; (ii) The person who taught how to use the software; (iii) Users, through their free and creative inputs into the software. According to Schlomit Yanisky-Ravid, rights should be attributed to "the more effective unit in controlling these structures" (Yanisky-Ravid, 2017). Thus, the theory poses the problem of determining who has the most influence in creating the work among the abovementioned subjects.

In addition, the Copyright transfer to the employer must be reflected in a written contract between the employer and the employee, the tenant, and the hired person. For example, in the United States, parties must sign a written document stating that the works "shall be considered a work of hire" (US Copyright Office, 2003). This raises a central issue, how can an AI program agree to transfer its copyright to an employer? This affects the theory's feasibility because treating AI as an employee is challenging.

In addition, it is necessary to address the issue of the protection period and moral rights. According to Professor Lionel Bentl, under this particular copyright regime, ownership of the work theoretically belongs to "the person who makes the arrangements necessary for its creation, the term of which is limited to 50 years and no moral rights are recognized" (Samuelson, 1986, 1185-1187). This has been documented in UK copyright law (CDPA203), which states that "in the case of a computer-generated literary, dramatic, musical or artistic work, the author shall be deemed the person subject to the arrangements necessary for the making of the work" (UK Copyright, 1988).

Allocate ownership to developers

Programmers are the people responsible for creating AI software. The view in favor of allocating ownership to developers focuses on the following reasons:

Firstly, the programmer is an essential contributor to the creation of the AI system. Without the creativity of programmers, AI might never have existed. All the programmer's creative choices in model selection, parameter setting, data selection and allocation, calibration, testing, and all other steps on the path from the original idea up to the final step to perform the output, as well as the tasks of monitoring and modifying the algorithm once it is up and running (Lehr & Ohm, 2017, 669-702). Any capabilities of the algorithm are

designed and controlled by the programmer. Algorithms can be programmed to express creativity, integrate randomness, or be designed to break the rules, all of which are from the programmer's design.

Second, the programmer "breathes" any work of AI. The programmer's choices in designing and modifying the algorithm have allowed the algorithm to be "creative" (Samuelson, 1986, 1185-1187). The algorithm itself is not inherently capable of producing anything except the ability the programmer gives it. Thus, an algorithm is like an extension of human creativity through the programmer. Even if an algorithm produces something innovative (Boden, 2007), that is only possible because of instructions and the ability to be programmed into it by the programmer.

Third, in terms of the operating mechanism, the computer operates according to the instructions of the programmer, not according to the instructions of the user. Although the AI user is the one who directly requests the AI system to create the work, such as the act of typing "compose" into the music maker, the programmer himself has written into the program the ability to allow the user to generate output by entering general instructions into the calculator. The complex and precise instructions for the computer will come from the programmer's code. This process of the programmer has a significant contribution to the output. Creating an excellent computer program requires the programmer's brain, time, and expense. It would be fair to allocate ownership to the programmer. If an AI system can produce quality work, at least part of the excellence in the output comes from the programmer's efforts.

However, some scholars have argued against granting copyright in computer-generated works to programmers for the following reasons:

First, empowering the programmer would be a significant break from traditional copyright principles by ignoring the mechanical origin of the work. The author of a work must be the one who "shapes" the work. Meanwhile, the programmer creates the ability to produce the output, not its practicality (Samuelson, 1986, 1205 - 1209). What the programmers design on the algorithm is just general information and principles, "no different from what teachers teach their students" (Haugeland, 1989). As for what the output of the machine might be, the programmer needs help to predict. Granting developers permission to all AI-generated outputs means incentivizing developers for works they do not know about. The unpredictability of the results suggests that the programmer needs more control over the output to be considered the work owner (Bridy, 2016).

publish works, and if "innovations are kept secret, it will not promote the advancement of useful science and art" (Samuelson, 1986, 1205 - 1209).

Third, users make decisions regarding the selection and editing of outputs, determining which versions to publish and which to discard (Samuelson, 1986, 1205 - 1209). One of the benefits of algorithms is their ability to operate at scale, and thus AI can produce large quantities of work. Users will often be forced to choose among those works. It is this choice that shows the creativity of the user.

