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AI Output: A Human Condition that Should Not be Protected Now, or Maybe Ever

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A Human Condition that Should *Not* be Protected Now, or Maybe Ever

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ABSTRACT

AI is usually considered to be a form of automatic and autonomous work, but when applied to the creation of literary and artistic works, challenges arise in deciding whether the AI is the de facto author of its output and whether AI outputs or AI-generated products should be protected under the copyright system. This article argues that these outputs should be human creations because the working principles of AI determine that AI functions merely as a mathematical tool applied by humans to not only conceive of but also to execute the creation of AI outputs. The creativity reflected in these outputs also qualifies them as copyrighted works. However, this article disagrees with faith-based opinions claiming that granting protection to AI outputs will be good for the public, and it adopts an evidenced-based approach to demonstrate that the protection of these outputs is neither useful nor necessary for achieving the copyright system's goal of promoting the public interest and other social benefits.

INTRODUCTION

With the boom in artificial intelligence (AI) technology, the issue of whether AI can be an author in the sense of copyright law has become a hot topic among scholars worldwide. Since many national laws and practices explicitly show that only humans can be authors under the current copyright system,[1] this issue is actually concerned with whether it is

1. See Jane C. Ginsburg, *The Concept of Authorship in Comparative Copyright Law*, 52 DEPAUL L. REV. 1063, 1092 (2003) (arguing that the concept of author refers to humans rather than machines by resorting to the legal practices in the United States, the United Kingdom, Canada, Australia, France, Belgium, and the Netherlands); Ana Ramalho, *Will Robots Rule the (Artistic) World?*

possible to accept AI authorship by changing current copyright laws. Since changes mean disruptions to the current copyright law, the question is as follows: given that the layers of disruption can be divided into minor doctrinal, major doctrinal, or theoretical,[2] how disruptive would AI authorship be to copyright law?

Several opinions have been provided in the discussion. One considers AI's function in its output to be closer to amanuenses than to true authorship.[3] Similarly, another claims that humans retain sufficient control over what the AI produces and should be considered as the author directly.[4] According to these arguments, AI output will not disrupt the copyright law because it is still a human creation. By contrast, many others hold that we should consider the AI to be the de facto author of its output.[5] However, even these opinions vary as to the degree of the disruption brought by AI authorship. One argument is that the AI's creations are not so different from human creations because all creativity is inherently algorithmic in

A Proposed Model for the Legal Status of Creations by Artificial Intelligence Systems, 21(1) JOURNAL OF INTERNET LAW 12, 16 (2017) (describing that AI cannot be an author in the United States, the European Union, and Australia by resorting to more recent cases); Takashi B. Yamamoto, *AI Created Works and Copyright*, 48(1) PATENTS & LICENSING 1, 1 (2018) (describing that Japan only protects works created by humans); Avishek Chakraborty, *Authorship of AI Generated Works under the Copyright Act, 1957: An Analytical Study*, 8 NIRMA U. L.J. 37, 38 (2019) (describing that AI cannot be considered as an author in India because it is unable to discharge legal responsibilities).

2. Margot E. Kaminski, Authorship, Disrupted: AI Authors in Copyright and First Amendment Law, 51 U.C. DAVIS L. REV. 589, 602 (2017).

3. Jane C. Ginsburg & Luke A. Budiardjo, *Authors and Machines*, 34 BERKELEY TECHNOLOGY LAW JOURNAL 343, 351 (2019) ("Even the most sophisticated generative machines proceed through processes designed entirely by the humans who program them").

4. Samantha Fink Hedrick, *I Think, Therefore I Create: Claiming Copyright in the Outputs of Algorithms*, 8 NYU J. INTELL. PROP. & ENT. L. 324, 324 (2019).

5. Annemarie Bridy, *Coding Creativity: Copyright and the Artificially Intelligent Author*, 2012 Stan. Tech. L. Rev. 1, 2 (2012) (describing that computers produce works autonomously and unpredictably); Russ Pearlman, *Recognizing Artificial Intelligence (AI) as Authors and Inventors Under U.S. Intellectual Property Law*, 24(2) RICH. J. L. & TECH. 1, 1 (2018) (arguing that modern AI can create works independently); Ramalho, *supra* note 1, at 13 (arguing that AIs are creators of literary and artistic works rather than a mere tool or aid to human creation); Pamela Samuelson, *Allocating Ownership Rights in Computer-Generated Works*, 47 U. PITT. L. REV. 1185, 1186-87 (1986) (arguing that AI programs acts as the "assistants" of humans in the creation of a wide range of products); Timothy L. Butler, *Can a Computer be an Author? Copyright Aspects of Artificial Intelligence*, 4 COMMENT L.S. 707, 711-16 (1981-1982) (arguing that AI functions as not only the code generator that automatically programs but also a simulator of human intelligence); Jean-Marc Deltorn & Franck Macrez, *Authorship in the Age of Machine Learning and Artificial Intelligence*, 1 (Centre for International Intellectual Property Studies (CEIPI) Research Paper No. 2018-10), https://ssrn.com/abstract=3261329 (AIs are "opening the way to unexpected forms of creation. Instead of depending on a set of man-made rules to produce novel artworks, generative processes can be automatically learnt from a corpus of training examples"); Kaminski, *supra* note 2, at 596 (arguing that AI programs produce outputs that their programmers and users cannot predict); Robert C. Denicola, *Ex Machina: Copyright Protection for Computer-Generated Works*, 69 RUTGERS U. L.R. 251, 286 (2016) (describing that currently, computers create, they write, draw, paint and compose music).

essence.[6] With this consideration, AI authorship only brings minor doctrinal disruption and can be solved by adjusting the work-for-hire doctrine,[7] an approach that has been supported by many scholars.[8] More specifically, it is opined that the US copyright system, which is built on utilitarian theory or instrumentalism, has reserved considerable room for nonhuman authorship,[9] as utilitarian theory is interpreted as being more removed from the humanity of its author than the moral rights or natural-rights theories.[10] However, different voices argue that utilitarian theory cannot accept nonhuman authorship because the incentive that this theory provides to promote social welfare is ultimately enjoyed by humans rather than by AIs.[11] Similarly, another view holds that including nonhuman authorship in the US copyright system will bring "further uncertainty by raising more questions than answers".[12] According to these opinions, since the nonhuman nature of AI authorship essentially conflicts with the human nature behind the current rationales for copyright law, protecting AI authorship does not mean minor tweaks for the copyright law but a shift in its underlying theory. As the introduction above shows, the divergence on whether AI authorship will disrupt the copyright system originates fundamentally from a disagreement on whether AI output should be considered a human or an AI creation. If the AI were the de facto creator of its output, then it would be meaningful to discuss whether and how to regulate AI creation under the copyright system. If the human were the de facto creator of that output, then we would need to determine whether the human can be the author and whether that output can be a copyrighted work.

Because the US copyright system is founded on the belief that the protection of a work is good for the public, Professor Denicola suggests shifting our emphasis from whether AI authorship is possible under the copyright system to whether AI output can be protected.[13] Following that logic, if AI-generated output had the same social benefits as copyrighted

6. Bridy, *supra* note 5, at 2.

7. *Id.* at 27.

8. *See* Pearlman, *supra* note 5, at 35; Bridy, *supra* note 5, at 26-27; Kaminski, *supra* note 2, at 615.

9. Arthur R. Miller, Copyright *Protection for Computer Programs, Databases, and Computer-Generated Works: Is Anything New Since CONTU?*, 106 HARV. L. REV. 977, 1060-65 (1993) (arguing that the federal courts and the Constitution do not give confirmative answer that human authorship is mandatory in the U.S. copyright act).

10. Kaminski, *supra* note 2, at 599.

11. Ramalho, *supra* note 1, at 15.

12. Kalin Hristov, *Artificial Intelligence and the Copyright Dilemma*, 57 IDEA 431, 441 (2017).

13. Denicola, *supra* note 5, at 270-71.

works, there would be a strong reason to support the copyright protection of AI output.[14] That raises an enlightening question regarding the copyright issues of AI output: does AI output have the same social benefits held by copyrighted works?

Professor Denicola, who considers AI output to be an AI creation, gives a positive answer to this question by demonstrating that AI output, especially the creativity reflected in that output, reaches the originality standard required by the US copyright system.[15] However, that argument has three problems. The first problem is that this answer is still built on the judgment that AI is the creator of its output, which is an issue that has not achieved consensus in the current literature. The second problem is that if the AI is the de facto creator, it is doubtful whether the originality or creativity standard can be unbundled from human creation and used to weigh the AI creation. In fact, the originality standards of other major jurisdictions in the world are built on the premise that the works are human creations. In the European Union, the standard of originality is described as the "author's own intellectual creation"[16] which is further interpreted as involving "creative freedom",[17] "personal touch",[18] or "free and creative choices".[19] In Japan, the originality standard for works that are less functional is called "subjective creativity", which refers to the "manifestation of author's personality".[20] In the examples above, expressions such as 'personal touch', 'author's independent creation', and the author's 'personality' all offer a detailed attribution of human creative actions that make a work original under the national copyright laws. Beyond other jurisdictions, although the collective concept of authorship in the US copyright system, which has bred the work-for-hire doctrine, facilitates the commercial exploitation of copyrighted works by attributing authorship to either a fictional entity like a company or a human like the producer of a film who is not the de facto author but has control of the

14. *Id.*

15. *Id.* at 271 ("Since the benefits that writings offer to the public are the ultimate object of the constitutional clause and implementing legislation, the question becomes whether works generated by computers provide the same benefits to the public as works produced by human beings. When judged by the standards of copyrightability applied to human-created works, it is clear that they do").

16. Infopaq International A/S v. Danske Dagblades Forening, 2009 E.C.R. I-06569.

17. Football Association Premier League Ltd and Others v. QC Leisure and Others and Karen Murphy v. Media Protection Services Ltd, 2011 E.C.R. I-09083.

