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THE ETHICS OF ARTIFICIAL INTELLIGENCE IN CREATIVE ARTS: A COMPREHENSIVE REVIEW

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ABSTRACT

The incorporation of artificial intelligence into the creative arts has introduced a fresh epoch of artistic manifestation and ingenuity while also giving rise to substantial ethical questions. This review article examines the complex ethical consequences of artificial intelligence's involvement in creative domains such as music, the visual arts, and literature. The article seeks to offer a thorough comprehension of the challenges and possibilities brought about by artificial intelligence in the arts by analysing the points where technology, creativity, and ethics converge. The initial segment discusses the notion of authorship and originality in art created by artificial intelligence. The text explores the challenges to conventional concepts of creative ownership that arise when artworks are produced by computers instead of humans. The final portion delves into the effects of artificial intelligence functioning as a collaborator in the creative process. This review emphasizes the importance of taking a balanced approach to artificial intelligence in the creative arts by considering perspectives from technology, law, philosophy, and art. In order to ensure that artificial intelligence complements rather than decreases human creativity, it is necessary to have continuous discourse and establish ethical rules to navigate the changing terrain.

Keywords: Artificial Intelligence -Generated Art; Creative Authorship; Ethical Implications; Bias in artificial intelligence; Human- Artificial Intelligence Collaboration

INTRODUCTION

The emergence of artificial intelligence has led to profound transformations in numerous industries, including the field of the creative arts. Artificial intelligence technologies have reached a point where they can generate music, create visual art, write books, and even craft film scripts. These innovations have expanded the possibilities for artistic expression, allowing creators to explore new frontiers and surpass previous limitations. Nevertheless, the convergence of artificial intelligence and creativity gives rise to significant ethical concerns that necessitate examination in order to comprehend the wider impacts of this technical advancement.

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The application of artificial intelligence in the realm of the arts presents a challenge to traditional notions of creativity, authorship, and uniqueness. Art has always been regarded as a uniquely human endeavour, serving as a means of conveying personal talent, ingenuity, and cultural heritage. The advent of artificial intelligence with the ability to produce artwork that is often indistinguishable from pieces created by humans is prompting a revaluation of what it means to be an artist (Oksanen *et al.*, 2023).

An important ethical dilemma in this emerging field is the matter of authorship. When an artificial intelligence generates a musical composition or a picture, who is the legitimate proprietor of such an artistic creation? Who is considered the primary creator of the artificial intelligence: the programmer, the user, or the artificial intelligence itself as an autonomous entity? This inquiry holds substantial legal and economic repercussions, namely pertaining to copyright and intellectual property rights (Bozkurt *et al.*, 2021). The existing legal frameworks are inadequate to address these emerging realities, resulting in possible conflicts and uncertainty.

Furthermore, the utilization of artificial intelligence in the realm of the arts prompt enquiries regarding the concepts of originality and authenticity. Artificial intelligence systems are educated using extensive datasets of pre-existing artworks, acquiring the ability to imitate various styles and techniques. While this facilitates the creation of novel and inventive works, it also obscures the distinction between inspiration and plagiarism. Can an artificial intelligence-generated work be deemed genuinely original, or is it only a skilled imitation of prior works? This lack of clarity poses a difficulty for the comprehension of artistic ingenuity and uniqueness.

Another crucial factor to take into account is the societal influence of artificial intelligence in the arts. Artificial intelligence has the potential to democratize the creative process by providing tools and resources to people without formal artistic expertise. The process of democratization in the arts has the capacity to promote increased variety and inclusivity, enabling a wider array of voices and ideas to be represented (Mondal, 2019). However, there is a potential danger that artificial intelligence could worsen pre-existing disparities. Artists who depend on conventional techniques may have a disadvantage in comparison to those who can utilize artificial intelligence technologies, resulting in a division between artists who work digitally and those who do not.