However, users need help with several issues before being allocated ownership of the AI work. First of all, the programmer is still the one who decides the program's structure, as well as allows the degree of change of the program. In other words, if the programmer restricts the user's creative process or the AI is within the programmer's power, the programmer should still be considered the author. In addition, in the choice between programmers and users, the decision to whom the copyright should be allocated will vary based on the nature of the software. For example, it would be unfair and unreasonable if the programmer owned all outputs without considering user contributions. However, suppose a program creates work that only needs to be mechanically manipulated by the user (such as pressing a button). In that case, allocating ownership of the work to the user is unreasonable.

Both developer and user are co-owners

Both programmers and users have specific contributions to the AI creation process. If the allocation of ownership to either subject is unsatisfactory, consider both subjects as co-owners of the work.

However, being recognized as a co-owner creates many difficulties for developers and users. A work is considered to be jointly owned if it is created by two or more authors, with the intention that their contribution is to form integral or interdependent parts of a work. In a co-author relationship, there will usually be agreements and harmonization of the parties' interests. For example, when two scientists work together to write a book, they will often collaborate based on an awareness of the contributions to be made by each and of how they share responsibilities and benefits. In addition, both will participate in selling the work to the publisher. At least the co-authors have a prior minus relationship, and their interests are pretty harmonized, dating from when the work was unfinished (US Congress, 1986, 69-73). For computer-generated works, it is easier to establish a shared purpose

between programmers and users when these two subjects have a common goal of a specific output work. The user is the direct object of the creation of the work, and no connection is established with the programmer. This is not a typical co-authoring partnership. The user would typically use the program remotely via the Internet, and at that time, the programmer was not involved in creating the user's work. Therefore, enforcing a solution that distributes ownership jointly for users and developers will be very forced and brutal.

Allocate ownership to the AI system itself

Therefore, the AI system has no legal status and cannot own the work. However, this is unlikely to continue, as several jurisdictions have begun investigating the matter. For example, the EU Commission recommended to Parliament: "Create a specific legal status for robots in the long term so that at least sophisticated autonomous robots can be considered stateful. Electronic persons responsible for any damage they may cause, and may apply electronic characterization to cases where robots make autonomous decisions or otherwise interact with third-party independently". Therefore, it does not rule out the possibility that the copyright of a work will be awarded to an AI machine in the future.

The question, however, is, assuming that an AI machine can theoretically be granted rights to its work, how does this affect the traditional intent of intellectual property law? Are not. The main goal of the intellectual property system is to empower creators to create an impetus for innovation. Based on this reasoning, allocating intellectual property to machines makes no sense since machines need not be incentivized to make products (Samuelson, 1986, 1205 - 1209). Machines cannot be encouraged in the same way that humans are encouraged (US Congress, 1986, 69-73). Algorithms are inherently just following the programmer's commands and need no other incentives. While allocating property rights to humans would make much sense, allocating them to machines would reduce the effectiveness of copyright law's incentives.

In addition, giving ownership of the work to the AI system in exercising its rights is not feasible. The computer itself cannot perform the tasks the copyright owner should have. For example, suing copyright infringers or transferring rights to others (Glasser, 2001). A computer cannot think and act like a human; they depend on human instructions. This suggests more satisfactory solutions than machine allocation (Acosta, 2012).

AI-generated works are in the public domain

If copyrighting an individual subject still needs to be satisfactorily resolved and a co-authoring solution is deemed unfeasible, it may be best to keep works private (Hewitt, 1983).

The public domain requires that no one owns the rights to AI-generated works. This solution is consistent with the implication that the author of copyrighted works must be human. Since machines generate AI works, it does not pose a problem of copyright protection (Butler, 1981). Traditional copyright policy, however, aims to maintain an engine for the study and expression of valuable ideas and promote scientific development. Intellectual effort or investment toward AI development will be limited if no protection is granted to AI works. If their product is not copyrighted and does not bring economic benefits, it will not be worth developing (Butler, 1981).

In addition, licensing the output can provide an incentive for the owner to publish the work. If an excellent work has been created using AI, and the law considers this work untenable, then users will have no incentive to publish the work. If there is no protection regime to bring the product to the public, the product may never be released. Knowledge kept secret will never promote the advancement of science and art (Samuelson, 1986, 1205 - 1209). Therefore, the solution of viewing works created by AI as belonging to the public goes against copyright law's foundation.

