Technology and Regulation

Reforming Copyright Law for AI-Generated Content: Copyright Protection, Authorship and Ownership

Author(s)	Yiheng Lu
Contact	yiheng.lu@qmul.ac.uk
Affiliation(s)	Yiheng Lu is a PhD student at Queen Mary University, London.

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Abstract

With the emergence of disputes over the copyright of AI-generated content (AIGC), academia has extensively discussed relevant issues, including copyright protectability and ownership. However, the copyright law community has not reached an international consensus. Adopting a doctrinal methodology, this paper investigates these issues and proposes reforms, arguing that copyright law should clarify the de facto authorship of AI and determine the originality of AIGC based on minimum creativity at the expression level. It also recommends attributing copyright of AIGC to the AI owner via statutory provision, allowing contractual allocation between parties. The proposed framework would resolve significant academic controversies on fundamental issues surrounding AIGC copyright and provide a reference model for future research.

1. Introduction

1.1 Research Background of this paper

As one of the three cutting-edge technologies of the 21st century, along with genetic engineering and nanoscience, AI initially originated at the Dartmouth Conference in 1956. The term 'artificial intelligence' was first formally used by John McCarthy at the conference after two months of discussions with ten experts in the field, intended to define the technical science of simulating, extending, and expanding human

intelligence through theories, methods, technologies, and application systems.[1] This event marked the official birth of the emerging field of AI.

After more than half a century of development, AI has gradually transitioned from a theoretical concept to a practical technology that has entered the real world and become effective in every sphere of society. In the realm of literary and artistic creation, AI is already capable of producing comparable works to those created by humans.[2] Some examples include Microsoft Xiaoice, which created the first AI poetry collection, *Sunlight Lost in the Glass Window*,[3] *and* Tencent Dreamwriter, which wrote more than 3,000 real-time battle reports at an average speed of 0.5 seconds per article during the Rio Olympics.[4] These examples demonstrate that AI has achieved quality and efficiency comparable to or even better than that of natural human authors and that AI has evolved from an initial writing aid for human authors to a self-learning intelligent creator. Several major technological revolutions have challenged copyright law, such as movable type and the Internet.[5] With AI, copyright law faces a new formidable challenge.

1.2 Definition of Terms and Research Limitations of this Paper

In order to realise intelligent manifestations such as the storage, management, and processing of external information, generalised AI can be divided into systems that use symbolic knowledge representation and systems that use non-symbolic knowledge representation, depending on their implementation method. The former encodes knowledge primarily using computer language symbols, while the latter encodes knowledge across groups of simulated neurons by simulating the operation principle of the human brain.[6] In terms of current technological advancements, AI is steadily advancing toward systems that employ non-symbolic knowledge representation and has achieved milestone success. For example, Alpha Go, a Go AI developed by Google's AI company DeepMind, applies neural networks to learn the Go manuals and improve its Go skills by continuously playing.[7] Since 2016, Alpha Go has defeated many Go experts, including world champion Lee Sedol.[8] Currently, AI in the field of literary and artistic creation makes extensive use of neural network technology, which generally requires only deep learning of human-supplied material to build a database and upgrade its creative capabilities so that it can create without human subjects.[9] The AI discussed in this paper refers to such narrowly defined AI capable of creating without human intervention using neural network technology, and the creations discussed are also creations made by such AI without human intervention. In contrast, AI that requires a human to control or intervene in the creative process is now generally acknowledged in academic and practical circles as an auxiliary tool to human creativity, and related creations are commonly granted copyright protection as relevant natural persons' creations.[10] Therefore, special legal issues regarding AI-assisted works, such as potential co-authorship between an AI model and human subjects, are outside the research scope of this paper.

1.3 Research Questions and Methodology of this paper

As AIGC continue to enter the creative market, related copyright disputes have begun to emerge. In *Tencent v. Yingxun* in December 2019, the People's Court of Nanshan District in China ruled that the article created by the AI Dreamwriter constituted work due to its originality at the levels of expression and creative process,

1. John McCarthy and others, 'A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence' (1955) 27 AI Magazine 13, 13–14.
2. Annemarie Bridy, 'The Evolution of Authorship: Work Made by Code' (2016) 39 Columbia Journal of Law & the Arts 395, 397.
3. Yanxia Lu, 'Artificial Intelligence Microsoft Xiaoice Published Its First Poetry Collection' *Beijing Daily* (20 May 2017) http://news.xinhuanet.com/local/2017-05/20/c_129609705.htm accessed 3 July 2022.
4. Feng Liao, 'Tencent Develops News Writing Robot' *Beijing Times* (11 September 2015) <https://www.163.com/news/article/B36QGTJV00014AED.html> accessed 9 July 2022.
5. Isabella Alexander and H Tomás Gómez-Arostegui, *Research Handbook on the History of Copyright Law* (Reprint edition, Edward Elgar Publishing Ltd 2018) 37.
6. Arthur R Miller, 'Copyright Protection for Computer Programs, Databases, and Computer-Generated Works: Is Anything New Since CONTU?' (1993) 106 Harvard Law Review 977, 1036–1037.
7. David Silver and others, 'Mastering the Game of Go with Deep Neural Networks and Tree Search' (2016) 529 Nature 484, 484–485.
8. KaChun, 'Lee Se-dol Defeated Again in Man-machine Battle: Alphago Made Me Challenge My Traditional Ideas About Go' *The News Lens* (15 March 2016) http://www.thenewslens.com/post/298186/ accessed 13 July 2022.
9. Juergen Schmidhuber, 'Deep Learning in Neural Networks: An Overview' (2015) 61 Neural Networks 85, 85–88.
10. Copyright Office, 'Sixty-Ninth Annual Report of the Register of Copyrights' (1966) L.C. Card No. 10-36017.

and identified it as a corporate work of the plaintiff Tencent; the defendant, Yingxun, violated the plaintiff's copyright by publishing the work on its website without permission.[11] This case, known in China as the first case of copyright of AI works, has been the subject of extensive public discussion since the verdict was rendered. However, although the issue of the copyright of AIGC has been discussed to some extent by academics, and different countries have addressed it from the legislative and judicial perspectives, no effective consensus has been reached at the theoretical and practical levels, making this issue difficult to resolve effectively in most circumstances.

Concerning the copyright of AIGC, the research questions are: first, whether AI is qualified to be granted authorship of copyright, and whether its creations compass originality and can be considered copyright-protected works; second, how the copyright of AIGC should be attributed. Through an in-depth examination of these research questions, this paper aims to present practical and implementable proposals to construct the copyright framework of AIGC, thereby adequately resolving the pertinent controversies in the academic community and providing adequate references for the legislative community. Considering these research questions, this paper aims to conduct a comparative analysis between civil law and common law jurisdictions, represented by mainstream jurisdictions including the U.S., U.K. and E.U., as well as China, as the jurisdiction with representative cases in the field of AIGC-related copyright issues. In this regard, this paper will adopt the doctrinal methodology to examine and critically analyse the mainstream views of the academic community and combine them with a comparative analysis of relevant legislation and typical cases, therefore proposing a reasonable copyright framework for AIGC.