It is important to thoroughly analyze the potential biases that are present in artificial intelligence systems. Artificial intelligence algorithms are educated using data that frequently mirrors societal biases and disparities. Consequently, artificial intelligence-generated art has the unintended consequence of perpetuating these biases, thereby strengthening detrimental preconceptions and excluding under-represented populations. Developers and artists must acknowledge and reduce these prejudices, guaranteeing that artificial intelligence in the arts foster's equity and inclusivity (Shah & Shukla, 2023).

Exploring the ethical implications of artificial intelligence's function as a partner in the creative process is a promising field. Artificial intelligence can function as a potent instrument for artists, providing novel avenues for experimentation and innovation. Several artists have enthusiastically adopted artificial intelligence as a collaborator, utilizing it to augment their creative productivity and venture into unexplored artistic domains (Najjar, 2023). Nevertheless, there is a valid apprehension that artificial intelligence may overwhelm human creativity, resulting in the erosion of the distinct human element that is widely regarded as indispensable to genuine art. This conflict between human and machine creation prompts a more extensive conversation regarding the fundamental nature of artistic expression and the significance of human contribution to the creative procedure (Epstein *et al.*, 2023).

Moreover, the sale of art created by artificial intelligence raises ethical quandaries. With the increasing capabilities of artificial intelligence in producing financially valuable art, there is a concern that the art market may give more importance to artificial intelligence-generated works compared to those created by human artists. This transition may have economic outcomes for artists, potentially diminishing the value of their work and jeopardizing their means of living. Striking a balance between the economic opportunities presented by artificial intelligence and the imperative

to uphold and protect human artistic pursuits is a multifaceted problem that necessitates careful contemplation (Dogan *et al.*, 2023).

To summarize, the convergence of artificial intelligence and the creative arts raises a multitude of ethical enquiries pertaining to authorship, authenticity, societal influence, prejudice, cooperation, and monetization. As artificial intelligence progresses and becomes more involved in the field of art, it is crucial for artists, developers, legislators, and society as a whole to actively participate in continuous discussions regarding these matters. By implementing ethical regulations and guidelines, society can successfully address the complex difficulties of this rising era, ensuring that artificial intelligence enhances rather than diminishes the inherent human ability for innovation. This review article intends to thoroughly examine the ethical aspects of the intersection between artificial intelligence and the creative arts. It will provide a detailed analysis of the difficulties and potential advantages that arise in this area (Ashritha & Reddy, 2024).

OBJECTIVE OF STUDY

- Analyze the ethical consequences of artificial intelligence-generated art on conventional concepts of authorship and originality:
- Examine the societal consequences and possible prejudices of artificial intelligence in the realm of the creative arts:
- Investigate the use of artificial intelligence as a collaborative tool for improving human creativity:

LITERATURE REVIEW

Introduction to Artificial Intelligence in Creative Arts

The incorporation of artificial intelligence into the creative arts has generated substantial attention and discussion among researchers, artists, and engineers. The capacity of artificial intelligence to produce music, visual art, literature, and other creative works challenges conventional concepts of creativity and authorship (Loureiro *et al.*, 2021). This literature review examines the ethical consequences of artificial intelligence in the arts, with a specific focus on the concepts of authorship and originality, social impact and biases, and the function of artificial intelligence as a collaborative tool.

Authorship and originality

The advent of artificial intelligence's artistic capabilities severely undermines the notion of authorship. Conventional perspectives maintain that art is created by the combination of human imagination, expertise, and cultural background. Nevertheless, the emergence of artificial intelligence-generated art challenges this perspective. Many researchers have contended that artificial intelligence systems, such as Google's Deep Dream or OpenAI's GPT-3, have the ability to generate creations that are comparable to human ingenuity (Oksanen *et al.*, 2023). These algorithms are trained using extensive databases of preexisting artworks, acquiring the ability to imitate various styles and techniques. One must consider: who is the genuine creator of these artificial intelligence-generated works?

