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**Copyright in the context of generative AI systems: between the
originality of the work and the limits of legal protection for
generated outputs**

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Abstract :

Creativity is considered one of the qualities most closely associated with the human mind, as it is the product of complex mental processes that are unique to humans. However, with the emergence of generative artificial intelligence systems, which have imposed themselves in various fields, including intellectual property rights, the door has been opened wide to the possibility of extending the attribute of creativity and authorship to non-humans. From this standpoint, this research paper aims to highlight the extent to which the attribute of authorship can be bestowed upon artificial intelligence systems and the recognition of the latter's intellectual property rights for the works and compositions they generate. This is achieved by demonstrating the extent to which current legal texts on copyright can deal with works and compositions generated by artificial intelligence systems, through studying and analyzing legal, jurisprudential, and judicial opinions to determine the adequacy of traditional systems for protecting copyright in protecting works generated by artificial intelligence.

Keywords : Artificial intelligence; copyright; originality; ownership of generated outputs; legal protection.

Introduction:

In the context of the digital revolution, or what is known as the digital transformation era, intellectual property rights have undergone a radical transformation in the ways literary and artistic works are created. This has imposed legal challenges on legislation in this field to keep pace with these changes imposed by the digital revolution. Since the emergence of the internet and its accompanying repercussions, legal legislation has sought to adapt to the technological reality by addressing electronic piracy and combating violations of digital intellectual property rights. This has been achieved through developing and adapting the international and national legislative system by amending national legislation and concluding international treaties such as the WIPO core treaties on copyright: the Berne Convention for the Protection of Literary and Artistic Works, which stipulates human authorship as the basis for protection; the WCT, which protects the right to digitally distribute works; and the WPPT, which expanded the scope of copyright to include the digital environment. However, we are currently on the cusp of a more complex and broader technological revolution known as the Fourth Industrial Revolution, whose main driver is Generative AI, which has the ability to produce original content and generate creative outputs

similar to human creativity. These technologies have the ability to generate texts and images, and thus intelligent systems such as ChatGPT and DALL-E participate in the creative process itself, which was limited to human creativity. This has become a challenge to copyright laws and regulations, in which the human author is the core of these legislations. After previous digital technology was centered around the problem of the digital distribution of works created by the human author, generative AI raises a deeper problem, namely the concept of creativity itself and the basis of the legal protection granted to it.

Based on the above, the main research question revolves around: To what extent can the outputs of generative artificial intelligence be subject to copyright protection principles? In other words, how adequate are current copyright protection systems in protecting AI-generated creations?

The following questions stem from this main question:

- ☒ What are the limits of copyright protection for AI-generated works?
- ☒ Can artificial intelligence be considered an author in the sense of a human author?

- ☒ What are the criteria for determining the originality of AI-generated works?
- ☒ What are the limits of legal liability in cases of copyright infringement by AI-generated outputs?

Based on this problem, the following research hypotheses can be formulated:

- ✓ If copyright laws presuppose a human author as an essential element for entitlement to legal protection, then these laws will be incapable of protecting purely AI outputs that lack attribution to a human author.
- ✓ If substantial human contribution is proven, such as the formulation of precise instructions and the selection of outputs, then traditional copyright laws become applicable, protecting elements related to human contribution but not purely automated outputs.
- ✓ If the originality standard remains general without controls for measuring human intervention, this will contribute to a widening legislative gap and create ambiguity regarding the ownership and attribution of generated outputs.

The importance of this research lies in highlighting the legal challenges of generative AI as an author or partner in the creative process by shedding light on the adequacy of the traditional copyright protection system in encompassing and protecting AI outputs. The study's limitations are defined by its focus on the creative outputs of AI resulting from generative models, without expanding to include patents. The research aims to:

- ❖ Establish the principles of copyright and originality in light of AI-generated outputs.
- ❖ Analyze the legal challenges posed by AI model outputs to the fundamental principles of copyright.
- ❖ Classify the types of works produced by AI models: original, derivative, joint, and collaborative.
- ❖ Evaluate the legality of training AI models on protected works.

The descriptive-analytical approach was employed, describing and analyzing relevant legal texts. The comparative approach was utilized where necessary.