18. Eva-Maria Painer v. Standard VerlagsGmbH and others, 2011 E.C.R. I-12533.

19. Football Dataco Ltd and Others v Yahoo! UK Ltd and Others, 2012 E.C.R. 1 (2012).

20. BALANCING COPYRIGHT – A SURVEY OF NATIONAL APPROACHES 571 (Reto M. Hilty & Sylvie Nérisson eds., 2012).

product,[21] those copyrighted works that are evaluated by the originality standard—independent creation plus a modicum of creativity[22]—are still creations coming from the collaboration of a group of humans. According to this perspective, currently, the originality standard in the US is still bundled with human creation. Again, whether that standard can be used to evaluate AI creations returns to the current discussion on whether AI authorship can be accepted by the human-oriented copyright system. The third problem is that even if we admit that AI creation can be evaluated by the human-natured originality standard, whether AI works reaching that standard will be good for the public would be a more empirical than theoretical issue.

Beyond the answer provided by Professor Denicola, we have not seen other persuasive answers to the question of whether granting protection to AI output will be good for the public. In the existing literature, we can see that protection of AI output will maximize the rewards for the AI industry and strengthen the national economy[23], and protection will provide incentives for future investment in AI.[24] Those beliefs are described as self-evident and function as the premise of the discussion on how to allocate the authorship of AI output. However, when seen from an instrumentalist perspective, other scholars have reminded us that the protection of AI output should rely on an analysis of whether the incentive to create and invest is necessary[25] and whether sufficient incentives already exist in current copyright or patent protection for software or databases.[26] That is, the empirical question of whether protections for AI output will be good for social welfare should be answered by adopting an evidence-based approach rather than a faith-based approach.[27]

To fill the gap in the existing literature, this article addresses two questions concerning AI output. The first is whether AI output should be

21. Catherine L. Fisk, *Authors at Work: The Origins of the Work-for-Hire Doctrine*, 15 YALE J.L. & HUMAN. 1, 4 (2003) ("From the economic perspective, the ability of the firm to obtain property rights in its employees' creative products is a significant feature of an efficient intellectual property regime").

22. *E.g.,* 1 MELVILLE B. NIMMER & DAVID NIMMER, NIMMER ON COPYRIGHT § 2.01[B] (2009). *See also* Benjamin Kaplan, AN UNHURRIED VIEW OF COPYRIGHT 45-46 (1967).

23. Samuelson, *supra* note 5, at 1224-27.

24. Pearlman, *supra* note 5, at 1 ("Artificial Intelligence (AI) is a booming field, yet the current United States intellectual property (IP) legal system may serve as a disincentive for future investments").

25. Deltorn & Macrez, *supra* note 5, at 24.

26. Ginsburg & Budiardjo, *supra* note 3, at 455.

27. William Patry, HOW TO FIX COPYRIGHT 52 (2012) ("there must be mandatory, independently-produced, impartial, empirically rigorous impact statements before any new copyright legislation is passed, as well as impact statements for existing laws so that we know whether existing laws need to be amended or repealed").

considered a human creation. Answering that question can contribute to the current discussion on AI authorship by not only deepening our understanding of the working principles of AI but also untangling the myth of AI creation. In summary, this article will respond to the current controversy over whether AI and its output have disrupted the current copyright system in a general sense. The second question is whether AI output should be protected from the perspective of instrumentalism. More specifically, we need to explore whether granting protection to AI output will benefit the public interest by turning to empirical evidence regarding AI and its output. Part I contextualizes the nature of AI output by introducing the technologies adopted in producing that output, including AI technology, machine learning, and deep learning. Based on this background knowledge, Part II explores the de facto author of AI output, and we find that the output should be considered a human creation, meaning that the issue of AI authorship does not exist for the copyright system at all. Given this conclusion, does this mean we need to grant copyright protection to AI output? The finding is probably not; Part III gives a social cost-benefit analysis of the protection of AI output, showing that the cost or the social risk resulting from granting protection to AI output will outweigh the benefits. Therefore, this article concludes that although AI output is a human creation and qualifies as copyrighted work, the time is not ripe to grant protection to that output. Only when a series of conditions is satisfied should we consider including AI output in the copyright system.

I. CONTEXTUALIZING AI OUTPUT: AI, MACHINE LEARNING, AND DEEP LEARNING

To understand where AI output comes from, we need to start by introducing AI technology. AI technology focuses on the study of intelligent agents, and four approaches define what the intelligent agent does: the first approach defines the agent as thinking humanly, the second as acting humanly, the third as thinking rationally, and the fourth as acting rationally.[28] The fourth approach is considered to be a more practical and achievable option than the others because rational action can be well defined from a mathematical perspective.[29] This is essentially decided by the mathematical nature of AI technology.

As a branch of computer science, AI technology is realized by a series of computer programs following an algorithm. The underlying logic of the

28. Stuart J. Russell & Peter Norvig, ARTIFICIAL INTELLIGENCE: A MODERN APPROACH viii, 2 (3rd ed. 2016).

29. *Id.* at 5.

algorithm is founded on discrete mathematics, which studies discrete objects consisting of distinct or unconnected elements.[30] The discrete nature can be further explained by the definition of an algorithm, which is formally defined as "an ordered set of unambiguous, executable steps that defines a terminating process"[31] In this definition, the term "unambiguous" means "during execution of an algorithm, the information in the state of the process must be sufficient to determine uniquely and completely the actions required by each step".[32] According to that definition, an algorithm executes a step-by-step operation to reach a conclusion,[33] and that conclusion should be presented with finite possibilities to avoid a situation in which the algorithm never stops.[34]

The mathematical nature of the algorithm can help us further understand what AI can do. As a scholar claims, AI does nothing related to intelligence, but is all about search and optimization.[35] The term *search* refers to the fact that most AI problems are described in clear mathematical terms as a search for a solution.[36] In other words, what can be realized or solved by AI should also be mathematically "well-defined problems in well-defined situations with well-defined parameters".[37] The term *optimization* means the AI needs to determine a good solution for the problem or to select one by comparing the possible solutions, and scientists enable the AI to do exactly that by using an objective function—a mathematical description, or equation, of the goal we are using the AI to search for.[38] In that sense, since behaviors such as thinking or acting like a human are still not completely understood by scientists, it will be harder to define them in a mathematical way. Thinking rationally belongs to the field of logic, and it is only one of the possible mechanisms for achieving the goal of acting rationally.[39] Therefore, acting rationally is a more reasonable goal for AI, and this is defined as follows: for each possible *percept sequence* (the complete history of everything the agent has ever perceived), the agent should select an action that is expected to maximize its

30. *See generally* Kenneth H. Rosen, DISCRETE MATHEMATICS AND ITS APPLICATIONS xix (8th ed. 2019).

31. J. Glenn Brookshear, COMPUTER SCIENCE: AN OVERVIEW 189 (11th ed. 2011).

32. *Id.*

33. Edward Ashford Lee, PLATO AND THE NERD 145 (2017).

34. *Id.* at 146.

35. Mike Cook, *A Basic Lack of Understanding*, NOTES FROM BELOW (Mar. 30, 2018), https://notesfrombelow.org/article/a-basic-lack-of-understanding.

36. *Id.*

37. Meredith Broussard, ARTIFICIAL UNINTELLIGENCE: HOW COMPUTERS MISUNDERSTAND THE WORLD 134 (2018).

38. Cook, *supra* note 35.

39. Russell & Norvig, *supra* note 28, at 4.

performance measure (the evaluation of any given sequence of environment states caused by the sequence of the agent's behavior), given the evidence provided by the percept sequence and whatever built-in knowledge the agent has.[40]

To reflect rationality, the agent is required to show its capabilities in learning and autonomy. The agent's capacity of learning means "a process of modification of each component of the agent to bring the components into closer agreement with the available feedback information, thereby improving the overall performance of the agent".[41] The capacity of autonomy means that the agent does not solely depend on the built-in knowledge provided by the programmer but can make adjustments to and even act independently from that knowledge after gaining sufficient experience of the environment.[42] Therefore, AI is also described as an autonomous machine that can carry out complex tasks without human intervention.[43]

AI's learning and autonomy capabilities are amplified by machine learning and deep learning technologies. As a branch of AI technology, the goal of machine learning is to program AI so that it can automatedly detect meaningful patterns in data and examples.[44] To learn to detect patterns and information, human programmers provide the data and examples to the AI, and the AI processes the data and draws conclusions that hold for the environment from which those data and examples are picked;[45] programmers then decide whether the AI output reflects the patterns they want detect. Deep learning is a cutting-edge area of machine learning that uses multilayered artificial neural networks to improve the accuracy in learning, extracting, and translating the patterns or features of data without introducing traditional hand-coded code or rules.[46] Deep learning technology is important because it has enabled the wide use of AI in fields such as writing poems[47] and novels,[48] creating paintings,[49] and designing

40. *Id.* at 34, 37.

41. *Id.* at 57.

42. *Id.* at 39.

43. Brookshear, *supra* note 31, at 462.

44. Shai Shalev-Shwartz & Shai Ben-David, UNDERSTANDING MACHINE LEARNING: FROM THEORIES TO ALGORITHMS xv (2014)

45. *Id.* at 6.

46. Özgür Genç, *Notes on Artificial Intelligence, Machine Learning and Deep Learning for Curious People*, TOWARDS DATA SCIENCE (Jan. 26, 2019), https://towardsdatascience.com/notes-on-artificial-intelligence-ai-machine-learning-ml-and-deep-learning-dl-for-56e51a2071c2.

47. Geoff Spencer, *Much More Than a Chatbot: China's Xiaoice Mixes AI with Emotions and Wins over Millions of Fans*, MICROSOFT / FEATURES (Nov. 1, 2018), https://news.microsoft.com/apac/features/much-more-than-a-chatbot-chinas-xiaoice-mixes-ai-with-emotions-and-wins-over-millions-of-fans/.

video games[50] in recent years. In other words, understanding how deep learning works will help explain how the AI output is generated.