Legal scholars have analyzed the impacts of artificial intelligence on copyright law. The existing legal frameworks are founded on the concept of human authorship, leading to considerable uncertainty over the proper attribution of authorship to works created by artificial intelligence. Bently proposes that the authorship of the artificial intelligence might be attributed to either the programmer or the user. However, this perspective gives rise to additional enquiries on creativity and authority (Cetinic & She, 2022).

Moreover, the authenticity of art created by artificial intelligence is frequently called into question. According to some scholars, artificial intelligence has the ability to generate unique works, but these creations are essentially

unoriginal because they rely on the data they are taught. This gives rise to apprehensions regarding plagiarism and the erosion of originality in the arts (Ashritha & Sathvika 2024). Can artificial intelligence-generated creations be regarded as genuinely innovative, or are they simply intricate imitations of preexisting artwork?

Effects on society and prejudices

The involvement of artificial intelligence in the arts also carries significant societal consequences. Artificial intelligence has the potential to make the creative process accessible to everyone. Software applications such as Adobe's Sensei and Runway ML enable anyone without artistic expertise to produce intricate artworks. Academic study has shed light on the phenomenon of democratization within the realm of the arts. Proponents argue that artificial intelligence has the potential to serve as a powerful tool for abandoned communities, providing innovative avenues for artistic expression (Al Naqbi *et al.*, 2024).

Nevertheless, artificial intelligence also possesses the capacity to worsen pre-existing disparities. It is emphasized the ability of artificial intelligence systems to perpetuate biases that exist in their training data. Within the realm of the arts, this signifies that artificial intelligence-generated creations have the potential to perpetuate detrimental stereotypes and abandoned under-represented communities (Yigitcanlar *et al.*, 2020). An investigation conducted by some scholars revealed that facial recognition algorithms frequently exhibit subpar performance when it comes to identifying individuals with darker skin tones, indicating the presence of biases within the data. Artificial intelligence-generated art may exhibit similar biases, which might raise ethical problems around representation and justice (Stark & Crawford, 2019).

Artificial intelligence-generated art has received significant attention among the art community, mostly because of its capacity to seamlessly integrate artistic expression with technological advancements. An exemplary case of artificial intelligence-generated art being auctioned took place on October 25, 2018. The exceptional artwork entitled "Portrait of Edmond de Belamy," produced by the art group Obvious, based in Paris, was successfully auctioned at Christie's auction house in New York City for an impressive sum of $432,500. This commercial triumph prompts enquiries regarding the economic repercussions on human artists. With the increasing popularity of artificial intelligence-generated works, human artists may face more challenges in maintaining their competitive edge, which might potentially jeopardize their careers. According to scholars, it is necessary to find a middle ground between harnessing the promise of artificial intelligence and safeguarding the importance of human creativity (Shah & Shukla, 2023).

The use of Artificial Intelligence as a collaborative tool

Another crucial area of ethical investigation is the function of artificial intelligence as a collaborator in the creative process. A growing number of artists are employing artificial intelligence as a means to augment their creative abilities. David Cope's Experiments in Musical Intelligence (EMI) employs artificial intelligence to create music that bears a stylistic resemblance to classical composers such as Bach and Mozart. Cope regards artificial intelligence as a collaborator in the creative process, assisting in expanding the limits of musical composition (Bahroun *et al.*, 2023).

The capacity of artificial intelligence to augment human creativity is significant. It examines the potential of artificial intelligence to aid artists by automating mundane chores, enabling them to concentrate on the more imaginative elements of their craft. This cooperation has the potential to generate groundbreaking artwork that would be unattainable without the utilization of artificial intelligence (Ameen *et al.*, 2022). Nevertheless, there are apprehensions that artificial intelligence may surpass human ingenuity. With the increasing sophistication of artificial intelligence systems, there is a possibility that they could replace human artists, resulting in the absence of the human element that is widely seen as crucial to genuine art (Shah & Shukla, 2023).

Furthermore, ethical considerations encompass the need for transparency regarding the involvement of artificial intelligence in the creative process. It is possible that audiences may not always be cognizant of the fact that an artwork has been produced with the aid of artificial intelligence (Iphofen & Kritikos, 2019). It is advocated for increased openness and clarity about the utilization of artificial intelligence in the field of art. Transparency is essential for upholding confidence and comprehending the significance of both human and machine contributions (Hagendorff, 2024).

