

Analysis of Copyright Attributes of Artificial Intelligence-Generated Content in Education and Teaching

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Abstract: With the spread of AI-generated content in education and teaching, many problems related to the copyright of such works have recently emerged. The three contents of this paper are the criteria for determining originality, the logic of ownership attribution and the scope of fair use. In terms of the newness of this study, the basis of reference will be changed from general works to the set of possible expressions under the same type of teaching task. According to the criterion of "substantive creative control" at the level of ownership attribution, this paper proposes that the right should be jointly held by users and developers, and a joint copyright structure should be established in the collaborative generation model. Fair use at the level of this paper refers to the conditions for the exception of reproduction acts, citation norms and the balance of interests in non-commercial dissemination. The purpose of this paper is to provide a theoretical basis for the copyright protection of AI-generated works in education and teaching.

Keywords: AI-generated content, education and teaching, copyright attribution, originality criteria, ownership attribution, fair use

Introduction

Artificial intelligence-generated content is now being used in many parts of education and teaching. It has the functions of exercise creation and lesson plan design for the automatic production of classroom presentation materials, and it is now widely used in teaching. At present, the main object of the copyright system is the creative works of natural persons. There are no clear institutional answers to the problems of whether algorithm-generated works meet the requirements of a work, who should be granted rights over them (the developer or the user), and how much exemption from liability can be given for their reproduction and dissemination in teaching activities. The theoretical gap mentioned above will restrict the actual application of generated content in teaching materials and prevent the good effects of artificial intelligence in education from being realised. Therefore, one should first learn the general rules of copyright law and then systematically study how to determine originality, distribute ownership, set boundaries for fair use in works created by artificial intelligence in educational and teaching contexts, and provide a theoretical basis for handling related disputes.

1. Criteria for Judging the Originality of Artificial Intelligence-Generated Content

1.1 Definition of the Creative Act for Generated Content in Education and Teaching Scenarios

The goal of content generation in education and teaching activities is to spread knowledge and promote learning. When artificial intelligence is employed in this manner, whether the result is text, exercises or teaching plans, it will only be regarded as a "work" under copyright law if there are intellectually creative decision-making nodes in the generation process. In the normal teaching instruction input mode, the user enters keywords for the subject, structural requirements, difficulty parameters, etc., and then the artificial intelligence will organise the content based on its training data. If the only change is to modify the original pattern of the algorithm, then the first requirement of individual expression in a work of art will not be met. At the same time, after a user has interacted with, filtered, modified or rearranged the generated content several times and made some selections at the level of teaching logic, this can also be regarded as an extension of the creative act.

The foundation of defining the creative act is to distinguish between "triggering generation" and "dominating expression". Teachers or students often give binding instructions during the course of teaching in light of the specific goals of that lesson. These instructions only provide a general direction for the generation of content and do not specify the style of language, selection of examples or interpretation paths for that content directly. If the artificial intelligence has a large number of expressions in its parameter space that exceed the expectations set by the instructions, and this diversity cannot be attributed to any particular choice by the user, then the expressive form of the generated content should be considered an autonomous output of the algorithm. In this case, the user is closer to the role of a "tool user" than to that of an "author"; only when the user adds or modifies content based on their own evaluation of the results of intermediate generation can the final output be considered a work of art^[1].

1.2 Dimensions of Differentiation for Algorithm-driven Generation and Human Intellectual Contribution

Generally speaking, the attributes of algorithm-generated data are that they can be reproduced and have some statistical properties. If the same input instruction and the same model are used repeatedly without changing the parameters, the resulting sequences of content will generally be very similar or even the same. The former does not have the problems of non-reproducibility, irrationality and subjectivity in the creation of knowledge by humans. Based on the technical logic of copyright attribution, the main reason for distinguishing between the two is the "origin of expressive choices". If, for every replaceable word, structure or example in the content, there are several choices with the same probability according to the internal probability distribution of the algorithm, and if the algorithm does not make a non-deterministic selection based on external aesthetic or logical standards, then this selection process lacks the intentionality of human intellectual activity.