1.4 Standpoint and Structure of this Paper

Regarding the aforementioned research questions of copyright of AIGC, this paper believes that, first, the de facto authorship of AI should be affirmed due to its creation fact, and the originality of its creations should be determined only from the level of expression based on the standard of minimum creativity; second, copyright of AIGC should be attributed to the AI owner via statutory provision, and contractual allocation between parties should be permitted.

In response, this paper will conduct research as follows. **Section 2** evaluates the protectability of AIGC: it firstly invesgates the various academic perspectives on AI authorship (§2.1.1) and then analyses relevant legislation and case law (§2.1.2) to identify the qualification of authorship; it then studies the originality of AIGC with analysis of academic views (§2.2.1), then investigates relevant legislative and judicial practice (§2.2.2), to construct the criteria for the originality of AIGC; **Section 3** addresses attribution of AIGC copyright: it initially considers arguments for attributing the copyright directly to AI itself (§3.1.1 - §3.1.2), then it evaluates various academic proposals that allocate copyright to human subjects including owners, designers or users (§3.1.1) with comparison to practical legal frameworks (§3.1.2) in order to propose a solution to the distribution of copyright of AIGC. Finally, **Section 4** reviews the conclusion and main contributions of this paper (§4.1 - §4.2) and acknowledges its limitations and directions for future research (§4.3 - §4.4).

2. Copyright Protectability of AIGC

2.1 Authorship Qualification of AI

Whether AI qualifies as an author in copyright law has been a long-standing controversy in academic circles. Traditional copyright law usually defines an author as a person who creates a work,[12] which means that non-human subjects are excluded from the scope of statutory authorship. As AI, which is not a natural person in essence, can create works independently of human beings, whether it can break through the traditional copyright law and obtain the qualification of an author has become the core of the academic debate.

11. *Shenzhen Tencent Computer Systems Ltd and Shanghai Yingxun Technology Co* [2019] People's Court of Nanshan (District of Shenzhen) Yue 0305 Min Chu No. 14010 1.
12. Jane C Ginsburg, 'The Concept of Authorship in Comparative Copyright Law' (2003) 52 DePaul Law Review 1063, 1075.

2.1.1 Academic Perspectives

Academics are largely in agreement that AI should not be granted authorship. Abe A. Goldman, for instance, holds the view that non-human creators cannot truly think independently in the creative process and that the majority of AI still requires the use of established algorithms and data materials to produce works under the control of human subjects, and thus should not be considered independent copyright subjects.[13] However, AI technology is currently able to conduct tasks including selecting content and composing the text, and ultimately produce work with merely non-creative human input. For instance, Dreamwriter, a news writing AI created by Tencent, could quickly generate news articles for publication during the Rio Olympics using intelligent algorithms based on information such as the event's background and real-time battle conditions collected from the competition sites, without any original arrangement by humans.[14] Consequently, the view that AI is merely a tool for the creation of natural person subjects and should be denied authorship is incongruent with the actual situation.

If AI with independent creative ability and its AIGC cannot be regulated by copyright law, a large number of unmanaged AIGC entering the market may probably result in many copyright disputes and a negative impact on the copyright framework. At the same time, such entry of numerous AIGC with over-abundance and low-cost availability into the creative market, where these AIGC are classified as being in the public domain and can be used by anyone at will, is likely to crowd out the living space for natural persons' works significantly and greatly disrupt the creative market, or may even result in a massive exodus of human authors from the creative market due to the difficulty of obtaining reasonable economic returns, potentially causing the creative industry to shrink as potential consumers tend to choose free AIGC over copyrighted works.[15] In addition, if AI, which cannot bear civil liability like natural persons, is not registered and managed to clarify its subject of liability, it will probably be challenging to pursue its liability specifically in copyright disputes, resulting largely in lower judicial efficiency and higher enforcement costs.

In order to solve such potential problems, Jiming Yi believes that AI should be formulated as the author through legal mimesis with reference to the framework of juridical persons, to affirm the de facto authorship of AI to better manage and protect AIGC; simultaneously, the copyright of AI should be exercisable by the relevant natural person subjects to ensure the reasonable realisation of rights.[16] In this regard, as the fact that AI is generally regarded as the creator or fixator of AIGC expression, the legal formulation of AI as an author and affirmation of its de facto authorship may not only provide an effective legal basis for further protection of AIGC, but also facilitate better management of AIGC by regulatory bodies. From the point of view of market development, placing the copyright of AIGC in the hands of the relevant natural persons could also better protect the interests of the relevant human subjects, thereby protecting the steady growth of the creative market.

2.1.2 Legislation and Jurisprudence

Legislative Practice

With the *National Artificial Intelligence Research and Development Strategic Plan* of the US and the *National AI Strategy* of the UK,[17] AI has been elevated to the level of a critical development strategy by major countries around the world. However, there is still a conflict between the development strategy and the existing legislation, and the vast majority of countries and regions continue to limit the subject of copyright rights to natural persons.

13. Copyright Office (n 10) 5.
14. Zhihong Jiang, 'Media Disruptors: Machine News Writing' (2016) 7 Journal of News Research 74, 74.
15. James Grimmelmann, 'Programming Languages and Law: A Research Agenda' (Association for Computing Machinery 2022).
16. Jiming Yi, 'Are Artificial Intelligence Creations Works?' [2017] Journal of Northwestern University of Political Science and Law 137, 142–143.
17. Michael Kratsios, 'The National Artificial Intelligence Research and Development Strategic Plan: 2019 Update' (Select Committee on Artificial Intelligence of the National Science & Technology Council 2019); Kwasi Kwarteng and Nadine Dorries, 'National AI Strategy' (the Office for Artificial Intelligence 2021).

Among the common law countries, the US Congress has enacted the *Copyright Act of 1976*, and the US Copyright Office has administered that statute and published the *Copyright Law of the United States* and the *Compendium of US Copyright Office Practices*, which stipulates that copyright-protected works must be of human origin,[18] and insist that only works created by human authors satisfy the legal and formal requirements for copyright protection. In 2022, the US Copyright Office denied copyright registration for the AI painting *A Recent Entrance to Paradise* on the grounds that it 'lacks the human authorship required for copyright'.[19] Similarly, the UK define authorship as a qualified natural person who creates a work, excluding from copyright authorship all non-human creators,[20] including AI. In civil law countries and regions, the EU *InfoSoc Directive (2001/29/EC) and relevant cas law* stipulates that a work must be created by a human because it must reflect the author's intellectual creation and personality,[21] thereby denying all non-human creators that lack intelligence and personality the opportunity to acquire copyright. The copyright law of China also specifies that only natural persons, juridical persons, and unincorporated organisations that create works can be recognised as authors,[22] explicitly excluding AI from being identified as authors.