THE FIRST TOPIC : Limits of authorship recognition for generative AI systems

To understand the relationship between copyright and artificial intelligence, which raises the issue of the attribution of works arising from artificial intelligence systems to whom they belong and the extent to which intelligent systems can enjoy the status of author, considering that the latter produce creations that require protection and the determination of their legal status, we must first clarify the legal concepts of artificial intelligence systems and copyright in the first requirement, and then the legal nature of artificial intelligence systems and the extent to which they can be granted the status of author in the second requirement.

First requirement: Conceptual framework of generative artificial intelligence and copyright

Creativity is a quality associated with the human mind. However, artificial intelligence systems and their capabilities that rival human creativity have opened the door to the possibility of extending this quality to non-humans. The jurisprudential and legal debate is still ongoing regarding the extent to which generative artificial intelligence systems can have the status of author and whether the outputs of these intelligent systems are considered works protected by copyright. Before delving into the legal challenges posed by these systems and

their outputs, it is worthwhile to establish the conceptual framework of generative artificial intelligence in the first section and then move on to the concept of copyright in the second section.

First section: The concept of generative artificial intelligence systems

There are numerous definitions of the term artificial intelligence (AI), and no single definition has been agreed upon. It's worth noting that AI is composed of two words: intelligence and artificial. Each word has its own definition. According to Webster's dictionary, intelligence is the ability to perceive and understand conditions related to variables. This means that intelligence encompasses perception, understanding, and learning. The word artificial, on the other hand, is derived from the verb "to create" or "to manufacture." Therefore, this term refers to materials created through artificial means, distinguishing them from things that exist naturally without human intervention.¹

Therefore, defining artificial intelligence (AI) is not as straightforward as defining human intelligence. There is no single, universally agreed-upon definition. Consequently, before delving into the various definitions of AI, we must first examine the definition of human intelligence. This will facilitate understanding AI, which is defined as the ability and skill to devise solutions, employ different research methods, and utilize acquired experience to generate new knowledge for solving problems in a specific field. It is worth noting that the study of human intelligence was initially confined to psychology. However, technological advancements have led to the integration of various sciences in the study and simulation of human intelligence systems, ultimately resulting in the integration of innate human intelligence and acquired human experience into computer software systems.²

Before delving into definitions of artificial intelligence, it's worth noting that numerous definitions exist, some focusing on humans, others on machines, their functions, and characteristics. Below, we'll review some of the most important definitions. Some define it as: the characteristics and behavior of computer programs that enable them to mimic human cognitive abilities and patterns of operation.³ In another definition, artificial intelligence is defined as a computer program system capable of performing tasks and drawing conclusions that resemble, albeit to a limited extent, human intelligence. Others have defined it as: the simulation of human intelligence processes through machines and software, and in particular, computer systems.⁴ The World Intellectual Property Organization (WIPO) has also provided a definition of artificial intelligence, stating that it is a discipline in computer science that aims to develop systems and programs capable of performing tasks that require human intelligence, with or without limited human intervention.⁵

In a different definition, artificial intelligence is defined as a branch of computer science concerned with developing computer programs that mimic human intelligence by enabling computers to perform some tasks that require thinking instead of humans.⁶ Based on the above, artificial intelligence can be

defined as the science concerned with the design, development, and programming of computers in order to give them the ability to perform tasks that usually require human intelligence.⁷ Therefore, after addressing the concept of artificial intelligence in general, it is essential to understand the concept of generative AI, which is the focus of our study. It is worth noting that generative AI is a branch of artificial intelligence that includes systems enabling users to create innovative content in response to prompts, such as text or images. This is achieved based on the training data of these systems, which rely on machine learning and neural networks to simulate human capabilities in creating new, original, and innovative data or content.⁸ Among the forms of generative artificial intelligence that generate texts is the natural language generative chatbot ChatGPT, released by OpenAI, where the abbreviation GPT stands for "Generative Pre-trained Transformer".⁹ Sunthesia, which can create a video output, Speechify, which produces an audio output, and DALL-E producer.¹⁰ From this perspective, the concept of generative artificial intelligence refers to those systems that have the ability to perform tasks that mimic human intelligence and can improve their efficiency and performance based on the results and data available to them.¹¹ Therefore, generative artificial intelligence (GAI) can be defined as a branch or category of AI algorithms that generate new outputs using the data they have been trained on.