In addition, the intellectual contributions of people are often displayed in their active creation of expressive forms, such as the selection of rhetorical devices, organisation of the sequence of arguments and establishment of a hierarchy among ideas. In the generation of education and teaching content, a teacher can have an artificial intelligence system produce three different explanations for a particular point of knowledge, and then select the one that best suits the cognitive level of the class and modify its word order and examples. At the same time, the algorithm can generate several draft versions in parallel; this is a computational act at the level of data processing, and selecting a version and adjusting the word order is an expressive decision made by the user at the level of intellectual input. The two are quite different; the former is the foundation for generation and variation, and the latter offers values and the final selection of expressions^[2].

1.3 Applicable Difficulties of the Objective Originality Standard and Their Adjustments

The aim of originality in copyright law is that a work should have an individual expression and be different from the usual way of doing things; it should not be reduced to rules or models. Most of the AI-generated content in education and teaching is used to spread standardised knowledge, and the resulting works are often uniform, highly reusable and lack diversity. For example, in creating a sample problem to solve a quadratic equation, most models are in the form of a story, such as: "standard form - discriminant calculation - quadratic formula substitution". Although the above structure can achieve the aim of teaching, it is difficult to confirm its originality in terms of purpose because it is very similar to the arrangement in other textbooks. The old standard of originality may result in the creation of many works with practical teaching value, but these are routine expressions that do not meet the criteria for copyright protection.

Therefore, the basis for the criteria of the original work needs to be modified to address the problems mentioned above. Originality in the field of education and teaching should not be considered an absolute deviation from the norm; rather, it is the creation of "non-unique reasonable expressions" within the scope of specific functions. If, for the same teaching goal and the same starting material, different people can achieve different expressions by taking different paths or interacting with the materials in various ways, then there is room for individualised exploration. In this case, the object of evaluation should be not only the degree of difference between the final content and the existing templates but also the expressive guidance provided by the user during the generation process that exceeds the minimum required range. Change the frame of reference from "general works" to "the set of possible expressions under the same type of teaching task", and the norm for originality can be both general and relatively inclusive in the teaching application of artificial intelligence-generated content.

2. The Logic of Ownership Attribution for Artificial Intelligence-Generated Content in Education and Teaching

2.1 Rules for the Initial Allocation of Rights Between Users and Developers

The problem of copyright for AI-generated works is that at the beginning, it has not been clear who should own the rights; that is, it is unknown whether the developer has made an original contribution to the work by creating an algorithm and training data. However, the developer's work is to create a system that can generate expressions; they do not directly create a specific work. In education and teaching, the user enters the instructions for the teaching task and sets functional or stylistic requirements for the output content. The behaviour of the user is closer to that of a commissioning party for a commissioned work. If only the developer holds the copyright, then users will no longer be able to modify the output of the generated results. If only the user owns the copyright, then there will be no place for the algorithm to use it in its own expression choices^[3].

Generally speaking, the current copyright system is based on the idea that the person who creates a work is the first owner of the rights. An index of the "effective creative direction" will be used to determine if it is AI-generated content. If the information in the instructions is rich enough to achieve the desired effect for a particular type of expression, such as asking for a teaching explanation that includes a specific analogy, personification or non-structured argumentation logic, and the output of the artificial intelligence meets these requirements accurately, it should be regarded as that the user has made an expressive choice. On the other hand, if the user only enters a general topic for the request and the artificial intelligence generates various expressions independently that are not in line with the instructions, then the creativity in such variation should be attributed to the algorithmic mechanism developed by the developer. The rule of allocation is that the right of mention should be given to the party that can anticipate and lead the details of the expression, rather than being determined by the physical operator.

2.2 The Effect of Teaching Instruction Input on the Copyright Ownership of Artificial Intelligence-Generated Content

The first feature of the input for teaching and learning is that it should be both functional and expressive. The more specific the instructions, the more control one can have over the results of their work in terms of copyright ownership. If the instruction is only "generate an example question about Newton's first law of motion", then the artificial intelligence system must independently choose the numerical values, type of object, narrative order and language style. In this case, most of the choices at the expressive level are determined by the probability distribution of the algorithm, and it is difficult for users to claim creative contributions to the specific combination of words and sentences in the example question. On the other hand, if the instruction explicitly requires "use the scenario of a soccer ball continuing to roll after being kicked, with an initial velocity of 10 meters per second, a friction coefficient of 0.2, and narrate in the first person", then the user has already prepared the main expressive elements of the content, and artificial intelligence only needs to carry out the executive function of linguistic filling and logical coherence.