In conclusion, the mainstream jurisdictions from both common and civil law seem to have chosen to maintain their existing copyright law frameworks and refuse to recognise AI as statutory authors. However, as stated previously, the denial of authorship to AI is likely to undermine market stability and judicial efficacy, so pertinent legislation should be amended to grant AI authorship.

Judicial Practice

At the level of judicial practice, the typical cases in numerous jurisdictions do not recognise non-human creators as authors. Among countries with a common law framework, the US Federal Supreme Court in the *TradeMark Cases* of 1879 held that the purpose of copyright law was to protect mental labour and intellectual work, and that only natural human subjects capable of mental creation could be considered authors in the sense of copyright law,[23] which is impossible with AI without mental attributes. Meanwhile, the US Court of Appeals excluded the macaque selfie from copyright protection in *Naruto v. Slater* because the non-human subject lacked authorship and there was no human intellectual involvement in the creation.[24] In this regard, AI is also not presumed to be an author under US copyright law because it is a non-human subject.

In civil law countries and regions, the Court of Justice of the European Union (CJEU) in the *Infopaq case* clarified that the work protected by copyright must be the author's own intellectual creation,[25] where the concept of intellectual creation involves the author's personality.[26] Due to the mechanical nature of AI, this requirement also appears to exclude it from copyright protection in the EU. In *Tencent v. Yingxun*, the People's Court of Nanshan District also explicitly rejected the possibility of the AI Dreamwriter as an independent author under copyright law on the grounds that it does not comply with objective circumstances and legal provisions.[27] This reason is further explained in *Li v. Liu*, where the Beijing Internet Court denied the authorship of an AI model named *Stable Diffusion* on the grounds that only natural persons or legal entities may hold authorship under *PRC Copyright Law*.[28] Therefore, it could be confirmed that the AI's inability to

18. Copyright Law of the United States 1976 (Pub L No 94-553, 90 Stat 2541) 1, s 101; U. S. Copyright Office, *Compendium of U.S. Copyright Office Practices* (3rd edn, 2021) ch 306.
19. U.S. Copyright Office Review Board, 'Second Request for Reconsideration for Refusal to Register A Recent Entrance to Paradise (Correspondence ID 1-3ZPC6C3; SR # 1-7100387071)' (14 February 2022).
20. Copyright, Designs and Patents Act 1988 1988 [1988 c. 48] s 9(1).
21. Directive 2001/29/EC of the European Parliament and of the Council on the Harmonisation of Certain Aspects of Copyright and Related Rights in the Information Society 2001 (OJ L 167) 10; *Infopaq International A/S v Danske Dagblades Forening (C-5/08)* [2010] ECJ F.S.R. 20 1.
22. Copyright Law of the People's Republic of China 1990 1, ch 2(9)(1).
23. *Trademark Cases* [1879] US Supreme Court 100 U.S. 82 84.
24. *Naruto v Slater* [2018] United States Court of Appeals for the Ninth Circuit No. 16-15469.
25. *Infopaq International A/S v Danske Dagblades Forening (C-5/08)* (n 21) 4.
26. European Parliament, 'European Parliament Resolution of 20 October 2020 on Intellectual Property Rights for the Development of Artificial Intelligence Technologies' (European Parliament 2020) A9-0176/2020.
27. *Shenzhen Tencent Computer Systems Ltd. and Shanghai Yingxun Technology Co.* (n 11) 4.
28. *Li v Liu* [2023] Beijing Internet Court Jing 0491 Min Chu No. 11279 3.

qualify as an author may be because it does not fall within the statutory category of authorship under the copyright law of China.[29]

In conclusion, decisions from different national courts in mainstream jurisdictions have similarly denied authorship to non-human creators such as AI, and these decisions have yet to be adapted to the actual situation for the reasons previously stated.

2.2 Determination of Originality in AIGC

The central question of whether an AIGC can be protected under copyright law is whether it meets the copyright law's general requirements for an original expression in the fields of literature, art, or science.[30] In response, the requirements of copyright law for a work can be divided into three distinct elements: first, the work must belong to a literary, artistic, or scientific field; second, it must be an expression, that is, it must express an intangible concept through a particular form of expressions, such as words, speech, symbols, sounds, movements, and colours, so that its existence can be perceived by others through their senses; thirdly, it must compass originality.[31] While AIGC easily meets the initial two requirements, the most contentious issue in theory and practice is the originality of AIGC, i.e., whether the newly generated expression differs from the existing expression.[32]

2.2.1 Academic Perspectives

Regarding the originality of AIGC, there is a significant amount of opposition in the academic community. For instance, Jane C. Ginsburg believes that the creative process of AI is fundamentally an algorithmic result of data processing and the application of established rules and templates, which is neither an intellectual expression nor an expression of thought and emotion as required by copyright law. As a result, AIGC are fundamentally distinct from works protected by copyright and therefore does not encompass originality.[33] As stated by Professor Geoffrey Jefferson in his 1949 Lister Oration: 'Not until a machine can write a sonnet or compose a concerto because of thoughts and emotions felt, and not by the chance fall of symbols, can we agree that a machine equals a brain.'[34] Indeed, AI has not yet been able to express ideas and emotions in AIGC, but it seems inappropriate to deny the originality of AIGC merely due to the lack of ideas and emotions. In detail, this view contradicts the actual provisions of modern copyright law in the majority of countries, where functional works such as computer programmes and databases are entitled to copyright protection as original works despite not reflecting the author's thoughts and feelings.[35] In addition, a simple understanding of the intelligence concept in copyright law, as the intelligence of a natural person, may also contradict the fact that AI is capable of thinking and learning. In response, Jacob Turner argues that AI is currently created by simulating the learning and thinking processes of the human brain, i.e., by forming a collection of simulated neurons from information via neural networks and iterating on algorithms by learning from big data models. This means that the creative process of AI is fundamentally distinct from mere algorithmic templates with predictable results and can be viewed as a simulation of the human brain's structure. Consequently, AIGC can be considered to encompass intelligence and originality.[36]

There are also numerous counterarguments to the notion of denying the originality of AIGC due to the lack of personality traits. Based on the dichotomy of idea and expression, i.e., that copyright law protects only the expression of works and not the ideas reflected in works,[37] Justice Sandra Day O'Connor ruled in *Feist v. Rural* that the ideas behind a work do not inherently fall under the protection of copyright law, and thus personality factors such as thoughts and emotions in the creative process should not be considered. Consequently,

29. Copyright Law of the People's Republic of China ch 2(9)(1).
30. Berne Convention for the Protection of Literary and Artistic Works 1886 1, art 14bis.
31. Hans Brox and Walker Wolf-Dietrich, *Allgemeiner Teil des BGB* (36th edn, Vahlen 2012) 78.
32. *University of London Press Ltd v. University Tutorial Press Ltd* [1916] Chancery Division 2 Ch 601.
33. Jane C Ginsburg, 'Creation and Commercial Value: Copyright Protection of Works of Information' (1990) 90 Columbia Law Review 1865, 1867.
34. Geoffrey Jefferson, 'The Mind of Mechanical Man' (1949) 1 The British Medical Journal 1105, 1105.
35. Directive 2009/24/EC of the European Parliament and of the Council on the Legal Protection of Computer Programs (Codified version) 2009 (OJ L 111) 16, art 1(1).
36. Jacob Turner, *Robot Rules: Regulating Artificial Intelligence* (1st edn, Palgrave Macmillan 2018) 122.
37. *Baker v Selden* [1880] US Supreme Court 101 U.S. 99 101 103.