4. EU legislation on the protection of works created by artificial intelligence

EU copyright law framework

The European Parliament has repeatedly mentioned the relevance of AI and copyright. The resolution was adopted on 16 February 2017, with recommendations to the Commission on Civil Code Rules for Robots stating: "No legislation specifically applies possible for robots, but … existing doctrines and legal regimes can easily be applied to robotics, although some aspects seem to require specific consideration" (European Parliament, 2017). A European Parliament's Committee on Legal Affairs study also highlighted the question in an October 2016 report: "This is a question that European policymakers may want to look at, considering the creative state of the robot itself... Can an autonomous robot be considered the author of an intellectual work, allowing it to be protected by copyright?" (European Parliament, 2017). Thus, it can be seen that although the reports acknowledge the relevance and importance of copyright issues for AI-generated

works, they do not answer whether the current EU law protects AI-generated works. The answer will lie in looking at the EU's legal framework regarding copyright protection.

The EU's legal framework for copyright includes directives applicable to all member states to harmonize the rights of authors, performers, producers, and broadcasters. These directives reflect the obligations of member states to comply with the Berne Convention, the Rome Convention, the TRIPS Agreement, the WCT Treaty, and the WPPT. Necessary directives in this area include Information Society Directive 29/2001/EC (InfoSoc); Software Directive 2009/24/EC (Software Directive); Database Directive 96/9/EC, and the Term Directive 2006/116/EC.

The above directives highlight two issues in the EU's copyright legal framework as follows:

First, Europe recognizes the role of copyright protection in the traditional approach. The conventional method accepts intellectual property rights exist to promote and encourage cultural and technological development. Essentially, exclusive rights provide the author with a financial return to compensate for the author's investment in creating the work (Kur & Dreier, 2013). Without copyright protection, others can freely benefit from the creator's efforts and thus stifle the development of the authors. Accordingly, a flawed copyright regime will discourage future investment in artistic and creative works (OECD, 2015). These considerations are stated in the preamble to Infosoc Directive 2001/29/EC: "The investment required to produce [innovative] products… is substantial. Legislation to protect intellectual property rights is necessary to ensure the availability of such rewards and to provide an opportunity to obtain a satisfactory return on the reward from this investment".

Besides the financial aspect, copyright also aims to reward creativity, stimulating investment in the creative sector (European Commission, 2016). The preamble to the Infosoc Directive 2001/29/EC defines a "harmonized legal framework for copyright and related rights, through solid legal enhancement and while providing a high degree of property protection, will spur significant investment in innovation and creativity, including infrastructure networks, and in turn lead to growth and increase the competitiveness of European industry, both in the content delivery and information technology and generally in many industrial and cultural areas. This will protect the work and encourage the creation of new work".

Thus, the EU copyright policy is a traditional copyright policy aimed at maintaining the economic engine for expressing valuable ideas and promoting scientific and literary development. Arts while simultaneously ensuring society's right to access knowledge (Butler, 1981). This formed the basis for today's European copyright framework.

Second, Europe recognizes standards for copyright protection of work based on compliance with the Berne Convention. The Berne Convention requires that a position to be protected must be "original" and "innovative" (Butler, 1981). The EU legislature addresses the requirement for originality and inventiveness in three directives: Article 1 (3) of Software Directive 91/250/EC and Article 3 (1) of Software Directive 91/250/EC. The Database Directive 96/9/EC, and Article 6 of the Term Directive 2006/116/EC. All three of these directives require that to be protected; a work must be original because it is "the author's intellectual creation."

The legal framework mentioned above shows that considering whether an AI-generated work is copyright-protected in the EU will be made based on the EU's approach to copyright, by the criteria set forth by the directives (in terms of originality and inventiveness). These criteria are illustrated in CJEU precedents.

CJEU's precedents

The first precedent is the dispute involving Infopaq company. Infopaq is a company that collects data from various Danish articles, then compiles abstracts of papers and sends them by e-mail to its clients. Disputes arise over whether Infopaq needs the consent of the owners of the pieces before copying them to send to customers.