Gradual teaching in a few rounds will also increase their sense of responsibility. First, write a rough draft and then, according to the revision instructions, revise the argument structure and examples. Every modification instruction that adds an expression is a new idea for the generated content. If it cannot be determined whether the expressive part provided by the original algorithm is different from the modified part by the user, then the entire generated work will be considered a joint work under the user's direction. It should be pointed out that if there is originality in the input to the teaching instruction itself, such as the construction of a complete instructional design framework or an original sequence of questions, this instruction may be protected as an independent literary work. However, the ownership attribution of the instruction and the output content should still be determined separately^[4].

2.3 Construction of Joint Copyright in the Collaborative Generation Mode

There are many cases of cooperation among all parties in the education and teaching system to apply artificial intelligence for content creation. A teaching and research group can jointly design a sequence of instructions, a teacher and a student can interactively adjust the generation results, or different users can successively and iteratively revise the same draft. If the intellectual contributions of all parties are required for the first publication of the final work during the course of joint creation, then

joint copyright may be established. Collaborative generation and simple relay generation differ in that, in the former, the instruction input for each subject in the collaborative process is not just summed up but is integrated into the same unit of expression (such as a paragraph or a set of teaching steps). Teacher A can present the general plan of the explanation for the concept; Teacher B can add three specific examples of analogies under this plan, and then artificial intelligence can generate a complete paragraph based on the above.

In order to establish such joint copyrights, both the condition of "intention of joint creation" and the condition of "identifiability of contributions" must be met. The aim of joint creation in the area of education and teaching can be shown by the operation records of a collaboration platform or a clear division-of-labour agreement. The problem of identifiability is that, due to the intermediate nature of artificial intelligence generation, the expressions of all participants are often interwoven in the final text. Based on the above, the "joint ownership" model will be adopted, and both co-owners will have the right to use the work together. However, in exercising their rights externally, the co-owners need to reach an agreement, and the division of benefits internally will be in proportion to the degree of contribution to the originality of the work. To avoid the inflexibility of joint ownership, a presumptive licence agreement can be made for the scope of non-commercial teaching activities, and any co-owner will be free to use the content in their teaching. Only when the content is to be published outside or used commercially will the consent of all co-owners be obtained.

3. Fair Use Boundaries of AI-Generated Content in Education and Teaching

3.1 Exemption Conditions for the Reproduction of Generated Content for Teaching Purposes

Reproduction of artificial intelligence-generated content in teaching activities refers to behaviour such as classroom display, distribution of learning materials and uploading to teaching platforms. If the copyright holder does not permit such reproduction and it is outside the scope of fair use, then it will not be considered fair use. The main reasons for this are the "transformative goal" of the reproduction behaviour and the displacement effect on the market for the original work. If the purpose of the reproduction behaviour is not to show off, but rather to elaborate on the in-class teaching, reinforce knowledge, refer to students' homework, etc., then it no longer meets the original functional requirements of artificial intelligence-generated content. The works that have been created are original works, and when teaching reproduction, they serve as teaching materials. Change the goal so as not to violate the reproduction rights of others.

Set out the conditions for exemption, and the scope of reproduction should be in line with the teaching objectives. During the course of education and teaching, reproduction should be limited to what is necessary to achieve the goals of teaching. For example, copying a paragraph of the artificial intelligence-generated concept definition for classroom explanation is more likely to meet the conditions for exemption than reproducing the whole long text in several separate parts for the same explanation. How frequently and how widely it has been distributed is also one of the reasons. Internal reproduction by a single class is less likely to affect the potential market of the copyright holder than public reproduction on a platform open to all students at the school, and is therefore more likely to meet the exemption conditions. It should be pointed out that the establishment of an exemption does not require that the reproduction behaviour be entirely free from loss of revenue for the copyright holder; rather, it needs to be within a reasonable scope after considering the public interest in education.