Based on the above, the difference between GAI, which refers to a branch of AI that relies on machine learning systems and neural networks to automatically produce new, innovative content such as images, text, video, and code, and AI, which refers to the broader field of all AI systems, including GAI, becomes clear. It is evident that humans are no longer the sole and direct source of creativity. Artificial intelligence has emerged with creative capabilities that sometimes surpass human capabilities, which has sparked debate about the ownership of these innovative works and whether they can be attributed to AI. Before delving into this debate, we must establish the foundations of copyright and its content to understand the issues raised by AI works under current copyright laws.

second section: The concept and content of copyright

Intellectual property legislation includes the protection of all human works and innovations, considering humans as the sole owners of intellectual property rights in general, and copyright in particular, given their capacity for creativity and innovation, and their legal personality that qualifies them to acquire rights and bear obligations. In this regard, legal scholars have defined the author as any person who produces an intellectual or mental creation, regardless of its type or method of expression, as long as this production possesses a degree of originality. It is worth noting that the term "author" usually refers to a natural person rather than a legal entity, due to considerations related to creativity, which is essentially the fruit of the mental and personal effort of a specific individual.¹² In another

definition, the author is the original owner of the copyright, who is necessarily the natural person who created the work.¹³

In this context, the Algerian legislator defined the author in accordance with Article 12 of Ordinance 03/05¹⁴ However, the author of a literary or intellectual work is considered to be the natural person who created it, and in some cases stipulated under the provisions of this order, a legal person may be considered an author. In this regard, it becomes clear to us that copyright applies to all creative works originating from human invention, such that these rights are granted to their creator as exclusive rights towards others in return for his creation and in appreciation of the fruit of his effort. In this context, if we review the term authorship specifically, we find that it refers to that human intellectual and mental creativity that is embodied in the formulation and crystallization of ideas, emotions, and feelings and bringing them into existence through tangible works.¹⁵

With the spread of artificial intelligence systems, concepts have changed, and traditional copyright laws, whose provisions protect human creativity, no longer encompass the creations resulting from intelligent systems. These systems possess the ability to create in various forms. For example, the ChatGPT program produces content interactively based on requests and questions directed to it, relying on its vast databases. Similarly, the E-DALL program can produce and compose original images and artwork based on written commands. Thus, the creative and authorial capabilities of these intelligent systems have sparked widespread debate, given their immense potential, which rivals the creativity of the human mind. In this context, the question arises of how to distinguish between works produced by these systems: should they be attributed to the intelligent system itself, or to the human who gave the commands and requests to the intelligent system to formulate the content or output? This issue is extremely complex and intertwined, given the nature of artificial intelligence systems, which almost position themselves on par with human intelligence.¹⁶

second requirement: The legal nature of generative artificial intelligence systems and the extent to which they can be granted authorship status

Given the creative capabilities of generative AI systems in the field of authorship and content creation, which rival human creativity, the question arises: Does generative AI, given its creative capabilities in authorship, meet the legal protection requirements stipulated by copyright legislation? This question leads us to a fundamental issue, namely the issue of classifying AI systems themselves and the extent to which they can be granted the same author status enjoyed by human authors. To answer this issue, we have divided this requirement into two sections, whereby in the first section we address the legal nature of generative AI systems, and in the second section of this requirement we address the possibility of applying the author status to generative AI systems.

First section: The legal nature of generative artificial intelligence systems

The question of the legal nature of artificial intelligence systems in general, and generative artificial intelligence in particular, is one of the most prominent legal issues in contemporary jurisprudence. This is because it touches the core of traditional legal classifications. In light of the rapid development of these systems, which have become capable of producing creative works of texts, images, and designs, the latter are no longer merely technical tools. Rather, the matter has evolved beyond that, as these systems have become an intermediary within the content production chain. Before moving on to the field of copyright and the possibility of assuming a non-human author, it is necessary to determine the legal classification of these systems. It should be noted that the jurisprudential treatment of artificial intelligence systems is still limited to general artificial intelligence. Consequently, we will try to review the most prominent jurisprudential positions in this regard and attempt to apply them to generative artificial intelligence systems. Jurisprudential opinions on this issue have been divided into two main trends, which will be detailed as follows:

The first approach, which supports granting legal personality to generative artificial intelligence systems:

Proponents of this approach base their argument on resolutions issued by the European Parliament, which call for the long-term recognition of legal personality for artificial intelligence and robots, where autonomous robots can be considered "electronic persons."¹⁷ Those who hold this view consider artificial intelligence systems to possess a legal personality independent of their original creator, by analogy to the provisions of legal personality, which is recognized by most laws as having a legal entity without a physical existence.¹⁸