Statement of the CJEU regarding the interpretation of Article 2(a), Infosoc Directive 2001/29/EC. Article 2(a) provides that authors have the exclusive right to permit or prohibit the reproduction of their "work." The CJEU considers that the interpretation of the "work" should be made by Article 2 of the Berne Convention. In addition to reference to Article 1(3) of Software Directive 91/250/EC, Article 3(1) of Database Directive 96/9/EC, and Article 6 of Terminology Directive 2006/116/EC, CJEU states that Article 2(a) of Infosoc Directive 2001/29/EC provides that a work protected by copyright when it is original, is "the author's intellectual creation" (ECJ Case C-May 8, 2009). The CJEU has completely harmonized the requirement for originality at the EU level. Besides, CJEU attaches great importance to the intellectual act of selecting and arranging text passages. "Regarding the elements of protected works, it should be observed

that they consist of words, considered individually… It is only through the choice, sequence, and combination of words that the author has able to express his or her creativity in an original and achieve an intellectual creation as a result." Thus, the creators of the articles have made a series of creative choices that render the original texts in the sense that they are "the author's intellectual creation." Thus, Infopaq needs the consent of the article owners before copying them to send to customers.

The second precedent in the Painter dispute, one of the questions in question, was whether a photograph could be published in magazines and on the Internet without the owner's consent (ECJ Case 145/10, 2011). In particular, the Court clarified whether the "original" photograph standard in Article 6 of the Term Directive 2006/116/EC includes portraits. The Court has pointed out that the criterion for judging whether a work can be considered "the author's intellectual creation" lies in the author's ability to "show his or her creativity in the process of producing the work, by making free and creative choices or not." Furthermore, by making these different choices, the author of a portrait can put their stamp on the work created. The Court then illustrated such creative options: "During the preparation stage, the photographer can choose the background, subject, pose, and lighting. When taking portraits, he can choose the frame, the angle of view, and the atmosphere created. Finally, when choosing a snapshot, the photographer can choose from various development techniques that he wants to apply or, where appropriate, use computer software" (ECJ, 2011). Thus, according to CJEU, a portrait photo is protected by copyright.

A third precedent, the creative criterion, was further clarified in the Murphy dispute (CJEU, 2011), in which the CJEU considered whether copyright issues were raised in sporting events. In this regard, the CJEU clarifies that about the process of "author's intellectual creation," there must be "creative freedom for copyright purposes." The Court concluded that since football matches are subject to the game's rules, they have no room for such creative freedom and cannot be copyrighted. The statement implies that a work is considered original only if it results from creative freedom. Game rules in sporting events are not credited to the author's creative freedom or protection.

The CJEU's decision in the Infopaq, Painter, and Murphy disputes clarified and developed the EU's concept of originality and inventiveness. The concept of "author's intellectual creation" is seen as the criterion for the claim of originality, that the author has

made a "free and creative choice" and expresses a personal impact in the creative process (Rosati, 2013).

Even so, the EU legal framework and CJEU precedents have yet to adequately explain whether an AI-generated work meets the requirements of originality and inventiveness for protection.

Protection of AI-generated works under US law

The "work made for hire" doctrine generally states that the law will treat the employer of the person who created the work as the "author" of the work. The result of the doctrine is that the employer has all the rights to own the piece, and the person who created the work cannot take back those rights. Work under this concept can be "a work prepared by an employee within the scope of his or her employment" or "a special work ordered for use."

The "work made for hire" doctrine derives from the United States copyright law, as defined by statute (17 USC § 101). If a work is "created for hire," then the employer is considered the legal author, not the employee-employee. The entity acting as an employer can be a legal entity or an individual (US Copyright Office, 2011).

Circumstances in which a work is considered "generated for hire" as defined by the United States Copyright Act of 1976 are (i) a work prepared by an employee within the scope of the work. Mine; or (ii) a work specially ordered or commissioned for use as a contribution to a collective work, as part of a cinematographic or other audiovisual work, as a translation, as additional work, as a compilation, as a guide, as a test, as a response document to a test, or as an atlas, if the parties expressly agree in writing signed by them that the work will be treated as a work for hire (17 USC § 101).

