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COPYRIGHT AND ARTIFICIAL INTELLIGENCE

Abstract

Artificial intelligence is being applied across all areas of life, including the creative domain, and holds significant potential. From the perspective of the broader public interest, such potential should not be hindered, as its further development may yield possibilities that were until recently beyond imagination. However, continued advancement must not occur to the detriment of authors as individuals, nor of the creative industry as a whole. The hypothesis that the existing legal framework is insufficient to adequately address this issuehas, regrettably, been confirmed through scientific analysis. It is concluded that the relationship between artificial intelligence and copyright law gives rise to two principal issues: the copyright protection of AI-generated works and the training of AI models on protected content. Both aspects necessitate urgent legal intervention, primarily to ensure legal certainty.

Keywords: copyright law, legal protection, artificial intelligence, author, AI model training, legal certainty, rule of law.

I Introduction

The emergence of artificial intelligence justifiably marks the advent of a new era of technological revolution, the impact of which extends beyond the purely technical sphere and permeates a wide range of social, economic, and legal relations.

When the development of artificial intelligence is observed over a broader temporal horizon, it becomes evident that the underlying ideas are not novel. As early as the mid-twentieth century, Alan Turing devised a test that laid

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the foundation for subsequent research in artificial intelligence, seeking to determine whether machines are capable of thinking, that is, whether they can exhibit intelligent behaviour indistinguishable from that of humans.[1] Subsequent technological advancements have constituted a significant step forward, primarily due to increased computational power, the development of the internet, and the availability of vast quantities of data.[2] Nevertheless, a decisive turning point occurred with the development of generative models capable of producing novel content, such as text, images, and video. Such content is becoming increasingly difficult to distinguish from that created by human authors, thereby calling into question the traditional conception of authorship and human creativity. At the same time, there has been a growing number of legal disputes concerning the use of protected content.

The aim of this paper is to identify the legal issues arising for the traditional postulates of copyright law within the novel context of artificial intelligence, as well as to assess the extent to which the existing legal framework is capable of providing concrete solutions.

In order to ascertain the actual impact of artificial intelligence and its models on copyright law, it is first necessary to define their concept and mode of operation. Thereafter, the fundamental concepts and principles of copyright law will be outlined. The central part of the paper will focus on the key issues arising at their intersection, in particular with regard to the training of artificial intelligence models on protected content, as well as the question of copyright protection of content generated through the use of such models.

II The concept of artificial intelligence and generative models

1. Artificial intelligence

A universally accepted definition of artificial intelligence does not exist; rather, numerous authors and institutions have advanced their own, typically simplified definitions, emphasizing its fundamental characteristics and methods of operation. Artificial intelligence is subject to continuous development, which renders it difficult to confine within a single precise definition. This is further influenced by the fact that it constitutes one of the most recent fields

[1] T. Mucci, The History of AI, https://www.ibm.com/think/topics/history-of-artificial-intelligence, last visited: 14. 3. 2026.

[2] M. Hajdarović, Povijesni pregled razvoja umjetne inteligencije, *Poučavanje povijesti* 3(2024)1, 70.

within scientific inquiry.[3] In its broadest sense, artificial intelligence is equated with algorithms. However, the term "algorithm" denotes a set of defined instructions for solving a problem or performing a computation. If artificial intelligence were to be defined merely as the use of algorithms, such a definition would also encompass numerous other activities, such as the operation of a pocket calculator or even instructions contained in a cookbook.[4] In its narrowest definition, artificial intelligence refers to the imitation of human intelligence by computers.[5] This understanding is also adopted by one of the pioneers in computing and information technology, the American corporation IBM, which describes AI as a technology enabling computers and machines to simulate human learning, comprehension, problem-solving, decision-making, creativity, and autonomy.[6]

On the other hand, the European Commission frames its definition around so-called AI systems, stating that artificial intelligence refers to systems that exhibit intelligent behaviour by analyzing their environment and taking actions with a certain degree of autonomy in order to achieve specific objectives. Such systems may be exclusively software-based, operating in the virtual realm (e.g., voice assistants, image analysis software, search engines, speech and facial recognition systems), or AI may be embedded in hardware devices (e.g., advanced robots, autonomous vehicles, drones, or Internet of Things applications - IoT).[7] That definition characterizes artificial intelligence through its three principal functions: perception, reasoning/decision-making, and action.[8]

An important aspect of its operation is machine learning, which encompasses a variety of techniques, including the widely used deep learning.[9] A key

[3] S. J. Russell, P. Norvig, *Artificial Intelligence: A Modern Approach*, 3rd ed., Prentice Hall Series in Artificial Intelligence, Hoboken, NJ 2020, 1.

[4] H. Sheikh, C. Prins, E. Schrijvers, *Mission AI: The New System Technology*, Research for Policy, Heidelberg 2023, 15.

[5] *Ibid*.

[6] C. Stryker, E. Kavlakoglu, What is AI?, https://www.ibm.com/think/topics/artificial-intelligence, last visited: 15. 3. 2026.

[7] European Commission, High-level Expert Group on Artificial Intelligence A Definition of AI: Main Capabilities and Disciplines, 2019, 1, https://digital-strategy.ec.europa.eu/en/library/definition-artificial-intelligence-main-capabilities-and-scientific-disciplines, last visited: 15. 3. 2026.

[8] *Ibid.*, 3.

[9] *Ibid.*

component in the development of machine learning systems is the dataset[10], which represents a collection of data, most often organized in tables, sequences, or other structured formats.[11] Such large datasets (typically containing billions of words from sources such as websites, books, and articles) are used to train so-called Large Language Models (LLMs). The most prominent example of such a model is OpenAI's ChatGPT (Chat Generative Pre-trained Transformer). LLMs represent a significant advancement in the way humans interact with technology.[12] When examining the domains addressed by artificial intelligence, it can be concluded that its fundamental and primary objective is to create a machine capable of exhibiting human-like behaviour.[13]

After having defined the concept of artificial intelligence and some of its operational modalities, it is also necessary to outline two main approaches to AI research. The first approach is so-called strong artificial intelligence (Strong AI), also sometimes referred to as artificial general intelligence (AGI), which aims to develop a machine possessing intellectual capabilities equivalent to those of a human being.