As the core of deep learning technology, artificial neural networks (ANNs) simulate the learning mechanism of biological organisms.[51] An ANN has three layers: the input layer, the hidden layer, and the output layer. The hidden layer consists of many computational units, which are referred to as neurons, with weighted connections that function as the intermediate parameters presenting the importance of inputs as seen below in Figure 1.[52]

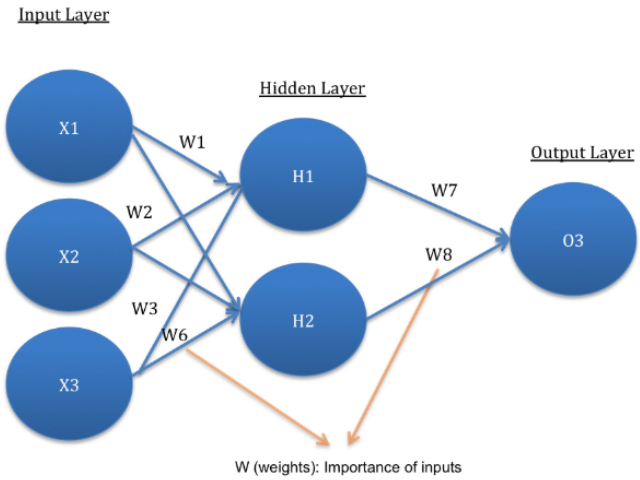

Figure 1: A simple ANN architecture (the feed-forward network)[53]

48. Michael Schaub, *Is the Future Award-Winning Novelist a Writing Robot?*, LOS ANGELES TIMES (Mar. 22, 2016, 10:30 AM), https://www.latimes.com/books/jacketcopy/la-et-jc-novel-computer-writing-japan-20160322-story.html.

49. Ahmed Elgammal, *AI Is Blurring the Definition of Artist*, AMERICAN SCIENTIST, Jan.-Feb. 2019, at 18.

50. Tommy Thompson, *Games by ANGELINA: The AI Game Designer*, TOWARDS DATA SCIENCE (Oct. 20, 2017), https://towardsdatascience.com/angelina-6d4a6a311a4.

51. Charu C. Aggarwal, *Neural Networks and Deep Learning* 1 (2018).

52. *Id.*, at 2.

53. Jahnavi Mahanta, *Introduction to Neural Networks, Advantages and Applications*, TOWARDS DATA SCIENCE (July 10, 2017), https://towardsdatascience.com/introduction-to-neural-networks-advantages-and-applications-96851bd1a207. In fact, the ANN shown by Figure 1 is a feed-forward network in which the information flows in one direction. A network, which allows the information to flow in two directions, also exists and is called the error backpropagation network, *see generally* Terrence J. Sejnowski, THE DEEP LEARNING REVOLUTION 111 (2018). *See also* David E. Rumelhart et al., *Learning Representations by Back-Propagating Errors*, NATURE, Oct. 1986, at 533–536.

According to **Figure 1**, the process through which an ANN is trained to solve a certain problem can be depicted briefly as below. The training data are provided to the input layer to be transferred into different values using the existing algorithms; the neurons will compute those values by adopting certain equations related to the weights and will pass the output values to the neurons in the hidden layer. Then the neurons in the hidden layer will adopt certain equations also related to the weights and obtain the predicted value for the output layer. The programmer then compares the difference, which is called the loss, between the predicted value and the target value and updates the weights so that the loss is minimized.[54] When all weights have been identified to minimize loss, the training of the ANN is complete, and the predicted value is the AI output presented in mathematical form. Therefore, in the process of producing the AI output, the ANN calculates the numerical values to obtain a predicted value by executing a series of equations and algorithms, and the human programmers not only provide the training data but also tweak and identify the weights that result in a predicted value with the minimum loss from the target value. That is, both AI and human programmers contribute to the output. This leads to a divergence in the current literature on the issue of whether the AI or the human should be considered as the de facto author of the output. This issue is thus a concern for how we interpret the contributions made by both the AI and the human programmers under the concept of the author in the sense of a copyright system. Therefore, we will take a close look at those contributions to determine the de facto author of the AI output.

II. THE DE FACTO AUTHORS OF AI OUTPUT: HUMANS

Before unfolding the analysis on whether the AI or the human programmer should be the author of a product, we first need to define the concept of author in the sense of the copyright system. According to Professor Ginsburg's summary built on many national copyright laws and practices, the definition of author can be summarized as the human who exercises subjective judgment in composing a work and who controls its execution.[55] Refining that definition, two essential conditions are mentioned in deciding the de facto author of a certain work: one is conception, which is the action of elaborating a detailed creative plan for a work rather than envisioning the general ideas, and another is execution, which refers to the action

54. Shiva Verma, *Understanding Different Loss Functions for Neural Networks*, TOWARDS DATA SCIENCE (June 20, 2019), https://towardsdatascience.com/understanding-different-loss-functions-for-neural-networks-dd1ed0274718.

55. Ginsburg, *supra* note 1, at 1063-64.

of converting the plan into concrete form.[56] According to this definition, the question becomes whether the human programmers' contribution to AI output satisfies these two conditions.

Many scholars currently answer that question with a negative because the AI output is automatically and autonomously created by AI and unpredictable to the programmers and users.[57] Those scholars' impressions of AI output reflect facts that lead us to refuse to admit the human authorship of AI output. The first fact is that humans are currently using machine learning and deep learning technologies to recognize something that is ineffable. As one scholar has claimed, machine learning technology is a new programming paradigm, a new way of communicating our human wishes to the computer.[58] A common example is how the human trains the algorithm to recognize a cat in an image. Although humans can recognize a cat easily, it is very hard for us to tell the AI how we recognize the cat, especially by programming using instructions understandable by the AI. In that sense, how to recognize a cat is actually ineffable for humans: something we know but cannot express through words, let alone to code for computer programs.[59] In the field of painting, AI is also used to express something ineffable for artists. The Artificial Intelligence Creative Adversarial Network (AICAN) is a newly developed deep learning algorithm for creating artworks.[60] When programing that algorithm, the artists depicted the AI's objective function as two opposing goals by using a mathematical equation: one drives the AI to learn the aesthetics of existing works of art, but the other aims to avoid presenting a style that is too close to any established styles.[61] In this situation, the human artists cannot exactly describe in detail the aesthetics reflected in what they have provided to the algorithm, nor can they describe what the requirement "not too close to any established styles" means exactly. What they want the AI to do is something ineffable, and they cannot predict or preconceive what the final output will be. What they have done is program their abstract and not-so-detailed goals through the algorithm, which leads us to argue that those artists do not have a detailed plan for what they want the AI to create. As a result, it seems that the AI creates the output autonomously without human intervention.

56. Ginsburg & Budiardjo, *supra* note 3, at 347.

57. *See generally* Bridy, *supra* note 5, at 2.

58. Cassie Kozyrkov, *The Simplest Explanation of Machine Learning You'll Ever Read*, HACKERNOON (May 24, 2018), https://hackernoon.com/the-simplest-explanation-of-machine-learning-youll-ever-read-bebc0700047c.

59. *Id.*

60. Elgammal, *supra* note 49, at 18.

61. Ahmed Elgammal et al., *CAN: Creative Adversarial Networks Generating "Art" by Learning About Styles and Deviating from Style Norms*, in Eighth International Conference on Computational Creativity (ICCC) (2017), https://arXiv.org/pdf/1706.07068.pdf.

The second fact is that the patterns recognized by the machine learning algorithm may also be beyond the human capacity to recognize. This is true because computers can process a large amount of data and examples that cannot be processed by humans, and AI under machine learning programs is able to recognize patterns outside the scope of human perception.[62] Taking the case of the artists who programmed AICAN, to achieve the abovementioned goals, they have fed the AI with 80,000 images that represent the Western art canon, and they aim for the AI to learn to avoid limitation to a certain style or genre.[63] Obviously, drawing a painting by analyzing and learning from 80,000 images is beyond the artists' capacity and gives us the impression that the artists cannot participate in the production process; thus it seems that the human does not practically execute the creation of AI output.

The third fact is that although the human programmers can adjust the weights of the neurons to affect the final output of the ANN, they cannot explain how the algorithm comes to its output.[64] This reflects the black-box problem of AI. The application of AI in the medical field can help us further understand this problem. When using AI for medical diagnoses, it only gives the final answer to a problem, which means that no one can know exactly and clearly the internal adjustments and processing that mold that answer. Rather than being guided by built-in medical knowledge and diagnostic rules, the answer is guided by something that cannot be recognized by doctors.[65] Accordingly, the black-box problem of AI is that humans are unable to understand how AI makes decisions. Similarly, although human artists tweak the weights of the neurons so that the AI obtains the desired output through computation, they do not understand what those numbers mean for the creation of a painting because the AI is handling something that is ineffable for them.[66] More specifically, they cannot know from the weights why some works are considered more successful in reflecting the aesthetics preferred by the artists, and from the predicted value, they cannot know why the AI considers the final product to be what they want to create.[67] In other words, although human artists can observe how the information flows and is processed inside the AI, they cannot understand what the flowing and processing mean, and that tends to make us think that human artists have lost control over the concrete form of AI output and thus that the AI is creating something that humans cannot predict.

62. Shalev-Shwartz & Ben-David, *supra* note 44, at 6.

63. Elgammal, *supra* note 49, at 18.

64. Sejnowski, *supra* note 53, at 123.

65. Siddhartha Mukherjee, *A.I. versus M.D.: What Happens When Diagnosis is Automated?*, THE NEW YORKER (Apr. 3, 2017), https://www.newyorker.com/magazine/2017/04/03/ai-versus-md.