work should be deemed to contain originality if it demonstrates a minimum level of creativity.[38] Admittedly, denying the originality of AIGC is evidently undesirable due to the lack of thought and emotion. From the perspective of rights protection, the fundamental purpose of the originality doctrine is to delineate the boundaries of rights, namely to differentiate between the scope of protection and the public domain, so that works meeting the criteria can be protected by copyright, thereby ensuring the orderly functioning of the creative market.[39] The delimitation of right boundaries is essentially a process of objective determination, and the inclusion of subjective factors such as personality and emotion is manifestly contrary to the legal requirements. From the perspective of judicial efficiency, it is difficult to define the author's thoughts and emotions at the time of creation through specific criteria due to the subjectivity and unknowability of ideas. Therefore, using this subjective standard for determining originality may lead to different judges making divergent judgments on the originality of the same work in judicial practice, which may significantly reduce judicial efficiency while adversely affecting the quality of judicial decisions. In conclusion, whether from the standpoint of rights protection or judicial efficiency, subjective factors such as the author's personality should be excluded, and the originality of AIGC should be determined merely based on whether the expression of the AIGC has a minimum level of creativity, therefore ensuring judicial fairness and efficiency while granting copyright protection to AIGC that meet the criteria.

Moreover, in terms of AI technology, Annemarie Bridy argues that it is difficult to distinguish at the level of expression whether the specific source of a work is an AI or a human subject at the current development level of AI, suggesting that AIGC objectively meet the originality criteria and can be considered copyrightable works.[40] For example, the AI DeepBach developed at the Sony Computer Science Laboratories in Paris produced 2,503 new pieces after being trained with 352 compositions by Johann Sebastian Bach. The 1,600 listeners, including professional musicians and music students, who viewed these pieces without being informed of the creation facts did not realise they were composed by an AI, and more than half of the listeners believed they were composed by Bach himself.[41] It follows that an AIGC is capable of achieving a level of expression comparable to that of work by a natural person, and that it is difficult to determine whether the creator is a natural person or an AI based on the level of expression alone without specific disclosure of the fact that it was created by an AI. In the case of such AIGC, if the originality of the work is determined solely based on whether the author is a natural person or not, this may inevitably make it more difficult to administer justice and result in differential treatment to creations of similar quality based on authorship, which may have an unfairly negative effect on the value of AIGC and the legitimate interests of related natural persons. Moreover, the differential treatment of AIGC may induce AI-related subjects to conceal the creation fact of AIGC to publish and claim the copyright in order to realise their own interests, which may ultimately disrupt the creative market and undermine the value framework of social honesty and credit.

Some academics hold a compromised view regarding the originality of AIGC. According to Guo Wang, originality should be discussed alongside authorship, and a one-sided determination on the level of expression or adherence to legal provisions would be undesirable because it would sever the inherent link between originality and authorship.[42] However, discussing the originality of an AIGC in conjunction with its authorship may inevitably lead to the previously mentioned dilemma of determining copyright protectability based on whether the author is a natural person, resulting in copyright discrimination against AIGC. Yuan Cao holds the view that the determination criteria for the originality of AIGC are essentially the result of choices made by each country based on its policies and national conditions, after weighing the pros and

38. *Feist Pubs, Inc v Rural Tel Svc Co, Inc* [1991] US Supreme Court 499 U.S. 340 344.
39. Elizabeth F Judge and Daniel J Gervais, 'Of Silos and Constellations: Comparing Notions of Originality in Copyright Law' (2009) 27 Cardozo Arts & Entertainment Law Journal 375, 388.
40. Annemarie Bridy, 'Coding Creativity: Copyright and the Artificially Intelligent Author' (2012) 5 Stanford Technology Law Review 2, 3.
41. Gaëtan Hadjeres, François Pachet and Frank Nielsen, 'DeepBach: A Steerable Model for Bach Chorales Generation' (2017) 70 Proceedings of the 34 th International Conference on Machine Learning 1362, 1364–1365.
42. Guo Wang, 'On the Protection of Copyright in Computer-Created Works' (2016) 29 Journal of Yunnan University Law Edition 20, 21–22.

cons of AIGC entering the market.[43] This perspective is a good explanation for the different attitudes of different nations towards the originality of AIGC, but it avoids answering the central question directly and provides no reasonable advice at the practical level.

2.2.2 Legislation and Jurisprudence

Regarding judicial practice, the perspectives and approaches of different national courts vary considerably. Among civil jurisdictions, the EU has enacted several relevant acts, including the *Infosoc Directive*, and in the *Infopaq case* it was explicitly interpreted that copyright-protectable works should be the result of the author's own intellectual creation,[44] meaning that AIGC do not meet EU requirements for works because the AI itself does not fall within the EU scope of the author. Specifically, the representative civil law countries that emphasise the attributes of personality rights in works, the German copyright act stipulates that only individual intellectual creations can be protected by copyright as works,[45] which means that AIGC cannot be considered as copyrighted works in Germany because their creators are not natural persons. Similarly, the French Supreme Court held in the *Pachot case* that an original work must reflect the author's spirituality and personality,[46] which means that an AIGC would not be copyrightable in France because it lacks the expression of personality. While the copyright law of China does not explicitly address AIGC, the two existing court decisions indicate a shift in its approach to the issue of copyright protection for AIGC. In *Film v. BAIDU* in 2018, the Beijing Internet Court ruled that the article in question was generated by AI instead of a natural person, and thus did not qualify for copyright protection.[47] In *Tencent v. Yingxun* in 2019, the People's Court of Nanshan District in China analysed the work at issue in terms of whether it differed to a certain extent from existing works or possessed a minimum degree of creativity, and concluded that its expression met the formal requirements of a literary work and that its content reflected the selection, analysis, and judgement of relevant data and information, and thus possessed a certain degree of originality.[48] Similarly, in Li v. Liu in 2023, the Beijing Internet Court Accepted Li's evidence of prompt design, iterative parameter tuning, and manual selection as showing "personal aesthetic judgments," therefore acknowledging the originality and copyright of the AI-generated graphic work in question.[49] In conclusion, the major of civil law countries generally consider that AIGC do not contain originality and cannot be granted copyright protection because AI is not a natural person. However, denying copyright protection to AIGC for this reason may lead to problems such as copyright discrimination as described above. As a result, some countries, such as China, are turning to determine the originality of AIGC from the expression aspect and are beginning to recognise the copyrightability of AIGC.