The second approach is so-called weak artificial intelligence (Weak AI) or narrow artificial intelligence (ANI – Artificial Narrow Intelligence), which focuses primarily on performing a single task in a manner comparable to human performance.[14] Some authors refer to weak (narrow) AI as traditional artificial intelligence (Traditional AI).[15] Supporting this characterization as traditional AI is the fact that all AI systems realized to date fall within the scope of weak artificial intelligence.[16]

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[10] A. Paullada *et al*., Data and its (dis)contents: A survey of dataset development and use in machine learning research, *Patterns* 2(2021)11, 1.

[11] A. Badman, M. Kosinski, What is a dataset?, https://www.ibm.com/think/topics/dataset, last visited: 15. 3. 2026.

[12] C. Stryker, What are LLMs, https://www.ibm.com/think/topics/large-language-models, last visited: 16. 3. 2026.

[13] D. Stipaničev, Lj. Šerić, M. Braović, *Uvod u umjetnu inteligenciju,* Split 2021, 14.

[14] *Ibid*., 15.

[15] K. Lo, Generative AI vs Traditional AI, https://www.blueprism.com/resources/blog/generative-ai-vs-traditional-ai/, last visited: 15. 3. 2026.

[16] D. Stipaničev, Lj. Šerić, M. Braović, *op. cit*., 15.

2. Generative models

For the purposes of this study, which examines the impact of artificial intelligence on copyrighted works and copyright law, it is particularly important to define the concept of generative artificial intelligence (GenAI) as a subtype of weak (narrow) artificial intelligence. Generative artificial intelligence refers to programs that, using deep generative models, are capable of producing new and realistic content - such as text, images, or computer code - often based on simple user instructions (prompts).[17]

Such deep generative models ("Deep Generative Models") have emerged as a class of deep learning models capable of generating new content based on existing data, thereby creating a range of novel possibilities for the application of artificial intelligence.[18]

The concept of prompt engineering was initially elaborated in an online article by Gwern Branwen, a writer and technologist who analyzed the capabilities of the GPT-3 model in the field of creative fiction.[19] Prompting represents an interaction technique and a distinctive feature of generative artificial intelligence, enabling end users to communicate with generative AI applications using natural language and to guide them *ad hoc* in producing the desired output, such as text, images, or other types of content.[20] Depending on the type of generative application, prompts vary according to the nature of the input data and directly influence the system's operation. For instance, "text-to-image" applications use textual prompts that describe the visual characteristics of the desired image, whereas "image-to-image" applications use an input image to direct the generation of new content.[21] The most well-known applications functioning as generative models include OpenAI's ChatGPT, Google's Gemini, and MidJourney.

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[17] L. Banh, G. Strobel, Generative Artificial Intelligence, *Electronic markets* 33(2023), 1.

[18] *Ibid*., 3.

[19] G. Branwen, GPT 3 Creative fiction, https://gwern.net/gpt-3, last visited: 15. 3. 2026.

[20] H. Dang *et al*., How to Prompt? Opportunities and Challenges of Zero-and Few-Shot Learning for Human-AI Interaction in Creative Applications of Generative Models, 2022, 1, https://arxiv.org/abs/2209.01390.

[21] L. Banh, G. Strobel, *op. cit*., 3.

III The concept and legal sources of copyright law

Copyright law forms an integral part of intellectual property, both of which emphasize subjective rights and intangible assets, namely intellectual creations.[22] The Croatian term for copyright (*autorsko pravo*) derives from the Latin word *auctor*, which in modern languages is used to denote the creator or author of an intellectual work.[23] The term *copyright* is employed, similarly to property law, to denote both a right in the objective sense and a subjective sense.

In the objective sense, copyright can be defined as a set of legal norms governing legal relationships concerning intellectual creations in the literary, scientific, and artistic domains. In the subjective sense, copyright can be defined as the right recognized by objective law to the author of intellectual creations in the literary, scientific, and artistic domains with respect to their work.[24] Subjective copyright encompasses: a) economic rights, which constitute predominantly exclusive rights to use the copyrighted work; and b) moral or personal rights, which protect the personal interests of the author.[25]

In most countries, the primary source of copyright law is specialized legislation (in Croatia, the Copyright and Related Rights Act).[26] Certain norms are also found in bylaws, such as the Rules on the Council of Experts for Remuneration in the Field of Copyright and Related Rights.[27] Considering the transnational character of copyright use, international treaties constitute a significant source of copyright law.[28] The foundation of international regulation was laid by the 1886 *Berne Convention for the Protection of Literary and Artistic Works*, which has been adopted by 181 countries, including the Republic of Croatia.[29]

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[22] G. Loje, Prava intelektualnog vlasništva, *Pravo i porezi* 22(2013)7-8, 69.

[23] I. Henneberg, *Autorsko pravo*, Zagreb 2001, 1.

[24] *Ibid.*, 3.

[25] I. Henneberg, *op. cit.*, 4.

[26] Copyright and Related Rights Act, *Official Gazette*, No. 111/21 – hereinafter: Copyright and Related Rights Act.

[27] Rules on the Council of Experts for Remuneration in the Field of Copyright and Related Rights, *Official Gazette*, No. 38/22, 152/22.

[28] I. Henneberg, *op. cit*, 3.

[29] Berne Convention for the Protection of Literary and Artistic Works, TRT/BERNE/001.

It was later supplemented by the *WIPO Copyright Treaty*[30], ratified by Croatia in 2000.[31]

As a member of the European Union, Croatia's legal system also incorporates EU law. Directive 2001/29/EC, known as the InfoSoc Directive,[32] represents a fundamental instrument for harmonizing copyright law in the digital environment within the EU. Almost two decades later, Directive (EU) 2019/790 on copyright and related rights in the Digital Single Market[33] was adopted, representing the continuation of European copyright law development in the modern digital context.

Regulation (EU) 2024/1689[34], commonly referred to as the *Artificial Intelligence Act (AI Act)*, represents the first unified EU act addressing artificial intelligence. The AI Act specifically addresses certain copyright issues in the context of AI; regarding the training of AI models on data from protected works, it does not introduce new concrete solutions but instead refers to the existing framework established by Directive (EU) 2019/790.