66. Kozyrkov, *supra* note 58.

67. Elgammal, *supra* note 49, at 18 (For example, although the human artists give AI their definition of creativity, the AI does not always coincide with the general consensus among art historians when selecting paintings that contain creativity.)

However, although the facts above are the reality of AI, none of them refute that the human programmers or artists conceive of and contribute to the execution of the final output. In essence, the programmers or artists create the AI output by using mathematics as a tool. How? We need to explain this based on the working principles of AI. As we discussed earlier, AI is an algorithm built on discrete mathematics, and the workings of the ANN has further shown us that inside the AI algorithm there are many equations functioning as computational tools.[68] It is worth noting that in addition to being a tool for computation, those equations also tell us about the underlying relationship between AI's inputs and outputs.[69] Let us further explain this by taking the world-famous equation $E=mc^2$ as an example. This equation tells us about the underlying relationship between energy and mass. More importantly, it reveals the law and principle of how energy and mass work in the physical world. Another way to phrase it, the equation $E=mc^2$ decides how the physical world has turned energy into mass or vice versa. In that sense, AI can also be interpreted as a more complicated equation that decides how human-provided work will be turned into output. Therefore, the human who programs AI decides how the elements in the provided works will be recombined to form the output. Moreover, by providing the existing works, the human programmers provide the elements that may be used in the creation of output. By tweaking the weights in the AI, the human programmers exert a fundamental influence on whether those elements have been recombined in the desired way, as displayed by Figure 2.

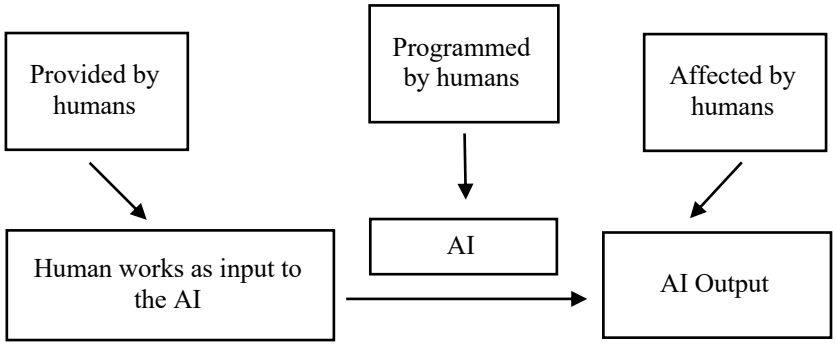

Figure 2 The process of producing AI output

With this understanding, we can explain why the humans who not only provide the works but also essentially decide how the AI works can be the author in the sense of copyright law. For the product conception, a detailed plan for the

68. Cook, *supra* note 35, and Verma, *supra* note 54.
69. Verma, *supra* note 54.

work the human wants to create does exist. That plan is reflected in the objective function of the AI—the goal the programmers want the AI to achieve.[70] For example, the goals in programming the AICAN[71] are the plan showing what the programmers want to create. Since AI describes how the provided works will be recombined into the AI-generated product, by programming the AI, the programmers explain in a mathematical way how to create those products. In addition, by providing the works to the AI, the provider prepares those works as the raw material for creation, which can be considered to be the plan for what elements will be used in the final output. For the execution, it is easy to understand that the action of selecting which works to provide to the AI and the action of tweaking the weights to obtain the desired outputs from the AI can be considered to be exercising subjective judgment in composing the work. Addressing doubts about human control of execution, we can use an analogy to explain why human programmers have exerted sufficient control over the output of AI. Assume we are using an electronic pen to draw on the screen of a computer such as an iPad or Surface. Once the pen touches the screen, it leaves a line with a certain thickness and color. We can adjust the thickness and color of that line by changing the parameters of the pen. When we used the pen to draw a painting, no one would doubt that we have sufficient control over that painting. Why? We have chosen the lines and decided how those lines will form the final output. It is the same case for the AI output. The programmers choose the lines they like by providing the selected works to the AI, and they also decide how those lines will be presented in the painting by tweaking the weights in the AI.

That analogy can further explain why the inability to recognize the hidden patterns in the provided works or to explain the computation made by the AI does not lead to rejection of the idea that humans have sufficient control over the creation of AI output. When we use an electronic pen to draw, our sufficient control over the painting does not rely on an understanding of why our touch on the screen leaves a line of different thicknesses or colors; that is an irrelevant technical detail. What is relevant is that we know there is a correspondence between our touch and the line shown on the screen. By relying on that correspondence, we will have sufficient control over what we want to draw. For the AI output, both the hidden patterns and the meaning of how the data are processed are irrelevant technical details. Since the AI functions as the equation that decides the correspondence between the human-provided works and the output, by programming and tweaking the AI, human programmers have sufficient control over that correspondence. In other words, by exerting decisive influence over how the AI will process the data and obtain the output, the programmers can

70. Cook, *supra* note 35.
71. Elgammal et al., *supra* note 61.

control the AI to produce what they want, and it does not matter whether those programmers understand how the data have been processed or how the output has been created. This is different from the situation presented in AI's application to medical diagnoses. The black-box problem of AI emerges in medical diagnoses because doctors will not be satisfied by simply obtaining a diagnostic result from the AI algorithm; they need to know more about how the AI algorithm has found critical features that may be decisive for detecting a certain disease.[72] However, that is not the case for the literary and artistic works protected by copyright law. In legal practices, how the work is created is irrelevant because what the courts need to know is originality verses copying.[73] That is, the courts hold a result-oriented attitude toward protected works, meaning that they think it is unimportant or impractical to know exactly the creation process for the work.[74] The black-box problem of AI is not persuasive in denying human control over AI output for another reason: the production process of a work created by a human in a traditional way without the use of computer or AI is also a black box because it is also very hard, or even impossible, to define or determine what variables have decisively influenced the final form of the work.[75] In that sense, although humans cannot understand or explain exactly the internal workings of AI, the fact that they can essentially affect the final output of AI by providing selected works and adjusting the parameters that decide how the AI processes these works is enough to show their sufficient control over the concrete form of the output.

Until now, we have explained why the humans who provide the selected works and exert decisive influence on how the AI works have satisfied the conditions of the author under the copyright system. However, there is still an issue that may prevent us from admitting the AI output as a human creation. That issue concerns the creativity shown in the AI output—the so-called *computational creativity*. In the existing literature, it is considered that computational creativity originates from AI,[76] which implies that AI is the de facto creator of its output. In essence, computational creativity should be considered a reflection of human creativity. The most important reason is still that AI, in essence, is a mathematical tool for humans to create works. Since AI itself has no connection to any human intelligence at all[77] and humans have sufficient control over both the input and output of the AI, computational creativity has to be something we can find within

72. Mukherjee, *supra* note 65.

73. Jessica Litman, *The Public Domain*, 39 EMORY L.J. 965, 1001 (1990).

74. *See* Arnstein v. Porter, 154 F.2d 464 (2d Cir. 1946) and Feist Publications, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 361 (1991). According to the two landmark cases above, when deciding infringement, the courts need to confirm the ownership of copyright and find the existence of copying, showing that the creation process of the disputed work is of no importance in deciding infringement.

75. Hedrick, *supra* note 4, at 370.

76. Bridy, *supra* note 5, at 347.

77. Cook, *supra* note 35.

our human creativity.[78] There is no difference in nature between the computational creativity and the human creativity reflected in products. The only difference is the fact that instead of using pens to write, brushes to paint, and computers to design, the humans use the mathematics to explore the underlying principles of how the existing works are constructed and to reconstruct the selected elements into new works. In fact, when seeing the historically new ideas that emerge from humans' application of AI in fields such as engine design, pharmaceuticals, and computer art, we can identify three forms of human creativity: *combinational creativity*, which means the combination of unfamiliar ideas; *exploratory creativity*, which refers to producing ideas by following stylistic rules that are culturally valued; and *transformational creativity*, which is triggered by frustrating the existing rules or styles.[79] Therefore, it is fair to say that computational creativity does not originate from AI but from the human who uses the mathematical tool in creating works.

Since the AI outputs are human creations and contain creativity having the same nature as that in other copyrighted works, it is fair to say that these outputs *can* be protected under the current copyright system. The author of those products, according to our previous analysis, can be the human or legal entity that not only provides the selected works but also essentially decides and affects how the AI works when recombining the elements of those selected works. However, the story does not end there because Professor Denicola has provided us with a different perspective for evaluating whether it is worth protecting the AI output under the copyright system.[80] More specifically, he reminds us to change our emphasis from the question of whether the AI outputs are, in practical terms, created by humans or AI to the question of whether the protection of these outputs can bring benefits to society.[81] In other words, although the AI outputs *can* be protected under the copyright system, a more important question is whether these outputs *should* be protected. For that question, it is necessary to conduct a social benefits analysis of the copyright protection of AI outputs.

III. SOCIAL BENEFITS ANALYSIS OF THE PROTECTION OF AI OUTPUT: RISKS OUTWEIGH BENEFITS

As Professor Denicola points out, according to the copyright-patent clause of the US Constitution, the Supreme Court opinion, and the emphasis of Congress, the primary goal of copyright protection in the US is to foster the creation of works

78. Margaret A. Boden, AI: ITS NATURE AND FUTURE 68 (2016) ("AI concepts help to explain human creativity.")

79. *Id.* at 68-69.

80. Denicola, *supra* note 5, at 271.

81. *Id.*

for the good of the public rather than for the benefit of the author.[82] From that, a crucial question regarding the copyright protection of AI outputs is whether those outputs provide the same benefits to the public as other copyrighted works do.[83] Professor Denicola gives a positive answer to that question by demonstrating that those outputs have satisfied the standards of copyrightability under the US copyright act. Following his logic, if the works were copyrightable or, more precisely, creative, then they would be considered good for the public. To evaluate that opinion, we first need to understand what benefits the copyrighted works have provided to the public and how copyright protection promotes that benefit.