3.2 Citation Norms and Limits for Using Generated Content as Teaching Materials

AI-generated works can be used as teaching materials, but some of the original materials created by people also need to be included. The three parts of the norms for citation are: the teaching value of the purpose of citation, how long the citation needs to be, and the obligation to identify the source of the citation. Teaching relevance refers to the creation of materials that can be directly used to show or give examples of the lesson content, and it should not be trivial. For example, showing the typical output paragraph produced by an artificial intelligence system to explain the logic of algorithm generation is teaching-relevant; on the other hand, quoting an artificial intelligence-generated poem that is not related to the subject in a literary appreciation class is out of bounds^[5].

The rule for determining whether to quote is whether it is a "basic expression" or not. If the cited content only consists of facts, ordinary examples or lists of data in the generated works, then these parts lack expressive uniqueness, and even with a relatively long citation length, there will be little effect on

the market exclusivity of the original copyright holder. At the same time, if the citation is highly personalised in terms of rhetorical structure, metaphorical system or argumentative path, even a short length may be considered appropriation of an important part of the original work. The citation limit in education and teaching may refer to the teaching substitution test; that is to say, it should be ensured that the cited materials are sufficient so that students do not need to access the original generated content. If the citation is the most original expression of the core of the original work and does not require students to learn the whole work, it should be regarded as an appropriate use of the work.

3.3 Non-commercial Teaching Dissemination and the Interest Balancing Mechanism with the Copyright Holder

Dissemination of non-commercial teaching refers to the distribution of artificial intelligence-generated teaching materials on teaching network platforms, school resource libraries, teaching and research exchange channels, etc., without direct economic benefits. The main difference between this type of dissemination behaviour and commercial use is that the reason for spreading it is not to make money through reproduction or distribution, and the scope of spread is generally limited to the educational community. Not being for profit does not mean it is fair use. Due to the wide dissemination of the content, the licensing opportunities in the teaching authorisation market have been taken away from the original copyright holder; although the disseminator does not earn direct income, the copyright holder will lose a considerable sum of money and may have to take legal action.

The basis of the interest-balancing mechanism is the introduction of a dual system of "cumulative effect control" and "reserved authorisation areas", and cumulative effect control should consider the total number of disseminations and the population covered by the same generated content in all teaching scenarios. If only one piece of content is spread by hundreds of teachers in various schools independently, the combined effect may be to harm the market for original works. Although the spread by each person is non-commercial, the general behaviour of dissemination should still be within the scope of licensing obligations. Reserved Authorisation Areas indicate that the copyright holder will still be free to use some parts of the work, such as developing fee-based teaching materials based on it, applying it in secondary training for generative artificial intelligence, or taking it out of the teaching environment to spread as popular culture. For non-commercial teaching dissemination outside of this area, a statutory licence or a collective management organisation can be set up to obtain low-cost dissemination licences for users and thus balance the convenience of teaching with the interests of copyright holders.

Conclusion

The copyright status of works created by artificial intelligence in education and teaching cannot be determined according to the old system for identifying works. Given the special circumstances of teaching, we will adjust the norm of originality, the logic of ownership attribution and the scope of fair use. In terms of the degree of originality, the demand for absolute novelty should be replaced with the idea of "non-uniqueness and reasonable expression", and the user's expressive guidance should also be taken into account in the evaluation. At the level of ownership attribution, the contributions of users and developers should be distinguished according to the degree of refinement of the instructions, and a joint copyright structure with an internal presumptive license mechanism should be introduced for multi-party collaborative generation. In the case of fair use for reproduction of works, the goal of transformation should be clear, and there should be limits on how far it goes. Citations need to pass the teaching-substitution test, and for non-commercial distribution, consider the interests of all parties, control the overall impact, and leave some space for permission. In the future, we will learn about all kinds of copyright attribution requirements for generated content at different levels of education (e.g., primary school and upper grades of secondary school), and how iterative development in generative artificial intelligence technology has changed the criteria for determining the "source of expressive choices".

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