IV Fundamental concepts and principles of copyright law

1. Copyrighted work

A copyrighted work represents the central concept of copyright law.[35] The term "copyrighted work" refers to intellectual creations in the fields of literature, science, and the arts.[36] Croatian legislation stipulates that a copyrighted work

[30] WIPO Copyright Treaty (WCT) 1996.

[31] Act on the Ratification of the WIPO Copyright Treaty, *Official Gazette*, No. 06/00.

[32] Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society, *OJ* L 167, 06/06/2019

[33] Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market, OJ L 130, 17.5.2019.

[34] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act) (Text with EEA relevance), *OJ* L, 2024/1689, 12.7.2024.

[35] I. Henneberg, *op. cit.*, 81.

[36] *Ibid.*

is an "original intellectual creation" and possesses an "individual character."[37] These two concepts constitute a legal standard, as the law does not strictly define the criteria for their assessment; rather, this depends on the specific case.

For an intellectual creation to be recognized as having the creative character of a copyrighted work, a certain degree of novelty is required. Unlike patents, trademarks, and other objects of industrial property, which require so-called objective novelty, objects eligible for copyright protection require so-called subjective novelty.[38] Subjective novelty is satisfied if the author has not copied another work known to them.[39] Subjective novelty points to the principle of originality, which constitutes the *conditio sine qua non* of copyright protection[40] that is, the minimum requirement that must be met for a given intellectual creation to qualify for copyright protection.

Copyrighted works may exhibit a greater or lesser degree of originality, but regardless of the level of originality, all copyrighted works that meet the minimum originality requirement enjoy the same scope of copyright protection. In the literature, there are criticisms of this approach, arguing that equating minimally original works with those that possess a higher degree of originality in terms of protection creates an unfair system, in which the law rewards works of minimal originality and highly original works equally.[41] These criticisms are becoming increasingly relevant with the advent of new technologies, particularly artificial intelligence.

In order for a work to be recognized as copyrighted, it must have a perceptible form, which is achieved through means of expression such as written or spoken language, bodily movement, sound, and various two-dimensional and three-dimensional forms. Written language may exist in printed or electronic, i.e., digital, form. Digital content encompasses any content stored as digital data in a specific format, including data transmitted or broadcast via program signals and streaming technologies (e.g., Spotify, Netflix).[42] This approach of requiring a material form ensures copyright protection exclusively for realized forms of creative expression, while abstract ideas and concepts are not

[37] Article 14, paragraph 1 of the Copyright and Related Rights Act.

[38] I. Henneberg, *op. cit.*, 84.

[39] A. Verona, *Pravo industrijskog vlasništva*, Zagreb 1978, 145.

[40] G. Parchomovsky, A. Stein, Originality, *Virginia Law Review* 95(2009)6, 1505.

[41] *Ibid.*, 1506.

[42] D. Lučić, *Nove informacijske tehnologije i otvorena pitanja autorskog prava*, Zagreb 2023, 2.

protected.[43],[44] However, this does not apply to unfinished works, which are also considered created and enjoy protection if expressed in a sufficiently perceptible manner.[45]

In conclusion, for an intellectual creation to qualify as a copyrighted work, it must cumulatively satisfy two basic requirements: the criterion of originality and the requirement of expression in a perceivable form. If these two conditions are met, the subject of protection may range from a doctoral dissertation to a drawing by a three-year-old child.[46]

2. Author

After considering the concept and characteristics of a copyrighted work, it is necessary to address the author as the holder of copyright. The author of a work is the natural person who created the copyrighted work.[47] Copyright vests in the author by the very act of creating the work,[48] without the need to fulfill any additional formal requirements, such as publishing the work or including a notice of authorship.[49]

However, the moment at which an author is recognized as holding copyright in their work varies depending on the legal system. In continental legal systems, the principle of non-formality applies, meaning that copyright arises automatically upon the creation of the work. This principle was established by the aforementioned Berne Convention, which provides that the enjoyment and exercise of the rights it establishes are not subject to any formalities. Under this system, copyright is regarded as a natural right of the author, with moral rights at the core, so that the author retains certain prerogatives over their work even when economic rights are transferred to another party.

In contrast, in the Anglo-American (common law) system, copyright is primarily viewed through its economic dimension. The emphasis is placed on

[43] M. Bećirović-Alić, *Autorsko pravo*, Novi Pazar 2025, 21.

[44] The Copyright and Related Rights Act explicitly enumerates in its Article 18 which creations are not protected.

[45] I. Henneberg, *op. cit.*, 115.

[46] D. Lučić, *op. cit.*, 2.

[47] Article 19, Paragraph 1 of the Copyright and Related Rights Act.

[48] Article 19, Paragraph 2 of the Copyright and Related Rights Act.

[49] I. Henneberg, *op. cit.*, 115.

the possibility of exploiting copyright commercially, i.e., through contractual transfer and licensing to third parties. Unlike the European continental model, the common law system traditionally attaches greater significance to certain formalities in the exercise of copyright, allowing authors to register their works with competent authorities, such as the U.S. Copyright Office or the UK Intellectual Property Office.[50]

A copyrighted work, which constitutes an intellectual creation of a human being, can be created only by a natural person, who is therefore considered the first or original holder of copyright in the work they have created.[51] However, the emergence of computer programs used in the creation of certain types of works has raised questions regarding the authorship of natural persons. Despite this, the prevailing view in theory and practice is that such programs are merely technical tools employed by the author to achieve the desired result.[52]

Copyright distinguishes several categories of authors depending on how the work was created, the number of persons involved in its creation, and the legal status of the author. This classification is significant because it affects the exercise of copyright and the allocation of rights among the participants in the creation of the work.[53] Based on these criteria, theory and legislation differentiate: individual authors, authors of compiled works, co-authors, co-authors of audiovisual works, contributors to audiovisual works, presumed authors, anonymous and pseudonymous authors, authors of works created in employment, authors of works created in state or public service, student authors, and authors of works created under a contract for commissioned works.[54]

3. Author's rights

Copyright embodies a fundamental component of authors' rights, safeguarding the relationship between the author and their work while also enabling its economic exploitation. As already explained,[55] these rights arise

[50] Article 5, Paragraph 2, Berne Convention for the Protection of Literary and Artistic Works.