In a general sense, the benefit that copyrighted works have provided to the public can be summarized as encouraging learning.[84] This is reflected in the establishment of the first modern copyright law. This law, the Statute of Anne, describes itself as "An act for the encouragement of learning, by vesting the copies of printed books in the authors or purchasing of such copies, during the times therein mentioned",[85] and thus the encouragement of learning is a critical target at the very beginning of copyright legislation. As the direct offspring of that Statute, the copyright-patent clause in the US Constitution further explains that copyright legislation should serve the aim of promoting "the progress of science and useful arts",[86] with the "science" mentioned here being a synonym of "knowledge or learning".[87] In addition, the US Supreme Court has repeatedly emphasized that "the primary public interest lies in increasing and spreading knowledge".[88] On an international level, a trace of the "encouraging learning" concept can also be found in the public interest referred to by the WIPO Copyright Treaty.[89] In the preamble of that treaty, some particular fields regarding the public interest are mentioned: education, research, and access to information,[90] which are all closely connected with the target of encouraging learning.

82. *Id*. at 270-71.

83. *Id*. at 271.

84. L. Ray Patterson & Stanley W. Lindberg, THE NATURE OF COPYRIGHT: A LAW OF USERS' RIGHTS 49 (1992).

85. Statute of Anne, 1710, 8 Anne, Ch. 19 (Eng.).

86. U.S. Const. art. I, § 8, cl. 8.

87. Patterson & Lindberg, *supra* note 84, at 48-49.

88. Ralph S. Brown, *Eligibility for Copyright Protection: A Search for Principled Standards*, 70 MINN. L. REV. 579, 607 (1985-1986). *See also* L. Ray Patterson, *Eldred v. Reno: An Example of the Law of Unintended Consequences*, 8 J. INTELL. PROP. L. 223, 228 (2001) ("the governing principle of both the First Amendment and the Copyright Clause is the right of public access to materials that enable the people to learn, for political purposes in some instances, and for personal education in others"). For the cases, *see* United States v. Paramount, 334 U.S. 131, 158 (1948), Sony Corp. of Am. v. Universal City Studios, 464 U.S. 417, 429 (1984), and Twentieth Century Music Corp. v. Aiken, 422 U.S. 151, 156 (1975).

89. WIPO Copyright Treaty, preamble, Dec. 20, 1996, 2186 U.N.T.S. 121; 36 I.L.M. 65 (1997).

90. *Id.*

The goal of encouraging learning is promoted by the copyright system in two ways. The first encourages the emergence of more cultural products that can be enjoyed by the consumers of copyrighted works.[91] As Professor Litman has pointed out, "copyright was designed to maximize the opportunities for nonexploitative enjoyment of copyrighted works in order to encourage reading, listening, watching, and their cousins."[92] In fact, the copyright system trades those rights for a greater chance of accelerating the creation and dissemination of cultural products, serving the final target of enriching society's wealth of culture and information.[93] This idea has been further reflected in the instrumentalism interpretation of copyright law. Under instrumentalism, copyright is considered an instrument that provides an incentive for the actions of creating and disseminating works of social value.[94] More specifically, by giving authors a monopoly over their works, copyright corrects the lack of incentive resulting from free riders' appropriation of the value created by an author's effort.[95] The instrumental function of the copyright can also be found from an economic perspective: copyright should function by not only overcoming the failures of the market economy to support the production of creative works but also by prohibiting unauthorized use to promote the correction of market failure and the efficient production of those works.[96] Therefore, by providing incentives for the creation and dissemination of works, society will embrace the richness of knowledge and information,[97] facilitating learning and benefiting consumers and ordinary people as a whole.

Another way to promote the public interest is to reserve the space enjoyed by the user of copyrighted works or a subsequent author building upon them, where the use of those works will be free from the liability of infringement.[98] In addition to the consumers of copyrighted works mentioned above, the user or subsequent author of those works are also critical beneficiaries of the copyright system[99] because appropriation, given the derivative nature,[100] is unavoidable in many creative activities.[101] Inside the copyright system, two mechanisms have been

91. Jessica Litman, *Lawful Personal Use*, 85 TEX. L. REV. 1871, 1879 (2006-2007).
92. *Id.*
93. Sony Corp. of Am. v. Universal City Studios, 464 U.S. 417, 429 (1984).
94. Stewart E. Sterk, *Rhetoric and Reality in Copyright Law*, 94 MICH. L. REV. 1197, 1197 (1996).
95. *Id.*
96. Gillian K. Hadfield, *The Economics of Copyright: An Historical Perspective*, 38 COPYRIGHT L. SYMP. 1, 5 (1988).
97. Samuelson, *supra* note 5, at 1224.
98. Patry, *supra* note 27, at 132.
99. *Id.*
100. Pierre N. Leval, *Toward a Fair Use Standard*, 103 HARV. L. REV. 1105, 1109 (1990).
101. Nicholas Ruiz, *Copyright's Paradox: The Public Interest and Private Monopoly*, 18 INTELL. PROP. L. BULL. 213, 213 (2014).

established to secure the existence of that space. One is recognition of the dichotomy of the idea and expression.[102] Expression, not idea, is protected by copyright law, which has become a universal principle worldwide.[103] By excluding the protection of the idea, the building blocks and other raw materials of our language and culture have been made available for all to use, facilitating the subsequent creation of works.[104] The second mechanism is the limitations and exceptions of rights. Those limitations and exceptions, which generally include the categories of works excluded from copyright protection, the free use called fair use or fair dealing in national practices, and non-voluntary or compulsory licenses, provide legal reasons for the subsequent creators to use or appropriate the content of an existing work.[105] Take the fair use doctrine stipulated in the US copyright act as an example. Under that doctrine, when the user of a copyrighted work has presented the appropriated materials in a way that provides a public benefit and has not substantially impaired the present or potential economic value of that work, that user can be exempted from the liability of infringement.[106] Therefore, the limitations and exceptions to the rights mean that a subsequent author or user has more chances to learn from and add value to existing works, increasing the knowledge and information that can be enjoyed by society as a whole.

As the analysis above shows, the copyright system promotes public interest by encouraging learning. That goal is achieved by not only accelerating the emergence of new cultural products on the market but also by reserving space for subsequent use that will be free from the liability of infringement. Understanding that, we can explain why the fact that AI outputs satisfy the copyrightability standard is not a tenable reason to grant protection: that fact cannot tell us whether granting protection will be useful and necessary for achieving the goal of encouraging learning. First, that fact tells us nothing about whether the protection of AI outputs will support making more cultural products available on the market. Indeed, the computational creativity reflected by AI outputs makes them qualified cultural products. However, that does not mean that granting protection will give the stakeholders of those outputs sufficient motivation to create more works and bring them into the circulation. Second, that fact cannot tell us whether the protection of AI outputs will be necessary to provide incentives and reserve space for the encouragement of learning. In other words, we need to further confirm whether granting protection will better encourage learning than not granting it. In

102. Paul Goldstein & P. Bernt Hugenholtz, INTERNATIONAL COPYRIGHT: PRINCIPLES, LAW, AND PRACTICE 5 (2013).

103. *Id.*

104. UNCTAD-ICTSD, RESOURCE BOOK ON TRIPS AND DEVELOPMENT 139-40 (2005).

105. WIPO, UNDERSTANDING COPYRIGHT AND RELATED RIGHTS 15-17 (2nd ed. 2016).

106. Robert A. Gorman et al., COPYRIGHT: CASES AND MATERIALS 949 (9th ed. 2016). *See also* 17 U.S.C. § 107 (1976).

fact, to know whether granting protection will be useful and necessary, we need to rely on empirical evidence concerning the reality of how AI outputs perform on the market.

A. The Usefulness of Granting Protection to AI Output

We will start by exploring whether granting protection to AI outputs will be useful in making more cultural products available on the market. The economic analysis of copyright has told us that both the author and the disseminator of a work will care about the financial return gained through the actions of creation and dissemination.[107] This idea has been further explained under the context of book publication as follows: without copyright protection, "the market price of a book will eventually be bid down to the marginal cost of copying, with the unfortunate result that the book probably will not be produced in the first place, because the author and publisher will not be able to recover their costs of creating the work".[108] Therefore, whether there will be more AI outputs available on the market is essentially decided by whether the author or disseminator of those outputs can obtain a financial return from the market. However, the problem is now that we have not found solid evidence for the existence of a market for AI outputs from which stakeholders can obtain financial returns.

According to the reports of AI-related industries, AI has greatly affected economic development worldwide, and it is predicted that AI will contribute up to $15.7 trillion to the global economy in 2030.[109] AI contributes to global GDP by improving labor production, realizing personalization, saving time, and improving quality, all of which concern the automation of routine tasks, referring specifically to manual work.[110] That is, AI has contributed to economic development by improving the efficiency of manual work; it has shown its commercial value for manual work. However, the reports do not mention the economic contribution from AI's application to mental work such as the creation of literary and artistic works. It is fair to say that AI's application to mental works has not resulted in the same financial importance for the economy as its application to manual works, implying that the commercial value of AI output is negligible. In addition, in the current investment environment for AI technology, currently, capital is favoring the following sectors: healthcare, financing, robotics, transportation, retail,

107. Sterk, *supra* note 94, at 1204.

108. William M. Landes & Richard A. Posner, *An Economic Analysis of Copyright Law*, 18 J. LEGAL STUD. 325, 328 (1989).

109. *Sizing the Prize: What's the Real Value of AI for Your Business and How Can You Capitalize?*, PWC (June 2017), https://www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html.

110. *Id.*

education, security, and manufacturing.[111] These sectors have no straightforward connection with AI's application to the creation of literary and artistic works, which means that, at least now, investors are not optimistic about the commercial value of AI outputs; the implication is that the interest contained in those outputs is either not attractive to them or is nonexistent. Therefore, the reactions of AI-related industries and investors to AI-generated cultural products implies that the commercial value of those products has not yet been confirmed.