The first situation applies only when the work's author is an employee, not an independent creator. Determining whether an individual is an employee is determined by many factors, including consideration of whether an employer-employee relationship exists. On the other hand, if a freelancer created the work, there must be a written agreement between the parties specifying that the work was completed for hire, using the phrase "work made for hire" (US Copyright Office, 2003). A work-for-hire agreement is quite different from a copyright assignment agreement. Under a lease agreement, the authorizing party (lessee) owns all the rights from the start, while in a copyright assignment agreement, the creator first owns the work. In 1999, a doctrinal revision was included in the Satellite

Home Viewer Improvement Act 1999. It stipulates that phonograms by musical artists in recording studios can be classified as works made for hire (USt House of Representatives, 2000).

In the dispute between Bleistein and Donaldson Lithographing Co, the US court determined that "Personality always hides something unique. It expresses its singularity even in handwriting, and a very modest level of artistry has in it something inescapable, that of a single man. He can copyright it" (US Supreme Court, 1903). Even if AI is programmed to be creative, that creativity is done by the programmer. The programmer is the person who selects and edits the algorithm (Samuelson, 1986, 1205 - 1209). The algorithm cannot have any function except the one the programmer gives. Thus, an algorithm is more like an extension of human creativity than an independent entity with unique and creative capabilities. Even if an algorithm produces something innovative (Boden, 2007), that is only possible thanks to instructions and humans' ability to be programmed into it. The "creation" of the algorithm is essentially just the result of randomness and other rules determined by the programmer's choices. This is different from human creativity. While an algorithm will unthinkingly follow the programmer's instructions and not be influenced by other governing factors, humans can be creative with different motives. It is believed that "man's strength lies in his creation (Ziemele, 2019).

Vietnamese law on the protection of works created by AI

Realizing the importance of promoting artificial intelligence, on 26 January 2021, the Prime Minister issued Decision No. 127/QD-TTg promulgating the National strategy on research and development. And the application of artificial intelligence by 2030. Combined with the 2008 Law on High Technology, this strategy has become a legal framework to help Vietnam promote AI development. However, the current Vietnamese intellectual property law must be revised to solve the copyright issue for works created by AI (including the Law on Intellectual Property No. 50/2005/QH11 dated 29 May). November 2005 of the National Assembly, effective from 1 July 2006; Law No. 36/2009/QH12 dated 19 June 2009 of the National Assembly amending and supplementing several articles of the Law on Intellectual Property, effective from 1 January 2010; Law No. 42/2019/QH14 dated 14 June 2019, of the National Assembly, amending and supplementing several articles of the Law on Insurance Business and the Law on Intellectual Property effective from 1 November 2019; Law No. 07/2022/QH15 dated 16

June 2022, of the National Assembly amending and supplementing several articles of the Law on Intellectual Property, taking effect from 1 January 01 the year 2023).

About the concept of author and works

Article 12a, Law on Intellectual Property 2005 (amended and supplemented in 2009, 2019, and 2022) provides for authors and co-authors as follows: The author is the person who directly creates the work. Where two or more people now co-create the work with the intention that their contributions are combined into a complete whole, they are co-authors. The person who supports gives suggestions, or provides materials for others to create works is not the author or co-author. The co-authors must agree upon exercising moral rights and property rights for results with co-authors unless the work has a separate part that can be separated for independent use without prejudice to the number of other co-authors or otherwise provided by law.

This regulation shows that the author of a work must generally be a "natural person," a biological person. In addition, this provision also excludes the possibility of considering both humans and AI as "co-authors" of the work. This comes from the fact that the co-author must have "intentionally" contributed to combine into a complete whole of the work. The "intentional" claim is meant to affirm a person's will. The AI system is essentially just the operation of machines, so there can be no "intention."

Article 8 of the 2005 Intellectual Property Law (amended and supplemented in 2009, 2019, and 2022) stipulates the state's policies on intellectual property as follows: (i) Recognition and protection of intellectual property rights of organizations and individuals based on ensuring harmony between the interests of intellectual property rights holders with public interests; failing to protect intellectual property objects that are contrary to social ethics and public order, harmful to national defense and security. (ii) Encourage and promote creative activities and exploitation of intellectual property to contribute to socio-economic development and improve people's material and spiritual life. (iii) Financial support for transferring and exploiting intellectual property rights for public benefit; encourage domestic and foreign organizations and individuals to sponsor creative activities and protect intellectual property rights. (iv) Prioritize investment in training and fostering the contingent of cadres, civil servants, public employees, and related subjects in protecting intellectual property rights and researching and applying science and technology. (v) Mobilize the resources of the society to invest in improving the capacity of the intellectual

property protection system to meet the requirements of socio-economic development and international economic integration.