[51] M. Bećirović-Alić, *op. cit.*, 11.

[52] *Ibid*.

[53] M. Bećirović-Alić, *op. cit.*, 29-31.

[54] The Act also recognizes in Article 25 a special category of copyrighted works for which the author cannot be identified or located (so-called orphan works).

[55] See supra IV.2.

by the mere act of creating a copyrighted work and belong to the author as its original holder. The author, as the creator of the work, is the first, i.e. original (primary) holder of the rights that constitute the content of copyright. However, the author may transfer all or some of these rights (as a rule, economic rights) to another person, who is then regarded as a derivative holder of copyright.[56] Owing to the possibility of transferring these rights to another person, it is important to distinguish between the concept of the author and that of the rights holder.[57] For the purposes of this paper, individual authors' rights will not be examined separately; instead, the emphasis will be placed on their fundamental classification into personal (moral)[58] and economic rights.[59] One of the fundamental principles of copyright is its absoluteness, meaning that it, and all the rights that constitute its content, have effect erga omnes, that is, against all third parties. This principle brings copyright closer to real rights[60], in particular the right of ownership. However, the law expressly emphasizes that copyright is autonomous and independent of the right of ownership and other real rights in the object in which the copyrighted work is fixed.[61]

The author's personal (moral) rights are absolute and exclusive rights by which the author's personal interests related to their work are protected.[62] These rights reflect the principle of personality (personality principle) in copyright, as they are inextricably linked to the person of the author and are therefore non-transferable.[63]

Property rights of the author generally comprise the author's rights to the economic exploitation of their copyrighted work and to derive financial benefit

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[56] I. Henneberg, *op. cit.*, 113.

[57] For example, the author of a book, as the original holder of economic rights, may, for the purpose of distributing the book to the general public, conclude a contract with a publisher by which certain economic rights are transferred to the publisher. In such a situation, the author of the book retains status as the author, while the publisher becomes the holder of the economic copyright.

[58] Exhaustively listed in Article 27 of the Copyright and Related Rights Act.

[59] Exhaustively listed in Article 32 of the Copyright and Related Rights Act.

[60] P. Klarić, M. Vedriš, *Građansko pravo*, Zagreb 2014, 190.

[61] Articles 112-118. of the Copyright and Related Rights Act.

[62] M. Bećirović-Alić, *op. cit.*, 15.

[63] *Ibid.*, 48.

from its use.[64] In contrast to moral rights, property rights are founded on the principle of transferability and enable the author to authorize another person through various contracts on the transfer of rights or licensing.[65] Another distinction from moral rights, which are in principle perpetual, is that property rights are subject to a temporal limitation, from which the principle of the limited duration of copyright arises. These rights subsist for the lifetime of the author and for 70 years after their death, irrespective of when the work was lawfully published.[66] This duration has been reached through successive extensions from the initial 30 years to 50 years, and finally to the current 70-year term.[67]

With regard to the use of a copyrighted work and the exploitation of copyright, the starting point is the principle of exclusivity, meaning that the author has the exclusive right to do as they wish with their work and the benefits derived from it, and to exclude all others therefrom.[68] This principle is of a relative nature, as there are exceptions established by the European Union and incorporated by the national legislator into the domestic legal framework.[69] In practical terms, this principle implies that any use of a copyrighted work requires the payment of a certain remuneration to the author.[70] It is noteworthy that the law on copyright of the former SFRY provided that author's right to use their work could be limited or entirely withdrawn if the work was of particular importance to national defence.[71]

4. Principles of copyright law in the context of artificial intelligence

The principles of copyright law constitute the fundamental normative postulates upon which the system of protection of intellectual creations is based, and their function is to ensure a balance between the interests of authors

[64] *Ibid.*

[65] *Ibid.,* 15-16.

[66] Article 119. of the Copyright and Related Rights Act.

[67] Z. Velagić, I. Hocenski, Autorstvo u hrvatskim zakonima o autorskom pravu od 1846. do 2007. godine, *Libellarium* 7(2014)2, 247.

[68] M. Bećirović-Alić, *op. cit.*, 101.

[69] See *infra* VI.

[70] I. Henneberg, *op. cit.*, 200-201.

[71] Copyright Act 1968, Official Gazette of the SFRY No. 30/1968; Z. Velagić, I. Hocenski, *op. cit.*, 239.

and those of society, whereby the development of generative artificial intelligence raises new questions regarding their application and reinterpretation, particularly with respect to authorship, originality, and the use of protected works for the training of models.[72]

a) Principle of originality

The principle of originality implies that copyright protection is granted only to those works which represent the result of the author's free and creative choices, whereby the concrete expression of an idea is protected, rather than the idea itself.[73]

In the context of artificial intelligence, this principle lies at the centre of the debate, as generative systems produce content without direct human creative input. Consequently, within European Union law, the position is maintained that such output cannot enjoy copyright protection unless there is a significant human contribution, thereby affirming the anthropocentric character of copyright law.[74]

b) Principle of absence of formalities

The principle of absence of formalities means that copyright arises automatically upon the creation of a work, without the need for registration or the fulfilment of any formal requirements.[75]

In the context of artificial intelligence, the question arises as to who acquires the right where a work is generated by an algorithm, with the prevailing view being that only a natural person may be considered an author, while AI systems cannot be holders of rights, which leads to a legal gap in cases of fully autonomous content generation.[76]

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[72] Resolution of the European Parliament of 10 March 2026 on Copyright and Generative Artificial Intelligence - Opportunities and Challenges, P10_TA(2026)006, https://www.europarl.europa.eu/doceo/document/TA-10-2026-0066_HR.html, last visited: 14. 3. 2026 (hereinafter: Resolution EP 2026); M. Senftleben, Generative AI and Author Remuneration, *International Review of Intellectual Property and Competition Law* 54 (2023), 1536–1537.