Moreover, in recent years, AI outputs have emerged in the fields of poems, novels, video games, and artworks; we will thus explore more concretely whether the market for those outputs exists. The first type of AI output is poems. An AI named XiaoIce was invented by Microsoft to write Chinese poems.[112] Although Microsoft claimed that the poems created by XiaoIce were creative and qualified for copyright protection,[113] its main purpose was not to appeal for the protection of those poems, but to acquire more data and users by encouraging more people to use XiaoIce.[114] To achieve that goal, Microsoft then claimed that it abandoned the "copyright" of those poems and welcomed others creating poems by cooperating with XiaoIce.[115] Since XiaoIce is a conversational AI whose main function is to process natural language,[116] collecting more data on how humans create poems can help XiaoIce to learn more about natural language, helping Microsoft better compete with Amazon's Alexa and Apple's Siri in the AI assistant market.[117] Thus, Microsoft's interest does not originate from the AI-generated poems themselves but instead originates from the desire to improve the AI's natural language processing. Microsoft's abandonment of the "copyright" of those poems shows that, in the current stage, the aim of maintaining private interests on those poems is inferior to the goal of developing AI technology, implying that the financial return regarding AI-generated products is not the current focus of stakeholders.

111. *Global Artificial Intelligence Industry Whitepaper*, DELOITTE (Sept. 27, 2019), https://www2.deloitte.com/content/dam/Deloitte/cn/Documents/technology-media-telecommunications/deloitte-cn-tmt-ai-report-en-190927.pdf.

112. *Microsoft XiaoIce Releases New Collection of Poems, and How the Poems Written by AI Taste?*, NETEASE TECHNOLOGY (May 19, 2017, 7:13:14 PM), http://tech.163.com/17/0519/19/CKQQV3G800098GJ5.html.

113. *Id.*

114. Ran Sun, *Interview with Microsoft Li Di: XiaoIce Has Written Poems, and She Can Make the Copyright Fees as Much as Thousands of Online Writers Make*, 36KR (May 17, 2017), https://36kr.com/p/5075409.

115. *Microsoft XiaoIce Announces to Abandon the Copyright of Its Poetry and Open a Joint Creative Model with Humans*, SINA TECHNOLOGY (July 5, 2017, 11:29 AM), http://tech.sina.com.cn/it/2017-07-05/doc-ifyhrxsk1872320.shtml.

116. Yonghong Xia, *Microsoft XiaoIce Writes Poems: Artificial Intelligence Is "Indifferent" to This World*, THE PAPER (May 24, 2017, 4:27 PM), https://www.thepaper.cn/newsDetail_forward_1692579.

117. Sun, *supra* note 114.

The second type of AI output is video games. For example, an AI named ANGELINA can create many games in a shorter time than human designers do, and one commercial target for AI is decreasing the cost of game design.[118] However, as admitted by the creator of ANGELINA, this target is still far from being achieved because the AI was unable to create a game that could be directly used by a human designer.[119] Under its current development level, ANGELINA can only provide some game concepts or game rules, and these are rarely useful for human designers.[120] Since AI technology is still not mature for designing games, the creator of ANGELINA currently does not expect to gain any commercial value from AI output. As this example shows, we can find that for those fields where AI technology is not mature, it is very hard, and even impossible, for AI outputs to bring financial returns to their stakeholders.

The third kind of AI output is novels. An AI has been trained to write a novel that emulates the style of Jack Kerouac, but in that novel, people "might just see fragments of meaning thrown into a neural network blender, full of hype and fury, obeying rules in an occasionally striking way, but ultimately signifying nothing".[121] Different from how people think about human-created novels, why do people think that the AI-generated novel signifies nothing? The answer lies in the fact that, ordinary human-created works can evoke a strong sense of experience among viewers because the creators' feelings and thoughts expressed in these works trigger their empathy.[122] And empathy is the feeling of understanding others' experiences and thoughts from their perspective.[123] However, empathy cannot happen in AI-generated novels or literary works because currently, neither human programmers nor AI can understand what has been created in those products. For the human programmers, the black-box problem of AI means that they cannot explain exactly how the works are created by the AI,[124] meaning that they cannot explain the meaning those products convey. For the AI, the current technological level is the narrow AI or weak AI stage, which means that AI does not have self-awareness, emotions and feelings but can only spot correlations in data and make predictions; thus, AI can achieve a shallow "understanding" that is

118. Simon Parkin, *AI Is Dreaming Up New Kinds of Video Games*, MIT TECHNOLOGY REVIEW (Nov. 29, 2017), https://www.technologyreview.com/s/609482/ai-is-dreaming-up-new-kinds-of-video-games/.

119. Andy Meek, *This Gaming AI Doesn't Play Games, It Builds Them Instead*, BGR (Jan. 21, 2018, 12:00 PM), https://bgr.com/2018/01/21/angelina-game-ai/.

120. *Id.*

121. Thomas Hornigold, *The First Novel Written by AI Is Here—and It's as Weird as You'd Expect It to Be*, SINGULARITYHUB (Oct. 25, 2018), https://singularityhub.com/2018/10/25/ai-wrote-a-road-trip-novel-is-it-a-good-read/.

122. Ingar Brinck, *Empathy, Engagement, Entertainment: The Interaction Dynamics of Aesthetic Experience*, 19(2) COGNITIVE PROCESSING 201, 201-02 (2018).

123. *Id.*

124. Mukherjee, *supra* note 65.

far from the human capability of understanding.[125] Only after scientists make technological breakthroughs in realizing artificial general intelligence (AGI) will we be able to endow AI with capabilities such as self-awareness, humor, love, empathy, and appreciation for beauty.[126] AI scientists' predict on average that the date for the emergence of AGI will be 2040, but this has been deemed an overestimation,[127] and it will still be a long time before AI can truly understand what it has created in its outputs, let alone explain that creation to human programmers because of the existence of black-box problem.[128] Therefore, unlike the feelings and thoughts conveyed by human-created works, what AI-generated products convey is unknown to both human programmers and AI. Since no one knows what AI-generated products are conveying, human viewers' empathy will not be evoked by these products. It can be reasonably inferred from this that AI-generated novels and other literary products will not be lucrative cultural products on the market, especially when compared with works with which human audiences can empathize.

The fourth kind of AI output is artworks. When compared with immature video games and the nonempathetic novel, the AI technology used in creating artworks is relatively mature because human subjects cannot distinguish AI artworks from the art generated by contemporary artists and shown at top art fairs.[129] For example, an artwork created by using AI sold at auction for $ 432,500 in New York.[130] However, although that may show the existence of commercial value in that artwork, it cannot prove the existence of a market for AI-generated artworks. In fact, according to the auction organizer, the auction was a test of whether the traditional art market is interested in AI art.[131] In other words, the stakeholders in AI art do not consider this auction as having universal significance in proving the existence of either the commercial value or a market for AI art in a

125. Kai-Fu Lee, AI SUPERPOWERS: CHINA, SILICON VALLEY, AND THE NEW WORLD ORDER 142 (2018).

126. *Id.*

127. *Id.*, at 143.

128. Mukherjee, *supra* note 65.

129. Elgammal et al., *supra* note 61, at 1. I need to further explain that, although there is no scientific conclusion, I conclude that AI technology applied to the creation of artworks as "relatively mature" by considering the fact that the AI-generated artworks cannot be distinguished by ordinary people from the human creations. Here, I use whether the AI-generated works can be distinguished by ordinary people as a standard because most AI researchers agree with the weak AI hypothesis which asserts that machine could act as if they were intelligent, and the Turing Test which explores the intelligence issue of AI by asking whether the machine can pass a behavioral test, i.e., whether human can tell the AI output comes from a person or a computer. Based on that standard, I conclude that the AI technology used in creating artworks is relatively mature than its application in other artistic fields. *See* Russell & Norvig, *supra* note 28, at 2, 1020-21.

130. Gabe Cohn, *AI Art at Christie's Sells for $432,500*, N. Y. TIMES (Oct. 25, 2018), https://www.nytimes.com/2018/10/25/arts/design/ai-art-sold-christies.html.

131. *Id.*

general sense. In fact, AI art seems not to be compatible with the traditional art market. In the traditional art market, social relationships are the core that govern exchanges among artists, collectors, and dealers.[132] To be more specific, dealers see themselves as patrons whose duty is to "assume responsibility to their artists and to provide them with support, recognition, and praise".[133] Unlike the economic relationship that is governed by capital and manifested in the auction, the social relationships in the traditional art market blurs the boundary between business and family ties, as they comprise long-term personal relationships between the dealers and the artists.[134] Under that relationship, the dealers' responsibility is to promote the reputation and status of artists who make good art. However, this will not be the case for AI-generated artworks. First, it is unknown whether there will any significance in the existence of a personal relationship between the dealer and the artist who uses AI as a tool in creating artworks. By using AI to create artworks, the artist can create more works in a shorter time, and thus we do not know whether the artist will need the patron relationship. Second, just as what the auction organizer of AI-generated artwork has told us, we do not currently know how dealers or galleries will evaluate AI art.[135] In their traditional patron relationship with the artists, they act as the promotors of artists who make good art, but they may have doubts about considering AI-generated artworks to be good art or even art because the artists who create them cannot exactly explain what they have conveyed, even if ordinary people cannot distinguish AI art from traditional art.[136] Therefore, AI art is different from artworks in the traditional art market built on the patron relationship between dealers and artists. In other words, although AI art has shown commercial value in an auction, it is still too early to conclude that AI art will have a market, especially within the traditional art market, or any commercial value in a general sense.

Examining the reality of all four representative AI-generated products, we can find that those products have not shown commercial value to their stakeholders. For poems, stakeholders are focusing more on technological iteration than on the exploration of commercial value. For video games and novels, AI technology is not sufficiently mature to help the programmer create something commercially valuable. For artworks, stakeholders are still exploring whether AI art will have a chance in the traditional art market.