Among the common law jurisdictions that emphasise the property nature of works, the UK copyright law provides that computer-generated works without human authorship are copyrighted works,[50] which means the UK recognises the originality of AIGC and includes them in the scope of copyright protection. In the landmark *Feist case* in the US history of copyright law, the US Federal Supreme Court held that work could be found to be original and protected by copyright law if it has a minimum level of creativity.[51] However, the the *Compendium of US Copyright Office Practices* states that copyright law protects only the fruits of intellectual work that are based on the creative ability of the human mind,[52] which means that AIGC that would otherwise meet the US originality standard at the level of expression would not be protected under copyright law because their creators are not human. In conclusion, although most common law countries tend to define the originality of work in terms of its expression in order to determine its copyrightability.

43. Yuan Cao, 'The Rationality of Copyright Protection for Creation Generated by Artificial Intelligence' [2016] Journal of Science, Technology and Law 488, 507–508.
44. Directive 2009/24/EC of the European Parliament and of the Council on the Legal Protection of Computer Programs (Codified version) art 1(3); Directive 96/9/EC of the European Parliament and of the Council on the Legal Protection of Databases 1996 (OJ L 77) 20, art 3(1); *Infopaq International A/S v Danske Dagblades Forening (C-5/08)* (n 21) 3.
45. Act on Copyright and Related Rights 1965 s 2(2).
46. *SA Babolat Maillot Witt v Jean Pachot* [1986] 130, 132.
47. *Beijing Film Law Firm v Beijing BIDU Technology Co* [2018] Beijing Internet Court Jing 0491 Min Chu No. 239 1 3.
48. *Shenzhen Tencent Computer Systems Ltd. and Shanghai Yingxun Technology Co.* (n 11) 2.
49. *Li v. Liu* (n 28) 2.
50. Copyright, Designs and Patents Act 1988 (n 20) s 9(3).
51. *Feist Pubs., Inc. v. Rural Tel. Svc. Co., Inc.* (n 38) 344.
52. U. S. Copyright Office (n 18) ch 306.

However, some nations may still choose not to protect AIGC because AI is a non-human creator, which also requires reasonable reform, as it may lead to the previously described negative consequences.

3. Attributing Copyright of AIGC

Since the industrial revolution of the eighteenth century, copyright laws in both common law and civil law countries have been based on the principle that the work belongs to the author, i.e., the author enjoys the exclusive rights arising from the work.[53] This principle's application to the context of AIGC may raise several questions. Suppose the traditional attribution principle is adhered to, attributing the copyright of AIGC to the AI itself because the AI is the factual creator of the creation. In that case, practical issues such as the AI's inability to exercise its rights may arise. With the emergence of entrepreneurial works such as films, the focus of rights ownership has shifted gradually from the author to other related subjects.[54] If the copyright of AIGC is attributed to human subjects beyond traditional attribution principles, the complexity of AI-related human subjects may cause problems in the distribution of copyright.

3.1 Attributing Copyright of AIGC to the AI Itself

3.1.1 Academic Perspectives

Some scholars hold the view that it is possible to circumvent the current legal framework to grant the copyright of AIGC to AI itself.[55] However, this notion has been widely opposed by academics. According to Nick Bostrom's three-stage theory of AI, the stages of AI development are comprised of weak AI that can perform specific tasks, strong AI with comprehensive capabilities comparable to humans, and super AI that surpasses humans in every aspect. Presently, modern AI is still in the stage of weak AI, which refers to intelligent programmes that excel in a single area but cannot deal with multiple levels of problems like humans.[56] Consequently, even if such AI can acquire the copyright to AIGC, it is unable to exercise and remedy its legal rights autonomously, and the relevant human subjects are not qualified to exercise or protect the AI copyright, which may result in the AIGC entering the public domain de facto, thus potentially causing the value of the AI program to decline significantly.[57] In addition, Ralph D. Clifford argues, from the perspective of copyright incentive theory, that AI would not be motivated to create more actively by being able to copyright AIGC, and that other relevant human subjects may treat the commercialisation and dissemination of AIGC negatively due to their inability to profit from these creations. This may have a negative impact on the value realisation of AI and AIGC, as well as the overall functioning of the creative market. In conclusion, granting copyright of AIGC to AI itself is detrimental to the exercise of copyright of AIGC, which may hinder their widespread dissemination and economic value realisation.

However, although attributing the copyright of AIGC to AI itself may result in a loss of interest for the parties involved, the fact that AI is the creator cannot be overlooked. Therefore, Timothy L. Butler proposed the well-known FHA theory, which suggests that AI can be formulated as a virtual author at the legal level, and the originality of its creation should be considered only at the level of expression to determine whether the AIGC differs from existing works, while leaving its copyright to be distributed among human subjects by judges.[58] Based on this perspective, John H. Gibbons argues further that the subject should be divided

53. Lionel Bently and Laura Biron, 'Discontinuities Between Legal Conceptions of Authorship and Social Practices: What, If Anything, Is to Be Done?' [2015] The Work of Authorship 237, 255.
54. Catherine Fisk, 'The Role of Private Intellectual Property Rights in Markets for Labor and Ideas: Screen Credit and the Writers Guild of America, 1938-2000' (2011) 32 Berkeley Journal of Employment and Labor Law 1, 37.
55. Shlomit Yanisky-Ravid and Luis Antonio Velez-Hernandez, 'Copyrightability of Artworks Produced by Creative Robots and Originality: The Formality-Objective Model' (2018) 19 Minnesota Journal of Law, Science & Technology Minnesota Journal of Law, Science & Technology 1, 30–32.
56. Nick Bostrom and Eliezer Yudkowsky, 'The Ethics of Artificial Intelligence' (2014) 15 The Cambridge Handbook of Artificial Intelligence 316, 326–327.
57. Ralph D Clifford, 'Intellectual Property in the Era of the Creative Computer Program: Will the True Creator Please Stand Up?' (1997) 71 Tulane Law Review 1675, 1682.
58. Timothy L Butler, 'Can a Computer Be an Author - Copyright Aspects of Artificial Intelligence' (1981) 4 A Journal of Communications and Entertainment Law 707, 737–738.

into the subject of creation and the subject of rights, and that AI itself should be included in the category of the creative subject so that it can be treated as de facto authors, while relevant human subjects should be recognised as subjects of rights, ensuring that they can effectively exercise and defend the legitimate rights and interests of AIGC.[59] While fully respecting the relevant creation facts, this approach could also ensure that the copyright of AIGC can be effectively exercised, ensuring that all parties can obtain reasonable benefits from AIGC and actively use AI to create, thereby promoting the growth of the creative market and AI industry.