Regulations on the state's policy on intellectual property rights for works do not directly assert that the author must be a natural "human." However, the set goals such as "encouragement," "promoting creativity," "financial support," and "resource mobilization"… are all the driving forces provided to people. AI systems are machines, not suitable to receive these goals and motivations. Only natural people are ideal for spiritual and material reasons.

The Law on Intellectual Property 2005 (amended and supplemented in 2009, 2019, and 2022) stipulates that moral and property rights constitute copyright. Moral rights include the following rights: The right to name the work. The author has the right to transfer the right to use the right to call the work to the organization or individual receiving the transfer of the property right by the provisions of the Intellectual Property Law; The right to have actual or pseudonymous names on the work; be given a real name or a pseudonym when the work is published or used; The right to post the job or authorize others to publish the work; The right to protect the integrity of the work from being misrepresented by others; not allow others to modify or mutilate the work in any way that is prejudicial to the honor and reputation of the author.

The Intellectual Property Law does not define what "personality" is. However, Article 5 of the 2014 Law on Civil Status stipulates that one of the principles of civil status registration is to "respect and ensure personal rights" and "all civil status events of an individual must be fully registered. , timely, honest, objective, and accurate; if the civil status registration requirements are not satisfied, the head of the civil status registration agency shall refuse in writing and clearly state the reasons. Clause 2, Article 9 of the Civil Status Law also stipulates: "When carrying out civil status registration procedures and granting a copy of a civil status extract from the civil status database, the individual shall present identity papers to the agency. Civil status registration office. The application must be enclosed with a certified copy of the identity document if it is sent via the postal system. These regulations show that the element "personality" is a factor that accompanies natural people. AI is a machine system, not a natural human, so there can be no "personality" element.

In addition, the provisions on transferring intellectual property rights in the Intellectual Property Law show that only a natural person can perform the transfer

activities. These activities can only be done by entering into and performing contracts. A machine system that lacks free will, the unity of will, and expression of choice cannot be the subject of copyright transfer.

About copyright protection conditions and terms of protection

Clause 1, Article 6 of the Law on Intellectual Property (amended and supplemented in 2009, 2019, and 2022) stipulates the grounds for arising and establishing intellectual property rights as follows: works are created and expressed in a particular material form, regardless of content, quality, condition, means, language, published or unpublished, registered or unregistered. Thus, the Intellectual Property Law requirements show that, for a work to be protected, the work must first be "created." However, the Intellectual Property Law and the guiding documents do not have specific guidelines on what is "creative." Therefore, it will be challenging to determine whether the works created by AI are "creative" or not.

Meanwhile, Article 13 of the Intellectual Property Law (amended and supplemented in 2009, 2019, and 2022) stipulates that "An author is a person who directly creates part or the whole of a literary, artistic and science." This regulation shows that if AI creates a work, then any other subject (such as AI system owner, programmer, or user...) cannot be the work's author because these subjects are not the "direct" creators of part or all of the work.

Clause 7, Article 4 of the Law on Intellectual Property of Vietnam (amended and supplemented in 2009, 2019, and 2022) stipulates that a "work" is a "creative product in the field of literature, art, and science expressed by any means or form." Clause 3, Article 14 stipulates that a protected work "must be directly created by the author with his or her intellectual labor, and not copied from another person's work." This provision also excludes protection for works created by AI because humans do not "directly" do the job.