From the analysis above, the findings concerning AI-generated products can now be presented. First, the economic contribution made by AI's application to the

132. Olav Velthuis, TALKING PRICES: SYMBOLIC MEANINGS OF PRICES ON THE MARKET FOR CONTEMPORARY ART 55 (2005).

133. *Id.*

134. *Id.*

135. Cohn, *supra* note 132.

136. Elgammal, *supra* note 49.

creation of literary and artistic works has not been shown to have any importance to the economy. Second, investors are not optimistic about the commercial value of those products. Third, the stakeholders in AI outputs have not confirmed or practically gained any interest in those products. All the findings above confirm a reality in which the author or disseminator of AI-generated products will not obtain financial returns from the market. Under that circumstance, granting protection to AI outputs will not contribute to achieving the goal of accelerating the emergence of more AI-generated cultural products on the market.

B. The Necessity of Granting Protection to AI Output

For the sake of public interest, we need to further confirm whether granting protection to AI outputs will better for encouraging learning than not granting such protection. The copyright system encourages learning in two ways: one is by providing an incentive for the creation and dissemination of works, and the other is by reserving space for the infringement-free use of copyrighted works. Therefore, incentive and space become two important aspects when judging whether it is necessary to grant protection to AI-generated products.

Let us first look at the incentive. According to the instrumentalism interpretation of copyright law, granting protection becomes necessary when the protection can correct the disincentive resulting from free riders' appropriation of the value created by an author's effort.[137] That is, the incentive provided by copyright protection is practically reflected in the avoidance or correction of free riders' appropriation of author-created value. This can be further explained by the example of the origin and establishment of the Berne Convention. The necessity of granting copyright protection on the international level originated when the international piracy of works became a problem. Initially, among European countries, although literary and artistic works were protected under national laws, the unauthorized reproduction and use of foreign works were not considered unfair or immoral.[138] However, gradually, a different voice emerged that criticized international piracy as not only robbing authors' creativity, labor, and investment but also depriving them of an incentive for creative activity that enriches a country.[139] At that point, authors' interests in foreign markets entered the vision of legislators. To prevent authors' interests from being damaged by piracy, national laws started to grant protection to foreign works, and ultimately bilateral agreements emerged; as the number of bilateral agreements increased, the time became ripe for the emergence of a multilateral agreement—which is the origin of

137. Sterk, *supra* note 94, at 1197.

138. Sam Ricketson & Jane C. Ginsburg, INTERNATIONAL COPYRIGHT AND NEIGHBOURING RIGHTS: THE BERNE CONVENTION AND BEYOND 19 (2d. 2006).

139. *Id.*, at 20-21.

the Berne Convention.[140] In the conception of that convention, the organization that represented the authors' and artists' interests—the International Literary and Artistic Association (ALAI)—played an important role in promoting the establishment of international copyright relationships.[141] Because of their role, the appeal to protect authors' and artists' interests was heard, accepted, and reflected in the Berne Convention, which defined those interests as crucial values for copyright protection on the international level.[142] From the origin and establishment of the Berne Convention, we can find that granting copyright protection becomes necessary under two conditions: one is that the author's interest is actually being damaged by free riders, such as the piracy in this case, and the other is that the authors are actively promoting the protection of their interest under the copyright system. Those conditions are also reflected in another example that concerns the protection of performances under the framework of related rights stipulated in the Rome Convention.[143] Although performances should have qualified as literary and artistic works under the Berne Convention,[144] they missed the opportunity because during the drafting of that convention, performers' interests in live performances were well protected by contract and competition laws.[145] Nevertheless, after the emergence of technologies allowing phonograms, films, and broadcastings, the rampant unauthorized recording and dissemination of live performances hurt the performers' interests practically and gravely, which led performers to appeal for legal protection against those free-riding actions.[146]

Therefore, to avoid creating a disincentive, granting protection becomes necessary when the interests in a certain kind of work are facing the risk of actual or possible damage from free riders' appropriation and the stakeholders in those works are actively promoting their protection. However, this is not the case for AI-generated products because free riders' appropriation of the author's effort has not and will not occur. First, currently, the commercial value of AI-generated products has not been confirmed by their stakeholders, meaning that free riders have little or no interest in appropriating those products. Second, as we have explained when

140. *Id.*, at 19-20, 42.

141. *Id.*, at 49-53.

142. *Id.*, at 57. ("ALAI text was to form the basis for formal negotiations on a governmental level for a multilateral copyright agreement.")

143. International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations art. 2, Oct. 26, 1961, 496 U.N.T.S. 43. It is worth noting that, although US is not a party to that convention and the US copyright act does not formally stipulate the related rights, the performers' interests are protected under other statutes like the United States Code. *See* Daniel Gervais, *Related Rights in United States Law*, 2018(6) AMI 245, 246-47.

144. Berne Convention for the Protection of Literary and Artistic Works art. 2, Sept. 9, 1886, 828 U.N.T.S. 221.

145. Ricketson & Ginsburg, *supra* note 140, at 1209.

146. *Id.*

discussing the novels generated by using AI, since many AI-generated products do not provide a basis for human empathy,[147] it is very hard or even impossible for humans to understand what those products convey. This reduces the probability of their unauthorized copying or communication. Third, reality has shown us that free riders' appropriation does not occur in practice. If we look at the first book written using AI in 1984, which is called "the first book ever written by a computer",[148] there have been more than 30 years since the emergence of the first AI-generated product in the literary and artistic domain. However, although during these 30 years, we have heard much news telling us that AI can engage in creative activities that it was previously incapable of, we have not heard of the existence of any lawsuit or economic dispute over AI outputs that have been copied or used in any other human-created works. That is, until now, free riders' appropriation has either not yet been identified or does not happen at all. Instead, we find that the interests that exist in AI outputs are well protected under the current legal framework. A selection by the programmers of the poems created by using XiaoIce were published in a collection titled *Sunshine Misses Windows* and sold online.[149] Another example, the allocation of the interest generated from the auction of AI artwork has not caused any legal disputation. These examples remind us of a similar situation in which the private interest in live performance was well protected by contract and competition laws before the advent of new technologies.[150] Since there is currently no evidence that the interests regarding AI-generated cultural products are facing the risk of damage, it is not necessary to grant protection to avoid a disincentive for the authors.

For the space reserved for the subsequent use of copyrighted works, granting protection to AI-generated products may risk its collapse. That risk originates from the *digital universe hypothesis* which may represent how AI technology has treated the world. The digital universe hypothesis postulates that "nature does not and cannot have a continuous range of possibilities, the total number of possible states that any system can have (including the entire universe) is finite, and physical systems are essentially equivalent to software."[151] Its core standpoint is that the possibilities represented in the physical world are not continuous but discrete, not infinite but finite. This hypothesis closely connects with AI technology because it

147. Lee, *supra* notes 127, at 142.

148. Racter, THE POLICEMAN'S BEARD IS HALF-CONSTRUCTED: COMPUTER PROSE AND POETRY (1984).

149. The collection *Sunshine Misses Windows* (in Chinese) can be found in https://www.amazon.com/%E9%98%B3%E5%85%89%E5%A4%B1%E4%BA%86%E7%8E%BB%E7%92%83%E7%AA%97-%E6%9C%80%E6%96%87%E8%89%BA%E7%9A%84%E4%BA%BA%E5%B7%A5%E6%99%BA%E8%83%BD%E8%AF%97%E4%BA%BA-%E5%B0%8F%E5%86%B0/dp/7559602967.

150. Ricketson & Ginsburg, *supra* note 140.

151. Lee, *supra* note 33, at 161.

supposes the underlying logic of AI technology. As we have already explained, AI technology is built on discrete mathematics,[152] which determines that the AI algorithm will process data in a discrete manner—a step by step operation to a finite conclusion, which is also the depiction of the digital universe hypothesis. Moreover, that hypothesis supposes that this discrete manner is actually how the world operates, implying that by using AI technology, humans can learn the ultimate and general principles of how the world operates. Similar to scholarly comments, the digital universe hypothesis stipulates that everything that it is possible to make can be made with software.[153]

For the literary and artistic domain, the connection between AI technology and the hypothesis means that human programmers may be on the way to reveal the general principles of creative activities using mathematical tools. What does this mean for the copyright system? If this hypothesis is true, it would mean that it is possible for human programmers to decode the principles of creative activities, and the expressions resulting from those creative activities will be theoretically finite. By following those principles, if we ignore the limitations on storage and computing power, when providing all human creations to the AI, in theory, it would be possible for the programmers to exhaust *all* the expressions that can or cannot be created by humans. Under that circumstance, since the expressions conveyed by creative activities are finite and can be exhausted quickly and efficiently by adopting AI technology, they should be considered expressions that can only be conveyed in limited ways or as building blocks of expressing ideas, meaning that the boundary between idea and expression is blurred. According to the merger doctrine, "[w]hen the 'idea' and 'expression' are thus inseparable, copying the 'expression' will not be barred, since protecting the 'expression' in such circumstances would confer a monopoly of the 'idea' upon the copyright owner free of the conditions and limitations imposed by the patent law".[154] Therefore, those expressions created by using AI technology should not be protected by copyright law, and granting protection will exacerbate the monopoly of ideas, resulting in shrinking and even destroying the space reserved for learning.