In this context, proponents of this view justified their arguments for granting artificial intelligence systems an independent legal personality based on the principle of the legislator's authority to recognize legal entities, as previously mentioned. According to them, the reasons that led the legislator to recognize legal entities as having legal personality are merely evidence of the legislator's ability to create new categories of persons whenever the need arises.¹⁹

Based on the idea that generative artificial intelligence systems do not rely on providing information in its original programmed state, but rather possess the ability to analyze and classify data in order to generate new outputs using artificial neural networks, it is therefore necessary to recognize generative artificial intelligence as a legal entity while taking into account the technical specificity of these systems.²⁰

The opposing view is that generative artificial intelligence systems should not be granted legal personality:

Conversely, another school of thought, notably French jurisprudence, opposes granting legal personality to artificial intelligence systems. Their argument is that granting these systems legal personality would raise a number of legal problems, including the possibility that such recognition would inevitably lead to laxity on the part of the creators of these intelligent systems and a lack of

precision in their production and use. This, in turn, could provide a pretext for evading responsibility for actions that cause harm to others. Furthermore, those opposing this view add another argument to support their position: that achieving public benefit through the creation or modernization of these systems does not necessarily warrant granting them unfamiliar legal statuses, which would ultimately lead to the existence of non-existent legal entities.²¹

Those who oppose granting legal personality to artificial intelligence systems add to their arguments that civil law in most countries recognizes only two types of legal personality. The first is the legal personality of a natural person, which is only established upon fulfillment of certain conditions, the most important of which is being born alive. The second is the legal personality of a legal entity, or what is called a corporate entity, which is also granted upon fulfillment of certain conditions. Intelligent systems cannot be classified as natural persons because they are limited to human beings. Similarly, they cannot be classified as corporate entities due to the different nature of each. More importantly, granting these systems legal personality requires that they possess free will, which is impossible for systems that have not yet reached the stage of self-programming without human intervention.²²

second section: The extent to which the author's role applies to generative artificial intelligence systems

The field of copyright, in its traditional structure, is based on a close link between the work and the author, in terms of the assumption of human creativity and the connection of some rights, especially literary ones, to the creator's personality.²³ After delving into the ongoing legal debate surrounding the legal status of artificial intelligence systems, and considering their capacity for innovation and creativity, we now turn to the possibility of positing a non-human author or establishing a unique legal framework distinct from the traditional concept of authorship. This raises the question of whether it is possible to consider generative AI systems as equivalent to human authors. If so, do these systems possess the same rights granted to human authors and stipulated in copyright laws?

It is worth noting at the outset that computer programs have been widely used since the 1970s in creating copyrighted works without raising any fundamental issues regarding ownership. This is because the function of these programs was limited to supporting the creative process, and human intervention was an essential element in producing the work. The legal status of these programs can be likened to that of writing tools and technical means, which, by their very nature, are not attributed with originality or authorship. However, the situation has changed radically with the emergence of generative artificial intelligence systems. Computer software is no longer merely an aid but has become capable of autonomously generating works and possesses the ability to make decisions that are relatively independent of human will.²⁴

This development in intelligent systems has directly impacted copyright law. In this context, the more autonomous AI systems become in making creative decisions, the greater the ambiguity surrounding the true author of the outputs they generate. This necessitates a reorganization of the current copyright system by expanding the concepts of originality and authorship to accommodate the outputs of generative AI. Within this framework, there are two main approaches for dealing with AI-generated works where human intervention is limited or nonexistent: either excluding copyright protection from these generated works, or assigning authorship to the system's creator or the entity behind its development.²⁵ In this context, we refer to The Next Rembrandt project, a computer-generated artwork model—a 3D-printed painting created by a facial recognition algorithm that analyzed data from hundreds of well-known original paintings by the Dutch artist Rembrandt. This project is sponsored by the Dutch banking group Ing, in collaboration with Microsoft and the marketing consultancy J. Walter Thompson. This project encapsulates the legal issues raised by generative AI systems regarding authorship and the limits of copyright protection. In this case, to whom is the authorship attributed: the developers of the algorithm and database, the funding body, or is the work excluded from copyright protection due to the lack of human creative contribution in its final form?²⁶ This work, created by generative artificial intelligence systems, is an applied example of the legal challenges and problems that works created by these intelligent systems pose to the traditional concepts of copyright protection. This prompts us to elaborate on the classical conditions for copyright protection and attempt to apply them to outputs generated by artificial intelligence in the following topic.