3.1.2 Legislation and Jurisprudence

At the practical legislative level, few countries, whether governed by the common law or civil law framework, have granted the copyright of AIGC to the AI itself. However, examples that some jurisdictions have considered or attempted to identify AI as a civil subject may potentially serve as a practical reference for the recognition of AI as copyright holders. The European Parliament's Committee on Legal Affairs proposed in 2017 that the identity of the most sophisticated autonomous robots can be granted "electronic personhood" with specific rights and obligations to regulate the management of intelligent robots while balancing the conflicting interests of all parties in society.[60] However, this proposal was then rejected by the Parliament in a 2020 resolution on AI and intellectual-property by considering it "inappropriate to give AI legal personality and insisted that IP ownership remain strictly human."[61] This concept was then adopted by subsequent legislation, which denied any notion of robot personhood and confirmed the EU's final human-centred stance.[62] Moreover, another remarkable example shows that Sophia, a humanoid robot created by Hanson Robotics, was granted citizenship by Saudi Arabia at the 2017 Future Investment Initiative, which is the first attempt to grant civil subject status to AI.[63] However, the functionality of Sophia and other autonomous robots is still limited to mimicking human gestures and facial expressions and carrying out simple conversations,[64] which is obviously a long way from being able to exercise rights and fulfil obligations as independently as humans. As stated previously, the most advanced automated robots are merely intelligent programmes that excel in a single field and do not possess the same civil capacity as natural human subjects.[65] Thus, it is premature to consider granting non-human subjects like AI models civil subject status, entitled to civil rights such as copyright of AIGC, according to the current development of AI technology. Moreover, granting copyright of AIGC to AI itself is likely to cause additional difficulties in legislative and judicial practice, such as difficulties in determining the intentions or subjective fault of AI, which clearly runs counter to the original goal of enhancing the efficiency of AIGC management and maintaining the order of the creative market.

3.2 Attributing Copyright of AIGC to Human Subjects

3.2.1 Academic Perspectives

The majority of academics hold divergent opinions regarding whether the copyright of AIGC should be attributed to their designers or users. Regarding this, AI designers are generally defined as the persons directly responsible for the conceptual design, development, and initial training of the AI models that create AIGC, while AI users are generally recognised as persons who directly operate AI models to initiate the

59. U.S. Congress, Office of Technology Assessment, *Intellectual Property Rights in an Age of Electronics and Information* (US Government Printing Office 1986) 70–73.

60. Committee on Legal Affairs, European Parliament, 'Report with Recommendations to the Commission on Civil Law Rules on Robotics' (European Parliament 2017) A8-0005/2017 https://www.europarl.europa.eu/doceo/document/A-8-2017-0005_EN.html; European Parliament, 'European Parliament Resolution of 16 February 2017 with Recommendations to the Commission on Civil Law Rules on Robotics' (European Parliament 2017) A8-0005/2017 https://www.europarl.europa.eu/doceo/document/TA-8-2017-0051_EN.html.

61. European Parliament, 'P9_TA(2020)0277' (n 26).

62. Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts 2024 [COM(2021) 206 final; 2021/0106(COD)] 1.

63. Alistair Walsh, 'Robots As Citizens? Saudi Arabia Dares to Be the First' *Deutsche Welle* (30 October 2017) https://p.dw.com/p/2mk7N accessed 24 July 2022.

64. Hanson Robotics Ltd., 'Sophia' (*Hanson Robotics*, 31 January 2021) https://www.hansonrobotics.com/sophia/ accessed 24 July 2022.

65. Bostrom and Yudkowsky (n 56).

creative process of AIGC.[66] As one of the arguments in favour of attributing the copyright to the designer, Kalin Hristov believes that the AI designer infuses their mindset into the rules of AI computing during the design process, and even though the work created after each run of the AI programme may be different, the creative process of the AI still represents the will of the designer, so the copyright of AIGC should be attributed to the AI designer.[67] Nonetheless, this viewpoint has prompted some academic reflections. Pamela Samuelson points out that although the AI designer has made a significant contribution to the AI programme, the AI is already protected by copyright law as the designer's software work, and to attribute the copyright of AIGC to the designer as well is unquestionably duplicate protection of the AI designer's intellectual achievement, thereby allowing the AI designer to double profit from their intellectual property, which is an unequal distribution of benefits.[68] Indeed, the idea of attributing the copyright of AIGC to the designer may give rise to problems regarding the distribution of benefits, particularly when the separation of identity between the AI designer of AI and the user occurs, namely when the AI programme is sold to the user by the AI designer. In this case, if the copyright of AIGC is still attributed to the AI designer, it may undoubtedly undermine the legitimate rights and interests of users to generate revenue from the purchased AI, which may not be conducive to the commercialisation and dissemination of AIGC and may even diminish the value of AI program as a commodity. Moreover, attributing the copyright of AIGC to the AI designer merely because the creative process is based on an algorithmic programme designed by the designer seems to overemphasise the role of the programme at the expense of the creative material's impact.

In arguing that the copyright should be attributed to the AI user, Emily Dorotheou holds the view that AIGC do not come directly from the designer but are primarily created using user-provided materials, and therefore there is a direct relationship between the creations and the user, and thus the copyright of AIGC should be attributed to the user.[69] In this regard, it is true that attributing the copyright of AIGC to the users who typically pay the relevant price when acquiring ownership of the AI programme to expect the corresponding benefits is relatively more reasonable from the standpoint of benefit distribution. Meanwhile, it may also make the attribution of rights more efficient and convenient, as the users operate the AI to create and often directly participate in the dissemination and commercialisation of the creations. Moreover, attributing the copyright to AI users could incentivise them to actively exercise their rights, maximising the usefulness of AI.[70] However, although the AI user provides the material for its creation, for an AI capable of creating on its own, the user generally does little more than import existing material and push a button to start the AI's creation without any original contribution in the majority of cases. Therefore, it would inevitably be equivalent to free-riding if granting AI users copyright over all AIGC for this reason alone.[71]

Moreover, with the continuous refinement of the labour division in society, the identity of the AI owner and the user may be separated under certain conditions, i.e., the AI owner, who legally owns the property rights of AI models,[72] may hire specialised personnel or institutions to operate the AI for creation. Under these circumstances, it seems that attributing the copyright of AIGC to AI users may unreasonably harm the legitimate interests of AI owners and undermine their enthusiasm for commercialising AIGC, thereby potentially undermining the commercial value of AIGC, even the stable development of the AI industry. This could potentially be demonstrated in the current condition of the AI industry, where major AI companies like OpenAI may not be able to cover their costs through their current profit model of software licensing

66. European Parliament, 'Regulation of the European Parliament and of the Council Laying down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts' (European Parliament 2023) A9-0188/2023 art 3(4).
67. Kalin Hristov, 'Artificial Intelligence and the Copyright Dilemma' (2016) 57 IDEA: The IP Law Review 431, 442–444.
68. Pamela Samuelson, 'Allocating Ownership Rights in Computer-Generated Works' (1986) 47 University of Pittsburgh Law Review 1185, 1207.
69. Emily Dorotheou, 'Reap the Benefits and Avoid the Legal Uncertainty: Who Owns the Creations of Artificial Intelligence?' (2015) 21 Computer and Telecommunications Law Review 85, 89.
70. Miller (n 6) 977.
71. Enrico Bonadio and Luke McDonagh, 'Artificial Intelligence As Producer and Consumer of Copyright Works: Evaluating the Consequences of Algorithmic Creativity' [2020] Intellectual Property Quarterly 112, 122.
72. European Parliament, 'Artificial Intelligence Act' (n 66) art 3(3).