Regarding the term of protection, article 27 of the Intellectual Property Law (amended and supplemented in 2009, 2019, and 2022) provides that the following moral rights are protected indefinitely, including (i) Naming the work ; (ii) Putting your real name or pseudonym on the work; be given a real name or a pseudonym when the work is published or used; (ii) Protect the integrity of the work, not allowing others to modify, mutilate or misrepresent the work in any way that is detrimental to the honor and reputation of the author. The right to publish the work or permit others to publish the

work and the protected property rights for a limited time are as follows: (i) For cinematographic, photographic, applied art, and anonymous works, the term of protection is seventy-five years from the time the work is first published; for cinematographic, photographic or used artworks that have not been published within twenty-five years from the time the work is fixed, the term of protection is one hundred years from the time the work is published. Shape; (ii) Works that do not fall into the category specified above shall have a term of protection for the entire life of the author and for fifty years following the year of the author's death; in the case of a work with co-authors, the term of protection shall terminate in the fiftieth year after the year of death of the last co-author.

The term protection does not directly address the issue of whether a work created by AI is eligible for protection. However, the term protection is based on "the whole life of the author" and a period since the death of the author or the last author's death (in the case of co-authors), indicating that only works created by humans are eligible for protection because only natural humans can die. An AI system has no life, just like an AI system cannot die. This implies that this term of protection does not apply to works created by AI.

Thus, the current Vietnamese intellectual property law needs to address the protection issue for works created by AI directly. However, current regulations show that Vietnamese intellectual property law does not recognize AI as the author and does not agree to protect a work created by AI.

4. Conclusions and recommendations

Traditionally, copyright issues for computer-generated works have been simple. With outdated technology gone, a computer program is just a tool to support the creative process for authors, just like pen and paper support writers when composing. Nevertheless, with the latest types of artificial intelligence, a computer program is now a tool; it makes many decisions regarding the creative process without, or with the least amount of, human intervention. These are works created with little or no human interaction in the creative process. Once again, in the face of technology, intellectual property law is faced with a choice, either to refuse copyright protection for AI-generated works or to assign copyright to work.

For the first option, denying AI-generated copyright protection, the laws of many countries do not accept non-human copyright issues, including the laws of the European

Union and Vietnam. The second option gives authorship to the creator or user of the AI. This approach is reflected in the rules of some countries, notably the United States. This option helps to solve the problem of copyright protection for AI-generated work, even if computers do the creative process.

As can be seen, copyright law always tries to balance two goals. The first is to encourage the creation of works. The second is maintaining a certain legal standard, determining whether a work is protected by copyright. The fact that AI is capable of creating work is undeniable. However, legally, AI is not considered to have the same status as human creativity. AI-generated results cannot be equated with original works of art. While AI can successfully mimic or outperform a part of the human brain (especially when it comes to analyzing and synthesizing knowledge, rules, complex calculations, and conclusions or results), however, AI cannot have the characteristics of the human brain, such as inspiration, imagination, consciousness, and emotional expressions such as love and fear. Intellectual creativity is tied to people in the field of copyright, and no artificial intelligence system can replace it.

Technology can enable artificial intelligence to mimic or outperform a part of the human brain, especially in analyzing and synthesizing knowledge, rules, and principles. , complex calculations, as well as drawing conclusions or results. However, technology cannot reflect the emotional aspects of the human brain, such as inspiration, imagination, consciousness, and expression of emotions such as love and fear. Free choice and creativity leave a personal mark on the author, which artificial neural networks cannot equate with random output. Accepting that a machine can create a work of art does not say anything; it does not come from within people. Despite this, the current intellectual property legal system still needs to satisfactorily solve the copyright issue for works created by AI, especially with technology's rapid and unlimited development.

Creative work is essential for many reasons: a prosperous society, rewarding labor, protecting natural human rights, and developing culture. To secure these benefits, the copyright system provides an effective tool – monopolies (personality theory adds moral rights to this). Creating new objects would not be possible without the creators and their intellectual efforts. So anthropomorphic-centric creators will be provided with exclusive privileges and thus guaranteed the benefits mentioned. However, AI challenges this assumption.

The strong link between copyright and ownership must be reassessed to prepare copyright law for the AI and data-driven era. Instead of trying to allocate the copyright of AI-generated works, policymakers should focus on a system to economically reward those who produce creative results that AI can generate. In the case of the application of AI, the subject that has enabled the AI to act in a particular way is the person who permitted the work to be created. That theme intends to make AI generate copyrighted works and invest money and time toward that goal. Thus providing copyright ownership to AI-generated work maximizes social benefit and cultural diffusion.

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