[73] Judgment *Infopaq International A/S v Danske Dagblades Forening*, C-5/08, EU:C:2009:465, paras. 37-39; L. Bently, B. Sherman, *Intellectual Property Law*, Oxford 2014, 108–109.

[74] P. B. Hugenholtz, *Copyright and Freedom of Expression in Europe*, Oxford 2001, 344; J. Pila, P. Torremans, *European Intellectual Property Law*, Oxford 2019, 58.

[75] Article 5, paragraph 2 Berne Convention for the Protection of Literary and Artistic Works; S. Ricketson, J. C. Ginsburg, *International Copyright and Neighbouring Rights*, Oxford 2006, 287.

[76] M. Senftleben, *op. cit.*, 1536–1538.

c) Principle of exclusivity of rights

The principle of exclusivity implies that the author holds exclusive economic rights to exploit the work, including the rights of reproduction, distribution, and communication to the public, and that any use requires the author's authorization.[77]

The development of artificial intelligence calls this principle into question, as the training of AI models often involves the mass use of protected works without the explicit authorization of authors, thereby raising issues of copyright infringement and the need for the development of new licensing models and remuneration mechanisms.[78]

d) Principle of territoriality

The principle of territoriality means that copyright is applied in accordance with the law of the state in which protection is sought, whereby such protection is tied to the national legal order.[79]

In the context of artificial intelligence, this principle becomes difficult to apply, as the training and use of AI systems take place on a global scale, leading to conflicts of legal regimes and the need for further harmonisation at the level of the European Union and beyond.[80]

e) Principle of limited duration

The principle of limited duration means that copyright protection subsists for a specified period, most commonly 70 years after the death of the author, after which the work enters the public domain.[81]

In the context of artificial intelligence, this principle acquires a new dimension, as AI systems use both works from the public domain and protected works, thereby raising the issue of balancing the availability of data for technological development with the protection of authors' rights.[82]

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[77] See: Directive 2001/29/EC.

[78] Resolution EP 2026; M. Senftleben, *op. cit.*, 1543.

[79] Treaty on the Functioning of the European Union, *OJ* C 202, 2016; T. Dreier, P. B. Hugenholtz, *Concise European Copyright Law*, Alphen aan den Rijn 2016, 21.

[80] J. Pila, P. Torremans, *op. cit.*, 60.

[81] Directive 2006/116/EC of the European Parliament and of the Council of 12 December 2006 on the term of protection of copyright and certain related rights, OJ L 372, 31/10/2011.

[82] P. Samuelson, *Enriching Discourse on Public Domains*, Durham 2006, 805.

f) Principle of the balance of interests

The principle of the balance of interests entails the reconciliation of authors' rights with the interests of society, particularly through limitations and exceptions such as the right of quotation or use for educational purposes.[83]

In the context of artificial intelligence, this principle becomes crucial, as it is necessary to strike a balance between the protection of authors and the encouragement of innovation, with particular importance attached to exceptions for text and data mining, which require more precise normative regulation.[84]

g) Principle of the protection of authors' moral rights

The principle of the protection of moral rights ensures the author's right to attribution and to the protection of the integrity of the work, whereby such rights are personal and, as a rule, inalienable.[85]

Artificial intelligence gives rise to new challenges, as it may generate content that imitates the style of a particular author, which may lead to violations of moral rights, particularly with regard to attribution and the preservation of the integrity of the work.[86]

h) Principle of technological neutrality

The principle of technological neutrality means that the rules of copyright law apply irrespective of the technology through which a work is used or distributed.[87]

In the context of artificial intelligence, this principle remains fundamental but reveals its limitations, as generative AI creates qualitatively new legal challenges that transcend traditional frameworks, thereby indicating the need to adapt existing rules.[88]

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[83] *Johan Deckmyn and Vrijheidsfonds VZW v Helene Vandersteen and Others*, C-201/13, EU:C:2014:2132, par. 25; C. Geiger, E. Izyumenko, Copyright on the Human Rights' Trial: Redefining the Boundaries of Exclusivity Through Freedom of Expression, *IIC - International Review of Intellectual Property and Competition Law* 45(2014), 323–324.

[84] Directive (EU) 2019/790.

[85] Article 6. Berne Convention for the Protection of Literary and Artistic Works; A. Lucas, *Traité de la propriétaire littéraire et artistique*, New York 2017, 301.

[86] M. Senftleben, *op. cit.*, 1536.

[87] Directive (EU) 2019/790; J. Pila, P. Torremans, *op. cit.*, 56.

[88] Resolution EP 2026; P. B. Hugenholtz, *op. cit.*, 345.

i) Conclusion

In conclusion, artificial intelligence does not abolish the fundamental principles of copyright law, but rather transforms and relativises them, particularly with regard to originality, authorship, and the balance of interests, which points to the need for the further development of the legal framework in order to ensure legal certainty and the protection of all relevant stakeholders.[89]

From the very beginning of the development of computer programs used in the creation of copyrighted works, discussions have emerged within legal scholarship regarding the copyright status of such works, particularly with respect to their originality and the application of the existing legal framework. With the advent of artificial intelligence, these discussions have further intensified, raising numerous issues related to copyright law. The following section will analyse those issues considered to be key, both for copyright law and for its *pro futuro* regulation.

V AI as the author of the work

1. Can AI be an author?

The first question that arises with the increasingly frequent use of artificial intelligence in the creation of copyrighted works is whether AI can be considered the author of such works. *Prima facie*, the answer appears evident - it cannot, as the author, as previously set out[90], is exclusively deemed to be a natural person[91] who has created the work. It is apparent that the statutory framework established by the legislator precludes any consideration of the possibility that any other entity (or thing) could be regarded as the author. However, in order to avoid superficial conclusions, this question must be examined from the perspective of the primary objective underlying the existence of artificial intelligence. That objective would be, as previously noted[92], to create a machine capable of imitating human behaviour and intelligence. Let us consider a situation in which this objective is, in general terms, achieved, and

[89] Resolution EP 2026; C. Geiger, E. Izyumenko, *op. cit.*, 340–341.

[90] See *supra* IV.2

[91] In this part of the paper, the use of the term "human being" instead of "natural person" appears more appropriate.