THE SECOND TOPIC : The legal framework for protecting copyright in the face of generative artificial intelligence outputs

Copyright is a moral right that provides legal protection for original artistic and literary creations and grants the owner of these creations and innovations exclusive powers to exploit them for a specific period determined and regulated by the legislation regulating copyright and neighboring rights. However, the emergence of generative artificial intelligence systems has disrupted the traditional legal foundations of copyright in terms of the principle of originality and human authorship required by copyright protection systems. To determine the legal framework for protecting outputs generated by intelligent systems, we have divided this topic into two requirements, so that in the first requirement we address the traditional conditions for protecting copyright in the face of the challenges of intelligent systems' works, and we have dedicated the second requirement to studying the adaptation of artificial intelligence outputs to the traditional divisions of copyright.

First requirement: Traditional copyright protections in the face of the challenges posed by intelligent systems.

Generative artificial intelligence systems raise a number of fundamental legal issues related to traditional copyright protection frameworks, posing challenges to the traditional conditions set forth by national legislation and international copyright protection agreements. This section will be dedicated to attempting to apply traditional copyright protection conditions to the outputs of generative artificial intelligence, and we have divided this section into two sections as follows:

First section: The human author as an essential element for entitlement to protection

Generative artificial intelligence systems have created significant challenges for traditional copyright frameworks, which have long required human authorship as a prerequisite for entitlement to protection. This issue remains a subject of widespread debate, as the author is required to be a natural person, although some laws and regulations relating to copyright stipulate that a legal entity is considered an author. However, it should be noted at this point that the legal entity's enjoyment of authorship status with respect to some works only relates to the possibility of the legal entity enjoying authorship rights, not that the legal entity acquires authorship status. The requirement of human authorship is derived from the Berne Convention for the Protection of Literary and Artistic Works, which, according to the text of Article 2, requires the existence of a human author for literary and artistic works.²⁷ Likewise, Article 12/1 of Order 03/05 relating to copyright and neighboring rights²⁸ In this regard, it should be noted that the United States Patent and Trademark Office (USPTO) and the United States Copyright Office (USCO) have concluded that artificial intelligence systems are not natural persons and, therefore, do not possess the status of creator or author of the generated works. Consequently, they are not entitled to patent or copyright protection in the United States. It is worth mentioning that the same laws that prohibit granting authorship to non-natural persons allow for the granting of patent and copyright protection to individuals who create works generated by artificial intelligence systems. However, legal protection in this case does not extend beyond the extent of human contribution. The DABUS case serves as an example in this context. The USPTO rejected an application for two patents independently derived by an artificial intelligence system called DABUS, arguing that the creator must be a natural person. The US Federal Court of Appeals upheld the USPTO's decision, based on the finding that the creator was not a natural person. The US Supreme Court also rejected the appeal filed by computer scientist Steven Thaler seeking a patent for the two inventions.²⁹

Although the DABUS case primarily concerns the invention aspect of patent law, it also has important implications for the debate surrounding artificial intelligence and copyright, specifically regarding the principle of whether

generative AI systems can be granted authorship for the works they generate, and who owns the copyright to those works generated by these intelligent systems: the AI software developer or the user of such software?³⁰ The debate surrounding AI-generated works and copyright has recently intensified. However, it's noteworthy that legal precedent and jurisprudence in the United States and Europe have not accepted the idea of granting AI systems the status of authors. This stems from the legal framework in this area, which presupposes the principle of human authorship. Their justification for this stance rests on the argument of human intervention in AI-generated works. This position was further reinforced by the 2018 US Court of Appeals ruling in the globally renowned case of *Naruto the monkey*, which rejected granting copyright to the monkey that took a series of photos after snatching the camera from the photographer.³¹