alone until 2029, according to the forecasts of OpenAI CEO Sam Altman.[73] Therefore, it may be more compatible with the long-term development of the AIGC industry to attribute copyright to the AI owner for recovering relevant vast investments of AI development. On the one hand, it is consistent with the general principles of property law for the AI owner to acquire and benefit from the copyright of AIGC based on its ownership.[74] On the other hand, under this attribution principle, it may be more intuitive and efficient for courts to determine copyright ownership in AIGC when resolving relevant disputes. Moreover, at the level of society, the AI owner-centred attribution principle may encourage the commercialisation and development of both AI models and AIGC, further promoting the advancement and creativity of the creative market and the technology industry. This could potentially be assisted in an OECD report on AI and data scraping, emphasising that intellectual property frameworks "help incentivise innovation and foster creativity by protecting the assets developed by individuals and businesses".[75] Nevertheless, the exclusive statutory attribution of the copyright to the AI owner may impede the free development of the AIGC industry when the parties involved attempt to freely allocate the copyright of AIGC by contract.

As there is some debate over whether the copyright of AIGC should be attributed to the designer or the user, the concept of identifying the designer and the user as joint-authors of AIGC has garnered widespread academic attention. The copyright law definition of joint authorship typically requires two or more authors to collaborate on a work based on different contributions.[76] In response, Bruce E. Boyden believes that in the AIGC process, it is evident that the AI designer created the AI programme with the intention of allowing future users to create the work by running the AI, and that the AI user intended to create the work by providing material for the AI programme. It follows that both had the same creative intention and contributed differently to the completion of the AIGC, so they could be considered co-authors of the AIGC and share its copyright, which resolves the dilemma of determining who should hold the copyright exclusively.[77] While identifying the AI designer and user as joint-authors may be consistent with the fact that they both contribute to the AIGC process, it does not effectively address the issue of copyright distribution in AIGC. In this regard, Pamela Samuelson points out, first, that there is no prior agreement between the AI designer and the user during the creation process and that it is implausible to conclude that the designer and the user have a shared creative intent based solely on the reasons mentioned above; second, the user generally has a direct relationship with the AIGC and is actively involved in its commercialisation and dissemination, and if the designer, who is not directly involved, can share in the benefits of the AIGC after having profited from the sale of the AI programme, there is the previously described problem of double profit.[78] Thus, the joint-authorship solution appears to avoid a single choice between AI designers and users, but it does not reasonably resolve the conflicting distribution of interests between these two parties and lacks a rational juridical basis.

In addition to these mainstream viewpoints, other scholars have also presented their own unique perspectives. For instance, Thomas K. Dreier argues that the copyright of AIGC should be attributed to the AI investor who provides the investment and bears the economic risk for the AI development, similar to the copyright regulation on films, in order to balance the conflicting interests of designers and users effectively.[79] This method unquestionably simplifies the distribution of commercial interests and ensures that AI investors are rewarded appropriately. In the meantime, it may also strike a balance between the interests of AI designers and users, while avoiding an excessive division of copyright that would hinder the realisation of relevant rights and interests. However, since the object of the investor's investment is only the

73. Karen Kwok, 'OpenAI's Profit Trajectory Is an Open Question' *Breakingviews* (Reuters News & Media Inc, 1 April 2025) https://www.breakingviews.com/considered-view/openais-profit-trajectory-is-an-open-question/.
74. Rita Matulionyte and Jyh-An Lee, 'Copyright in AI-Generated Works: Lessons from Recent Developments in Patent Law' (2022) 19 SCRIPT-ed 5, 19–21.
75. Organisation for Economic Co-operation and Development (OECD), 'Intellectual Property Issues in Artificial Intelligence Trained on Scraped Data' (OECD Publishing 2025) 33.
76. Elena Cooper, 'Joint Authorship in Comparative Perspective: Levy v. Rutley and Divergence Between the UK and USA' (2015) 62 Journal, Copyright Society of the U.S.A. 245, 255–256.
77. Bruce E Boyden, 'Emergent Works' (2016) 39 The Columbia Journal of Law & The Arts 377, 382.
78. Samuelson (n 68) 1207.
79. Dreier Thomas K., 'Intellectual Property Law Aspects of Artificial Intelligence' [1991] WIPO Worldwide Symposium on the Intellectual Property Aspects of Artificial Intelligence 151, 159.

AI itself and the investor could already obtain revenue from the sale of the AI programme itself, attributing the copyright of AIGC to the investor in this situation might also fall into the aforementioned dilemma of duplicate protection of the investor's interests, while attributing the copyright to the investor after the AI has been sold as a commodity may also harm the consumer's interests. Moreover, Susan H. Nycum and Ivan K. Fong assert that, given the private law nature of copyright law, the parties should be permitted to freely allocate the copyright of AIGC via contract.[80] This approach respects the intent of each party and, while allowing for the possibility of profit for all parties, may provide an incentive for designers to further optimise and upgrade AI programmes in order to develop the AI industry, as well as for AI users to actively run AI and promote the dissemination and commercialisation of AIGC. Nevertheless, in the absence of a contractual agreement between the human subjects involved, the statutory distribution of the copyright of AIGC is still necessary.

As stated previously, as the division of labour in the AIGC industry becomes more refined, it may be more consistent with the industry's long-term development to attribute the copyright of AIGC to AI owners. Therefore, as a reasonable solution to the dilemma concerning distributing the copyright of AIGC, the relevant human subjects should be permitted to distribute the copyright of the AIGC contractually, while the copyright of AIGC should be granted to the owner by statutory provision in the absence of a contractual agreement. This may prevent disputes over the distribution of benefits in the absence of contracts and safeguard the legitimate interests of the AI owner. Even in cases where the identity of the owner and the user are separated as described above, the owner is still entitled to the corresponding rights and could pursue their legitimate interests, and may therefore be incentivised to actively use the AI for the creation and exercise their rights in order to promote the widespread dissemination of AIGC.

3.2.2 Legislation and Jurisprudence

On the level of Legislation and Jurisprudence, countries have also made their choice between the aforementioned mainstream perspectives. Among common law countries, the UK stipulates in its copyright law that the copyright of computer-generated works should be granted to the person who made the necessary arrangements for the work's creation.[81] In *Nova Productions v. Mazooma Games*, the UK court attributed the copyright of the graphics generated by the video game software to the programmer.[82] This appears to mean that the person who makes the necessary arrangements for the work's creation under UK copyright law should typically refer to the computer programmer, which is the AI designer in the case of an AIGC. Similarly, commonwealth countries such as New Zealand have also followed the UK's lead in introducing provisions that vest copyright of AIGC in the person who makes the necessary arrangements for the work's creation.[83] As mentioned previously, the United States, on the other hand, denies copyright protection to AIGC because their creators are not human, and therefore does not regulate copyright distribution of AIGC. In conclusion, most common law countries tend to attribute copyright to the AI designer. However, attributing the copyright to the AI designer is likely to lead to problems such as duplicate profits as described above. Consequently, the relevant legislation and case law should be reformed to establish the aforementioned framework for copyright distribution of AIGC.