[92] See *supra* II.1.

a machine is created that "perfectly" imitates human behaviour and intelligence, including the creative process involved in the production of a copyrighted work.[93] Even if such a scenario were to transition from the realm of science fiction into reality, authorship could still not be attributed to artificial intelligence, as it does not fulfil the fundamental prerequisite for acquiring rights and obligations - legal capacity.[94] It is precisely the absence of legal capacity that renders the recognition of authorship to artificial intelligence legally inadmissible, from which it follows that only a human being may be regarded as an author.[95]

Professor Ryan Abbott, in his work, highlights the need to redefine the concept of authorship to include both humans and non-humans.[96] However, it is our view that this would raise more questions than answers.

2. Holders of copyright on AI-created works

Starting from the position that artificial intelligence cannot be an author in the legal sense, the literature has developed a classification of three potential copyright holders: the programmer (developer), the user, and the owner (of the data or system). This classification reflects the complexity of the AI work

[93] Such a "perfect" machine would be capable of generating an enormous number of copyright works without any creative contribution from a human being. Its outputs would be comparable in quality to works created by humans and, in certain aspects, might even surpass human creativity. In this situation, a further question arises in addition to the initial one: can artificial intelligence be considered merely a technical tool for work?

[94] P. Klarić, M. Vedriš, *op. cit.*, 33.

[95] An examination of contemporary legal practice confirms this position, as reflected in a recent U.S. court case. The United Kingdom court considered a lawsuit filed in 2022 by Dr. Thaler. He brought the claim because the local Copyright Office had refused to register a work that he asserted was "autonomously" created by an AI program. Furthermore, Dr. Thaler argued that national copyright law does not require the existence of human authorship. The court rejected his claims, holding that "human authorship is a chosen element of a valid claim for copyright protection," explaining that human authors require copyright as an incentive to create expressive works. *Thaler (Appellant) v Comptroller-General of Patents, Designs and Trademarks (Respondent)*, UKSC/2021/0201, The Supreme Court, https://www.supremecourt.uk/cases/uksc-2021-0201 (accessed: 24 March 2026 at 20:25); C. T. Zirpoli, *Generative Artificial Intelligence and Copyright Law*, Congressional Research Service, LSB10922, 2025, 2, https://www.congress.gov/crs-product/LSB10922, last visited: 24. 3. 2026.

[96] R. Abbott, I Think, Therefore I Invent: Creative Computers and the Future of Patent Law, *Boston College Law Review* 57(2016)4, 1098.

creation process, which involves multiple human actors with varying levels of contribution.

a) Programmer (Developer)

The first possible solution is that the copyright holder could be the programmer or the company that developed the AI system. The programmer created the algorithm and technical infrastructure that enables the generation of the work, and without this system, the work would not exist. However, this approach has a significant limitation: the programmer is not involved in the concrete creative process of producing an individual work.

The literature emphasizes that AI-generated works are merely an "indirect result" of the programmer's work, as they do not participate in the selection of content or the final expression of the work. For this reason, many authors reject this model as insufficient for recognizing authorship.[97] Nevertheless, certain programmers could argue that some rights on the work might be acknowledged, given that they designed the AI model, thereby contributing a "remote creative input."

Applying Croatian law to this issue, it would be concluded that a programmer cannot be recognized as a copyright holder, as this follows directly from the very definition of author and copyrighted work. As repeatedly noted, the author is exclusively considered to be a natural person who has created the work, which embodies their creative contribution manifested in the originality of the work. Other legal frameworks (specifically European law and common law) also do not recognize this possibility in their legislation, nor can existing rules be analogously applied.

b) Final user

The second possible solution would be the final user who operates the AI tool, as the user entering a prompt can modify and shape the output and participates in the creative process. Recent studies emphasize that the perception of authorship increases with the level of user engagement, the more the user influences the result, the higher the likelihood of being considered the rights holder.[98]

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[97] A. Gaidartzi, I. Stamatoudi, Autorship and Ownership Issues Raised by AI-Generated Works: A Comparative Analysis, *Laws* 14(2025)57, 5.

[98] Y. Hwang, D. Shin, J. H. Lee, Who owns AI-generated artwork? Revisiting the work of generative AI based on human-AI co-creation, *Telematics and Informatics* 98(2025), 1.

However, the problem is that a simple prompt is often insufficient to achieve "originality," and using artificial intelligence limits control over the outcome. The literature highlights that minimal human contribution does not meet the authorship standard in most legal systems.[99]

c) Owner (of data or system)

The third possible solution would be the owner of the AI system or the owner of the training data. This model is based on the idea that the AI system generates a work using large datasets, which often include protected works. The result may be a "derivative work" based on existing content. The literature notes that data owners could have rights because the AI uses their content as the basis for creation.[100]

On the other hand, the problem arises from the difficulty of proving a direct connection between a specific work and a particular source, since AI does not necessarily reproduce individual works but generates new content.

In conclusion, all three approaches have significant limitations. On the one hand, the programmer, as the person who developed the system, has no control over the specific work, and therefore there is no basis for recognizing them as the rights holder. On the other hand, the user often lacks a sufficient creative role, and the data owner has only an indirect connection to the outcome.

As a result, the prevailing view is that fully AI-generated works frequently remain without a copyright holder and enter the public domain, as confirmed by contemporary studies emphasizing that most legal systems still require human creativity as the foundation for protection.[101] However, this issue necessarily requires detailed legal regulation.

3. Conditions for recognizing copyright protection for AI-created works

There is no specific legal framework addressing this issue, neither at the EU level nor at the national level. Consequently, general principles of copyright law are applied as a guideline, taking into account more concrete solutions established within common law jurisdictions.

[99] *Ibid.*

[100] A. Gaidartzi, I. Stamatoudi, *op. cit.*, 5.

[101] D. V. Voinea, AI and Copyright – Who Owns AI Generated Content?, *Social Sciences and Education Research Review* 10(2023)1, 264-265.