second section: Standard of originality and personal creativity

For intellectual property rights to be protected under copyright law, a work must contain a creation or invention attributed to a personal concept. This concept presupposes that the author is the person who creates the work. An original work is one that stems from the author's personal imprint, which permeates their creative work. In this context, copyright protection requires that works possess originality. Legally, originality is defined as an independent creation with a minimum degree of creativity. This criterion does not require novelty or artistic value, as is the case with patents. However, it does require the author to create original works rather than mechanically reproducing existing ones. This criterion is closely linked to human authorship because it presupposes that creations are made by a person with the capacity for understanding. On this basis, the originality criterion distinguishes between works worthy of copyright protection and routine works. Researchers have discussed the extent to which artificial intelligence systems can meet the requirements of the originality criterion, considering that current AI systems lack the awareness necessary for creativity. This is because these systems rely on training data through statistical pattern recognition rather than making conscious decisions. This is where the difference and the criterion for distinction in copyright law lies. Which rewards creations based on awareness and intention, not accidental or mechanical outputs.³²

In this regard, the US Copyright Office has taken a decisive stance against protecting works created solely by artificial intelligence systems, considering that copyright law presupposes human authorship. The *Dabus* case is a clear example of this position, as the copyright was refused due to the work's lack of a human author. The courts have upheld this approach. Conversely, the office has also addressed works created with the assistance of artificial intelligence in a modern and distinctive manner. This involves differentiating between cases where the intelligent system is merely a tool that relies on human intervention, in which case such works can be protected to the extent of the human contribution, and cases where the work is produced independently by the intelligent system, in which case it is not protected. The *Zarya of the Dawn* case exemplifies this modern approach. In this case, Kristina Kashtanova produced a graphic novel using AI-generated

images through the Midjourney program. Initially, the copyright office granted the novel a copyright, but later reconsidered its decision and ultimately decided to protect the text, layout, and formatting without protecting the AI-generated images. This decision embodies a functional approach that focuses on examining the creative contributions in each work rather than excluding them. All works that incorporate artificial intelligence in an absolute sense, and on this basis, the office concluded in its decision that Kristina Kashtanova's selection and arrangement of the images, along with their pairing with original text of her own creation, constitutes a sufficient degree of human authorship, and therefore the work deserves legal protection in its entirety.³³

In light of the above, it becomes clear to us that generative artificial intelligence systems lack the personal imprint of the author on his work, and the condition of originality presupposes human authorship. On this basis, artificial intelligence systems do not enjoy the status of author in any way under the traditional conditions of copyright protection legislation.

second requirement: The current approach to copyright ownership of generative artificial intelligence works

The issue of ownership of works generated by artificial intelligence systems has sparked widespread debate in legal circles. Given the lack of recognition of legal personality for artificial intelligence systems, the incompatibility of traditional copyright protection conditions with the nature of AI-generated works, and the exclusion of the idea that AI systems possess the status of author, this legal vacuum leads us to question who owns AI-generated works. In other words, who owns the copyright to AI-generated works? Is it the software developer as the owner or the user as the creative director?

First section: The AI-generated work is attributed to the software developer as the owner

Intelligent system developers make a major contribution to the creation of AI-generated works. Although these works and works are not directly created by the intelligent system developer, they would not exist without the intelligent software developer. Therefore, it is logical and likely that the designers of this software own the works generated using their programs. The term "software developer" refers to the individual who develops the intelligent software, as well as the companies that work in this field and employ programmers to develop these programs under employment and collaboration contracts. Ownership of these programs ultimately reverts to the software development company.³⁴ However, it is worth noting in this regard that the issue of ownership of AI-generated works presents two hypotheses: The first scenario is considering AI systems as agents, in which case the principal or founder holds the copyright. The second scenario is dealing with AI systems as computer programs or consumer products, in which

case the end user of the programs is the copyright holder, not the company that sold those programs.³⁵