As most civil law countries believe that AIGC are not protected by copyright because its creators are not natural persons, few nations have addressed the issue concerning copyright ownership of AIGC. However, as disputes over the copyright of AIGC continue to arise, a minority of civil law countries have begun to examine this issue in judicial decisions. In *Tencent v. Yingxun*, the People's Court of Nanshan District in China ruled that the article generated by the AI Dreamwriter was the plaintiff Tencent's corporate work.[84] Nevertheless, as the AI Dreamwriter in question was invested in and programmed by Tencent as well as used for Tencent's own news article creation, Tencent had multiple identities as the AI's investor, designer, user, and owner. Therefore, the decision does not reflect which relevant human subject the Chinese court preferred to attribute the copyright of AIGC. While in Li v. Liu, the Beijing Internet Court clarified this

80. Nycum Susan H and Fong Ivan K., 'Artificial Intelligence and Certain Resulting Legal Issues' (1985) 2 The Computer Lawyer 1, 6.
81. Copyright, Designs and Patents Act 1988 (n 20) s 9(3).
82. *Nova Productions Ltd v Mazooma Games Ltd* [2006] Chancery Division R.P.C. 14 398–399.
83. Copyright Act 1994 (1994 No 143) s 5(2)(a).
84. *Shenzhen Tencent Computer Systems Ltd. and Shanghai Yingxun Technology Co.* (n 11) 4.

confusion by recognising the user Li as the sole author and owner of the AI-generated portrait because his human prompts, as "substantial intellectual investment", satisfy authorship criteria.[85]

In conclusion, only a few civil law countries have attempted to resolve the issue regarding the copyright ownership of AIGC by attributing the copyright to the relevant human subjects, but these countries have not discussed the allocation of the relevant copyright among different human subjects. This may also necessitate the introduction of pertinent legislation as soon as possible to establish a copyright attribution framework as outlined above, in order to fill this legal gap and address any future copyright disputes that may arise.

4. Conclusion

4.1 Standpoint and Structure of this Paper

This paper investigated the most contentious issues on the path to copyright protection for AIGC, taking into consideration the current approaches to these issues in academia, legislation and Jurisprudence, and finally proposed a practicable reform of copyright protection for AIGC that is compatible with the current development of AI technology. Regarding the aforementioned research questions, the paper argued that the de facto authorship of AI should be affirmed through legal provision, the copyright of AIGC should be protected and allocated reasonably among human subjects, and the AI attribution rights should also be protected by law.

In this regard, this paper first analysed the copyright protectability of AIGC, focusing on whether AI is qualified to be recognised as an author under copyright law and whether AIGC contains originality and constitutes copyright-protected works. Second, the attribution of the copyright of AIGC was discussed, i.e., whether the copyright of AIGC should be attributed to the AI itself or human subjects, and if the copyright of AIGC is attributed to human subjects, how that copyright should be allocated among human subjects, including designers, users and owners.

4.2 Research Findings and Contributions of this paper

This paper summarised the system of copyright protection for AIGC and provided the following reform proposals:

First, this paper contended that AI should be formulated as an author to affirm its de facto authorship status under copyright law and allow a reasonable allocation of its copyright among related natural persons, thereby providing a basis for further granting copyright protection to AIGC. By analysing the ability of AI to create autonomously and the severe consequences of denying the copyright of AIGC, this paper corrects the common misconception in the available literature that AI, as a computer program, does not qualify as an author.

Second, this paper argues that the originality of AIGC should be evaluated at the level of expression by the criterion of minimal creativity to protect the copyright of AIGC effectively. By analysing the principles of neural network technology commonly used in AI and the negative repercussions of denying the originality of AIGC due to AI's non-human status, this paper rectifies the erroneous view in the existing literature that AIGC are not considered emotional expressions or intellectual outcomes and therefore are devoid of originality.

Finally, this paper asserted that the copyright of AIGC should be reasonably allocable among related subjects under the contract to respect the autonomy of each party, and the copyright of AIGC should be attributed to the AI owner by the statutory provision in the absence of a relevant contract. Comparing and analysing the pros and cons of attributing the copyright of AIGC to different natural person subjects in the existing literature, this paper proposed a legislative framework combining statutory and intentional allocation that

85. *Li v. Liu* (n 28) 4.

could adequately reconcile the different claims of the parties regarding the attribution of copyright and is consistent with the long-term development of the AIGC industry.

4.3 Limitations of this paper and Future Research

The AI discussed in this paper is limited to AI that can create autonomously based on neural network technology without the control of human subjects. The handling of relevant copyright in special situations, such as AIGC incorporating a certain degree of human creative input, is outside the research scope of this paper. Consequently, the research findings of this paper are still only applicable to the general treatment of copyright of AIGC, and the solutions to copyright issues under special circumstances may require further investigation and research in the future.

Meanwhile, as existing judicial decisions regarding the copyright of AIGC are currently quite limited, although this paper has constructed a relatively complete copyright framework for AIGC, this system still needs to be further improved in the future by taking into account practical problems in actual cases that are currently unforeseeable, as the technological advancement of AI and the number of related copyright disputes continue to rise. A dedicated follow-up study will therefore examine the private international law and treaty questions that arise when AI outputs circulate simultaneously in multiple jurisdictions.

In conclusion, the copyright framework for AIGC proposed in this paper is simply a solution based on the current state of AI technology and the creative market for AIGC, in the hope of promoting a general consensus among academics on the relevant controversies that currently exist and providing legislators with a reference template for future copyright law reform concerning AIGC.

4.4 Concluding Remarks

Although the copyright of AIGC has been recognised to varying degrees in the copyright legislation systems of different countries, the exploration of copyright issues in AIGC is still grappling with a difficult situation, as countries have not yet reached an effective consensus on the regime of copyright protection for AIGC. From the perspective of macrohistorical trends, technological advancements have always been the inherent driving force for the development of copyright law up to the present, pushing the law's continuous adjustment and progression. The widespread use of printing with movable type in the 16th century led to the birth of the first copyright law in the world, *the Statute of Anne*; the ubiquitous utilisation of video recording devices in the 20th century sparked the second wave of development in the history of copyright law; the proliferation of internet technology in the 21st century contributed to the development of protection mechanisms for the right to disseminate via information networks.[86] Under these circumstances, the legislative framework proposed in this paper aims to provide a practical method to regulate AIGC across individual jurisdictions and in cross-border enforcement. With the rapid development of AI technology, the general copyright protection for AIGC may inevitably become the next direction of copyright law adjustment, and the technology industry and creative market would flourish as a result.

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86. Alexander and Gómez-Arostegui (n 5) 37.