If AI-generated works are considered under the general rules of copyright law, it can be concluded that recognition of protection requires the works to meet the criterion of originality. However, the problem lies in the fact that originality, as a concept, is not strictly defined. It is a legal standard that must be assessed in each specific case. A landmark was set by the Court of Justice of the European Union, which for the first time clearly defined the originality criterion within the EU. In the *Infopaq* decision of 2009, the Court held that a work can be considered original if it constitutes the "author's own intellectual creation," manifested through creative choices.[102] This position has been confirmed and further elaborated in subsequent case law.

The use of artificial intelligence can have a dual effect on originality. On one hand, it can stimulate human creativity when used as an assistive tool. On the other hand, it may entirely substitute the human creative process if the author relies exclusively on artificial intelligence to produce the work.

In the first case, an AI-assisted work[103] is created with significant human contribution, where artificial intelligence serves only as a tool to achieve the intended result. In the second case, the work is generated entirely by artificial intelligence, with minimal or no human contribution.[104] However, the distinction between these two categories of works is not always straightforward. For this reason, the literature highlights a third category, so-called hybrid works, arising from a combination of human input and autonomous generative processes.[105]

Considering the first category (AI-assisted works), it is apparent that they are less likely to pose a problem from a copyright perspective, as authorship and creativity derive from human contribution.[106]

The second category (AI-generated works) raises the fewest controversies regarding protection. For instance, the U.S. Copyright Office[107] refuses to regis-

[102] Case *Infopaq*, par. 6.

[103] S. Rocco, Originality and Authorship in AI-generated Works: The Australian Law Copyright Law Perspective, *Law and Media Working Paper Series* 6(2021), 3.

[104] K. Hristov, Artificial Intelligence and the Copyright Dilemma, *The Journal of the Franklin Pierce Center for Intellectual Property* 57(2017)3, 435.

[105] A. Gaidartzi, I. Stamatoudi, *op. cit.*, 3.

[106] *Ibid.*

[107] It operates within the Library of Congress and is the principal institution for copyright registration in the United States. https://www.law.cornell.edu/wex/united_states_copyri-

ter works that are "produced by a machine or mere mechanical process that operates randomly or automatically, without any creative contribution or intervention by a human author."[108]

The challenge lies in hybrid works, where the proportion of human contribution versus reliance on artificial intelligence is unclear. For example, in the creation of an image, a painter may select specific elements (such as brush type, colors, and style) and input them into an AI program to generate the desired image. Although the painter cannot predict the final output, they have directly contributed to its creation and hold some expectation of the result.[109]

Guidance may be found in the most recent instructions of the aforementioned U.S. Copyright Office, which states that the sufficiency of human contribution must be assessed on a case-by-case basis.[110] These instructions also refer to guidelines from Japan's Cultural Council, which identify factors to consider in the assessment, including: 1) the quantity and content of instructions and prompts provided by the AI user, 2) the number of generation attempts, 3) user selection among multiple outputs, and 4) any subsequent human edits and corrections to the AI-generated work.[111]

VI Use of protected data for AI training

AI models (e.g., generative models) are trained on large datasets that often include texts (books, articles), images (photographs, artworks), and music. The problem is that these works are frequently protected by copyright, and authors typically have not given explicit consent for such use.

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ght_office#:~:text=The%20Copyright%20Office%20serves%20as%20the%20main,a%20department%20of%20the%20Library%20of%20Congress, last visited: 19. 3. 2026.

[108] United States Copyright Office, Copyright Registration Guidance: Works Containing Material Generated by Artificial Intelligence, *Federal Register* 88(2023)51, 16192. https://www.govinfo.gov/content/pkg/FR-2023-03-16/pdf/2023-05321.pdf, last visited: 25. 3. 2026.

[109] K. Hristov, *op. cit.*, 435.

[110] United States Copyright Office, Copyright and Artificial Intelligence, Part 2: Copyrightability, A Report of the Register of Copyrights, 2025, 28, https://www.copyright.gov/ai/Copyright-and-Artificial-Intelligence-Part-2-Copyrightability-Report.pdf, last visited: 25. 3. 2026.

[111] Legal Subcommittee Under the Copyright Subdivision of the Cultural Council, General Understanding on AI and Copyright in Japan, 2024, 17, https://www.bunka.go.jp/english/policy/copyright/pdf/94055801_01.pdf, last visited: 25. 3. 2026.

From a legal perspective, the fundamental question is whether training an AI model constitutes an act falling within the exclusive rights of the author, particularly the right of reproduction. The Court of Justice of the European Union has repeatedly adopted a broad interpretation of the concept of reproduction, emphasizing that even temporary reproductions may be protected if they contain elements of originality.[112] In this sense, it can be argued that the AI training process, which involves copying and analyzing large amounts of data, constitutes an act requiring the rights holder's permission.

However, EU law provides certain exceptions. Directive (EU) 2019/790 on copyright and related rights in the Digital Single Market introduces the concept of text and data mining (TDM), which allows automated analysis of large datasets. Article 3 provides a mandatory exception for scientific research purposes, while Article 4 allows TDM for commercial purposes, provided rights holders have not explicitly reserved such use.[113] This so-called "opt-out" model has sparked debate, as it shifts the burden of protection to authors, who must actively prohibit use of their works. Recent studies note that while this ensures control for authors, it also complicates the application of TDM, particularly in training generative models. If authors widely exercise the opt-out (which is not only legally allowed but encouraged), datasets for training may be incomplete or biased, undermining AI model' s effectiveness and reliability.[114] Additionally, training generative models differs from the traditional application of TDM, which focuses on discovery and analysis rather than creating new content.[115]

An additional dimension is introduced by the AI Act, which imposes transparency obligations on providers of generative AI systems. In particular, such systems are required to respect copyright and disclose summaries of data

[112] *Infopaq*, paras. 33–37. The judgment states that protection applies not only to the work as a whole but also to its parts, provided that those parts contain elements that reflect the author's intellectual creation. The Court emphasized that even very short excerpts (in this case, 11 words) can be protected if they meet the originality criterion. The Court further highlighted that the concept of "reproduction in part" under Directive 2001/29/EC must be interpreted autonomously and consistently throughout the European Union.

[113] *Ibid*., articles 3., 4.