In spite of the disastrous result of granting protection to AI-generated products, some may observe that if the digital universe hypothesis is false, then granting protection would not risk the space reserved for learning and knowledge. Unfortunately, although the truth of that hypothesis is debated, a consensus has formed among physicists supporting it.[155] Since some physicists have accepted that hypothesis, we cannot know how that acceptance will affect AI technology

152. Rosen, *supra* note 30.
153. Lee, *supra* note 33.
154. Herbert Rosenthal Jewelry Corp. v. Kalpakian, 446 F.2d 738, 742 (9th Cir. 1971).
155. Lee, *supra* note 33, at 161.

and its future development, meaning that we cannot rule out the possibility that granting protection will lead to that disastrous result. Moreover, if the hypothesis were indeed false, it would not mean that the space reserved by the copyright system will be safe when we grant protection to AI outputs. As we have explained, the hypothesis addresses whether human programmers can determine the general principles of creative activities by using mathematical tools. If the hypothesis is false, it means that either human programmers will not completely decode the principles of creative activities forever or that those principles do not exist at all in a general sense. However, the progress made in AI-generated artworks lead us to wonder whether that hypothesis may still be valid in certain or limited fields of creative activities such as painting. More specifically, since AI technology has enabled programmers to create artworks indistinguishable from human-created ordinary artworks,[156] we are not sure whether there may be some general principles for creating artworks and whether those programmers are on the way to reveal those principles. If so, then granting protection to AI-generated artworks would also lead to the shrinking and destroying of space reserved for the learning and future creation of paintings. In addition, the progress of AI technology in producing artworks also reminds us to keep an eye on whether the principles in creating certain works such as novels and video games will be decoded with the development of AI technology, although the technology is not yet mature.[157] Therefore, regardless of whether the digital universe hypothesis is true or false, its close connection with AI technology means that granting protection to AI outputs will risk subsequent negative effects on the space reserved for learning. To avoid that risk, a reasonable choice is to isolate all AI-generated products outside the realm of the copyright system until we have a more in-depth understanding and to maintain constant observation of how AI technology will practically affect the creation of different works. In other words, when considering the space reserved by the copyright system, it is not necessary to grant protection to AI outputs and take this risk.

In addition to considering incentive and space, if we think bigger, jumping outside the copyright box, we find that granting protection to AI-generated products may expose society to other risks. The first risk lies in exacerbating the inequality of social wealth. That inequality originates from the core status of data in current AI technology. As we have introduced above, the algorithm is essential to AI technology. To train a successful AI algorithm requires big data, computing power, and the work of strong-but-not-necessarily elite AI algorithm engineers, and the quantity of data is decisive for the overall power and accuracy of an

156. Elgammal, *supra* note 49.
157. *E.g.,* Meek, *supra* note 119, and Hornigold, *supra* note 121.

algorithm.[158] This forms a virtuous circle that can strengthen the best products and companies: more data lead to a better algorithm, which means good products, which attracts more users, who generate more data that can further improve the products.[159] By taking advantage of AI technology, wealth will naturally be concentrated in companies that can provide the best products, breeding tycoons in the AI industry, certain countries, and even worldwide. Therefore, the winner-take-all mechanism caused by AI technology will increase the inequality of social wealth. Considering that since copyright is a monopoly that burdens both competitors and the public,[160] granting copyright protection to AI outputs, which is believed to be a way to maximize rewards for the AI industry,[161] may instead exacerbate that inequality inside and outside the AI industry. Inside the AI industry, it creates an environment for the emergence of new tycoons grasping monopolistic power over the literary and artistic domains. Outside the AI industry, it attracts existing tycoons in other fields to expand their monopolistic power over those domains.

Moreover, granting protection to AI-generated products may become a catalyst for other social problems, one being the job loss problem. Since AI has already replaced manual labor in many jobs,[162] we do not know whether the development of AI technology will make it possible for AI programmers to replace traditional human authors on a large scale, nor do we know whether the protection of AI output will speed the process of replacement, aggravating the job loss in society. Another social problem regards discrimination and prejudice. In the fields where AI applications are mature, such as finance, insurance, education, and political campaigns, AI algorithms become imprinted with and amplify the programmers' prejudices, misunderstandings, and biases, leading to unfairness and inequality.[163] We do not know whether that problem will also occur when AIs are used in creating cultural products. We do not know whether the protection of AI-generated products will lead to the emergence of more biased and discriminatory works, exacerbating the misunderstanding between different groups not only within a nation but also internationally.

158. Lee, supra note 127, at 14.

159. *Id.*, at 19-20.

160. Zechariah Chafee Jr., *Reflections on the Law of Copyright*, 45 COLUM. L. REV. 503, 506 (1945).

161. Samuelson, *supra* note 5, at 1226.

162. Lee, *supra* note 127, at 19 (The author predicts that AI will be able to technically replace around 40 to 50 percent of jobs in the United States within fifteen years).

163. Cathy O'Neil, WEAPONS OF MATH DESTRUCTION: HOW BIG DATA INCREASES INEQUALITY AND THREATENS DEMOCRACY 10 (2016).

Just as Professor Breyer had done in making a social cost-benefit analysis of books,[164] in this part, we have tried to make a similar but rougher analysis of AI-generated products. By granting protection to those products, we expect to provide incentive for the creation and dissemination of those products and to reserve an infringement-free space for learning. However, reality ruthlessly frustrates that expectation. When granting protection, on the one hand, we maximize the rewards for the stakeholders in those products by turning the uncertain interest or unconfirmed commercial value into certain legal rights. On the other hand, we risk society by shrinking and even destroying the space reserved for learning, exacerbating the problem of unequally distributed social wealth, and aggravating other social problems such as job loss, discrimination, and bias. In other words, the cost that society needs to pay seems much greater than the benefits that stakeholders, the AI industry, and perhaps the national economy can gain. Therefore, considering the social benefits that may be affected by the protection of AI outputs, granting copyright protection to them is not a reasonable choice now and maybe forever.

CONCLUSION

This article demonstrates the seemingly distorted view that although AI outputs should be considered human creations, we should not protect them under the copyright system. By examining the technological knowledge of AI, machine learning, and deep learning, we find that both humans and AI make contributions to the final output. When evaluating those contributions, we find that the human programmers or legal entities that not only provide existing works to the AI but also decisively affect how the AI processes those works deserve to be viewed as the author in the sense of the copyright system, while the AI merely functions as a mathematical tool helping the author create AI outputs. The so-called computational creativity reflected in those products is actually a form of human creativity. Therefore, our findings confirm that AI output is a human creation rather than an AI creation, which means that the issue of AI authorship does not exist at the current technological level, and there is no theoretical disruption to the copyright system if we grant protection to AI-generated products.

However, those findings only tell us that AI outputs *can* be protected like any other human-created works under copyright law; they do not tell us whether these outputs *should* be protected, which is a different and empirical question. We try to answer that question by evaluating whether granting protection to those outputs will achieve the goal of promoting the public interest or social welfare. The public

164. Stephen Breyer, *The Uneasy Case for Copyright: A Study of Copyright in Books, Photocopies, and Computer Programs*, 84 HARV. L. REV. 281, 291-92 (1970).

interest promoted by the copyright system is reflected in the encouragement of learning. More specifically, by granting protection under the copyright system, we expect to not only provide an incentive for the creation and dissemination of AI-generated cultural products but also to reserve space for the subsequent and liability-free use of the products. However, according to the empirical evidence, we find that commercial value and private interest have not been confirmed by AI-related industry, investors, and even stakeholders in AI outputs. Therefore, it is not likely that stakeholders will obtain financial returns by bringing those products into circulation, which means that they lack the essential motivation to accelerate the creation and dissemination of AI outputs, and granting copyright protection will not be useful in providing that motivation. In addition, currently, disincentives do not exist because no evidence has shown that the existing interests in AI outputs are facing actual or possible damage from the free-riding actions forbidden by copyright law, meaning that it is not necessary to provide the incentive by granting copyright protection. More importantly, considering the close connection between AI technology and the digital universe hypothesis, granting protection to AI outputs will risk shrinking and destroying the space reserved for learning and subsequent use. When not limited to the public interest under the context of the copyright system, we can also find that granting protection to AI outputs may result in a series of social problems outside the realm of copyright law. Therefore, by weighing the possible benefits and expenses in protecting AI outputs, this article concludes that we should not grant copyright protection at least under the current technological level, although those products are human creation.

From our findings in this article, we further suggest that only when four conditions are satisfied should we consider including AI output in the copyright system. These conditions can be summarized in four questions. The first question is whether stakeholders have found a mature business model confirming and exploiting commercial value or private interest in AI outputs. The second question is whether the confirmed interest in these outputs is facing actual or possible damage from those actions forbidden by copyright law. The third question is whether AI technology will turn the expressions of a certain field into limited expressions or merge the idea with the expression and whether AI technology can help human programmers or creators exhaust or deplete those limited expressions. The fourth question relates to whether the protection of AI outputs will negatively affect other aspects of society. It is worth noting that every time AI technology develops or makes a breakthrough, such as reaching the stage of AGI, we should reexamine all four questions above to assure that protection will not undermine our current copyright system.

More importantly, through this seemingly distorted conclusion, this article provides an observation that will be considered unfashionable compared with the

current discussion around AI. Usually, the temper of time is to maximize intellectual property rewards, especially for high technology innovators,[165] and to emphasize what should be protected more than what should not.[166] In the current discussion around AI, instead of relying on empirical evidence, we are likely to draw a conclusion from the faith-based demonstration, ignoring or distorting the reality of how AI-generated products are performed in practice on the market. In addition to the issues of AI, when confronting any products or works created or realized by adopting newly emerged technologies, the first question we ask is always how to protect it under the copyright system rather than whether it is truly necessary to protect it. We need to keep in mind that since a copyright is in essence a monopoly[167] and empirically leads to a winner-take-all result,[168] there is always a tension between protection and the public interest. To avoid a tragedy in which the public interest or other social interests are damaged, we should insist on an evidence-based approach to determine whether it is necessary to grant protection to a certain kind of work created by adopting newly emerged technologies.

165. Samuelson, *supra* note 5, at 1125-26.
166. Litman, *supra* note 73, at 977.
167. Chafee, *supra* note 162.
168. Patry, *supra* note 27, at 80-82.