In this context, we find the Nova case in the United Kingdom. The Copyright, Designs and Patents Act 1988 in the UK regulates the copyright protection of computer-generated works in cases where no human author is involved. Thus, the aforementioned law does not require human authorship as a condition for protection. According to the provisions of this law, the author of a computer-generated work is the person who undertook the necessary arrangements to create the work. In this context, some consider this law to be the first global legislation protecting copyright in the context of artificial intelligence technology. They have also called for the adoption of the computer-generated works provisions of the 1988 law to address the challenges of developing artificial intelligence systems. The Nova Productions v. Mazooma Games and Others case does not concern artificial intelligence, but rather the computer-generated game Pocket Money. The judge examined whether the computer-generated work in this game could be attributed to the programmer or the user and ultimately concluded that the necessary arrangements for creating the work were undertaken by the programmer. On this basis, the programmer is considered the author under the provisions of Section 9, Paragraph 3 of the 1988 law.³⁶ Although the ruling in the Nova case regarding ownership of computer-generated work between the programmer and the player was logical, the matter is different and not straightforward in all software technologies, especially with regard to artificial intelligence systems. This is due to the difference between traditional programming, which relies on sequential instructions for the machine, and AI systems, which rely on a massive amount of data to train the machine. Therefore, software is not the only influential aspect in intelligent systems, and software developers have significantly less control compared to traditional software. Consequently, claiming ownership of AI-generated work by the software developer is not always easy. In another case in China, specifically Tencent v. Shanghai Yingxun Technology Co., The case, involving an article about the Shanghai Stock Exchange written by an artificial intelligence program, saw the court rule that the software developer had contributed originally to the AI-generated work and, therefore, was the owner of the work. This was because the work would not have existed without the developer's choices in defining the criteria for selecting and arranging the existing data, which the AI then used to complete the arrangements for writing the article. It is worth noting that this case is exceptional from a comparative law perspective, as courts rarely rule that AI developers have demonstrated skill in the creation of an AI-generated work.³⁷

second section: The AI-generated work is attributed to the user as the owner of the arrangement

The second approach attributes the generated work to the AI user, considering them the originator of the work. This is because software developers cannot fully

understand the AI's decision-making process or predict its outputs. Therefore, attributing ownership of the work generated by their software to the software is not feasible or ideal on a general scale. Furthermore, the role of developers in AI-generated work is more marginal compared to computer-generated work, as seen in the cases of Nova and Tecent. On the other hand, if companies producing smart system applications sell these applications to users as consumer products, and users create new works using these applications, the AI application's manufacturer loses copyright, which then transfers to the user. For example, Hexachords has a product called Orb Composer that generates music using AI. This product helps users create musical models. Similarly, Automated has produced and sold an AI product called Insights, which uses natural language generation and helps users write human-like narratives. In this case, the user has ultimate control over the AI's output. The attribution of these works should belong to the user, and the latter should have copyright rights if the artificial intelligence program is a consumer product.³⁸ In this context, we find the case of Feilin v Baidu China, which revolves around a dispute over the ownership of the article "Big Judicial Data in the Film, Television, and Entertainment Industry." The plaintiff published the article, while the defendant argued that it was not copyrighted because it was the result of the plaintiff's search in the Wolters Kluwer database, which presented the results in the form of an analytical report containing statistics and charts on the subject of the disputed article. The Beijing court ruled in favor of the plaintiff because the latter had created original content, distinct from the search results in the disputed article.³⁹

Conclusion:

In conclusion, this research paper states that the contributions of generative artificial intelligence systems and their ability to author cannot be overlooked. Under the current traditional copyright systems, which cannot accommodate the outputs of artificial intelligence, AI systems have become a key element in the creative process at present. However, the current traditional legal frameworks for legislating copyright have become unable to keep pace with this shift in concepts related to authorship and innovation. In light of this deficiency, the question remains: who owns the works generated by artificial intelligence? However, it is likely that legal systems in this field will continue to grant legal protection to works that contain a certain degree of human creativity until legal rules are established and created that keep pace with the requirements of these intelligent systems.

This study yielded the following results:

_There is a legislative gap in regulating artificial intelligence systems, particularly in the area of intellectual property rights.

_Traditional legal frameworks (such as the Berne Convention and national legislation) remain limited to the concept of "human authorship," which leaves AI systems' works without any current legal basis.

_The entitlement to legal protection for a work depends exclusively on the presence of a creative human imprint. Therefore, in the case of self-generated works, the work lacks the requirement of originality under copyright law.

_AI systems have given rise to a new category of works: "hybrid works," which combine human and artificial intelligence. This has created several complexities in assessing the degree of contribution and determining protection.

_Works generated by AI cannot be legally protected under existing copyright laws due to the absence of the necessary conditions for protection.

Based on these findings, we recommend the following:

- Enacting specific legislation to regulate AI-generated works, granting them "adjacent" copyright protection.
- Requiring applicants for copyright registration with relevant authorities to disclose the extent of AI tool use and to document prompts to demonstrate human effort in the AI-generated work.
- Enacting legal provisions to regulate the legal status of AI systems.

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