[114] N. Lucchi, Generative AI and Copyright, Training, Creation, Regulation, Study requested by the JURI Committee, European Parliament, 2025., 23, https://www.europarl.europa.eu/RegData/etudes/STUD/2025/774095/IUST_STU(2025)774095_EN.pdf, last visited: 24. 3. 2026.

[115] S. Stober, T.W. Dornis, Generative AI Training and Copyright Law, *Transactions of the International Society for Music Information Retrieval*, (2026), 4, https://doi.org/10.48550/arXiv.2502.15858.

used for training.[116] While this facilitates transparency, it does not provide a clear solution for compensating authors.

To close the so-called "value gap" and ensure fair remuneration for authors, potential solutions include mechanisms such as collective licensing and the introduction of a new statutory remuneration right at the EU level.[117]

In practice, disputes are already ongoing, especially in the United States, where the application of the "fair use" doctrine to AI training is considered. Governed by Section 107 of the Copyright Act[118], this approach is significantly more flexible than the European framework. This flexibility is seen as providing U.S. research organizations with a comparative advantage over European counterparts.[119] However, it also introduces greater legal uncertainty for authors, as the determination of whether a particular use constitutes fair use is assessed on a case-by-case basis.[120], [121]Although the European legal system does not have

[116] Regulation (EU) 2024/1689 of the European Parliament and of the Council on artificial intelligence (AI Act), Article 53(1)(d).

[117] N. Lucchi, *op. cit.*, 80-81.

[118] The Copyright Act of 1976 codified copyright law in Title 17 of the United States Code, the principal federal copyright statute in the United States, https://www.copyright.gov/title17/, last visited: 24. 3. 2026.

[119] K. Horváth, AI and Data Mining - Questions of Copyright, CMS, https://cms.law/en/svk/publication/ai-and-data-mining-questions-of-copyright, last visited: 24. 3. 2026.

[120] S. Stober, T. W. Dornis, *op. cit.*, 3.

[121] A recent U.S. court decision in the case of *Bartz v. Anthropic*, an IT company that created the AI model Claude, could have significant implications for future cases. In the lawsuit, the plaintiffs claimed that Anthropic used their works to train the AI model without permission or compensation. They specifically highlighted that the company used not only legally obtained books but also a large number of pirated copies, creating an extensive internal "library" of content for training their AI model.

The court's ruling drew a clear distinction between the act of training the model itself and the manner in which the data was obtained. It concluded that training an AI model on legally obtained works may constitute "fair use" if such use is "transformative," meaning it adds new expression or meaning to the original rather than merely copying it. The court also drew an analogy between teaching artificial intelligence and a human reading books to learn how to write. In other words, the court determined that the act of training alone is not unlawful, but illegality may arise from the method of obtaining the data.

Bartz v. Anthropic PBC (3:24-cv-05417), District Court, N.D. California, https://www.courtlistener.com/docket/69058235/bartz-v-anthropic-pbc/ (last visited: 24. 3. 2026); D. Lučić, *Bartz v. Anthropic historic settlement regarding piracy and artificial intelligence*, Ius-Info, 2025, https://www.iusinfo.hr/aktualno/kolumne/bartz-v-anthropic-povijesna-nagodba-u-vezi-piratstva-i-umjetne-inteligencije-66711.

an identical concept, comparative analysis reveals a similar challenge: balancing technological development with protection of authors' rights.

In conclusion, the use of protected works to train AI models lies at the intersection of permissible data analysis and copyright infringement. The existing EU legal framework provides some solutions through TDM exceptions and transparency requirements, but numerous questions remain unresolved, particularly regarding fair remuneration and the protection of authors in the context of large-scale and automated data processing.

VII Conclusion

Artificial intelligence has demonstrated unlimited potential in all areas in which it is applied. From the perspective of broader societal interest, such potential should not be hindered, as its further development could bring possibilities that were until recently unimaginable. However, it must not come at the expense of authors as individuals or the creative industry as a whole. Many existing legal solutions are insufficient to address this issue concretely, although initiatives to find solutions are underway.

We have established that the issues surrounding artificial intelligence and copyright law arise from two main aspects: the copyright protection of AI-generated works and the training of AI models on protected data or content. Both aspects require urgent legal intervention, primarily to ensure legal certainty.

In literature and practice, efforts are being made to find the best solution. The idea of redefining the concept of authorship to include "non-human" authors falls outside all current legal frameworks. Therefore, the attempts focus on identifying the most appropriate copyright holder: the programmer, the user, or the owner of the system or data. However, none of these models provides a fully satisfactory solution due to the lack of direct human creativity. Copyright protection could potentially be granted to the user if they contribute sufficient creative input and influence the final result.

In this context, one must ask what would be the rationale for broadly interpreting the existing legal framework or even establishing a new *sui generis* copyright law that would extend protection to an increasing number of such works? In our view, this would place human creative labor in the background and could consequently lead to a gradual decline in the motivation of authors to create copyrighted works.

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Autorsko pravo i umjetna intelingencija

Sažetak

Umjetna inteligencija se primjenjuje u svim aspektima života, uključujući i stvaralački dio i ima iznimno veliki potencijal. Ako polazimo od šireg društvenog interesa, takav se potencijal ne bi trebalo kočiti, jer bi njen daljnji razvitak mogao donijeti mogućnosti kakve donedavno nismo mogli ni zamisliti. Međutim, ne smije se dogoditi da se daljnjim razvojem ide na štetu autora kao pojedinaca, ali i sveopće kreativne industrije. Hipoteza u redu je da su postojeća pravna rješenja nedostatna za konkretno rješavanje ove problematike, i analizom u radu kroz primjenu znanstvenih metoda ona je, nažalost, i potvrđena. Zaključeno je da problematika odnosa umjetne inteligencije i autorskog prava proizlazi iz dva aspekta: autorskopravne zaštite AI-generiranih djela te treniranja AI-modela na zaštićenim sadržajima. Oba aspekta zahtijevaju hitnu pravnu intervenciju prvenstveno zbog osiguravanja pravne sigurnosti.

Ključne riječi: autorsko pravo, pravna zaštita, umjetna inteligencija, autor, treniranje AI modela, pravna sigurnost, vladavina prava

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