The utilization of artificial intelligence in the realm of creative arts gives rise to noteworthy ethical considerations, namely pertaining to the possible disruption of conventional concepts of authorship and originality, societal effects, and the possibility of biases. The role of artificial intelligence as a collaborative tool raises significant enquiries (Mukhamediev *et al.*, 2022). Sustained communication and collaboration among artists, technologists, policymakers, and society as a whole are imperative in light of the growing integration of artificial intelligence into the arts. This is crucial to ensuring that these dynamic practices are thoroughly scrutinized and effectively governed (Olider *et al.*, 2024).

Creating ethical rules and frameworks is essential for effectively navigating the intricate aspects of artificial intelligence in the arts. It is imperative that these principles encompass the appropriate acknowledgment of authorship, mitigation of biases, advancement of transparency, and safeguarding of human creativity (Huang *et al.*, 2022). By adopting this approach, it can be guaranteed that artificial intelligence will augment rather than undermine the innate human capacity for creativity, thereby cultivating a future in which technology and art exist in perfect synergy. The promise of artificial intelligence in the creative arts is intriguing, but its full realization necessitates meticulous deliberation of the ethical aspects. By doing ongoing research and engaging in meaningful discussions, which can be effectively addressed these issues and fully embrace the benefits that artificial intelligence offers. This will enhance the artistic environment for future generations (Zhang & Lu, 2021).

LITERATURE GAP

Although there is an increasing amount of research on the ethical consequences of artificial intelligence in the creative arts, there are still numerous significant gaps that need to be addressed. There is a requirement for more extensive legal frameworks that specifically tackle the distinct difficulties presented by artificial intelligence-generated art, particularly on the issues of authorship and intellectual property rights. The ongoing legal debates over artificial intelligence-generated works sometimes lack coherence and do not offer definitive instructions.

Moreover, a more thorough examination is needed to understand the societal consequences of artificial intelligence making the creative process accessible to all. Although the potential for enhanced accessibility is recognized, the long-term impacts on artistic careers and the wider art market have not been thoroughly investigated. Moreover, the use of artificial intelligence as a collaborative tool to enhance human creativity is frequently discussed in theoretical terms, but there is a shortage of empirical research that assesses real-world applications and results. It is essential to address these deficiencies in order to establish ethical principles that guarantee artificial intelligence technology will improve, rather than weaken, the integrity and diversity of the creative arts.

DISCUSSION

The ethical consequences of artificial intelligence in the creative arts pose a complex dilemma, involving legal, societal, and creative aspects. The focal point of this discussion is the matter of authorship. The conventional notions of authorship and intellectual property are disrupted by the autonomous artistic generation capabilities of artificial intelligence (Zhai *et al.*, 2021). The existing legal systems face difficulties incorporating the concept of a creator who is not a human, resulting in considerable uncertainty regarding ownership and rights. Therefore, it is imperative to establish novel legal criteria that can effectively handle the intricacies brought forth by artificial intelligence-generated creations (Al Naqbi *et al.*, 2024).

Furthermore, the influence of artificial intelligence on society in the field of the arts shows both potential and challenges. Artificial intelligence facilitates the democratization of artistic creativity by empowering individuals without formal training to generate intricate and refined works. While there is the possibility of promoting tolerance and diversity, there is also the danger of perpetuating preexisting biases (Cetinic & She, 2022). Artificial intelligence systems, which are taught on datasets that mirror societal biases, have the potential to unintentionally perpetuate these biases in their outputs. Hence, it is imperative to develop strong methodologies to detect and alleviate biases in artificial intelligence models in order to guarantee just and impartial depiction in artificial intelligence-generated art (Wingström *et al.*, 2022).

The use of artificial intelligence as a collaborative tool has substantial prospects for augmenting human creativity. Artists have the ability to utilize artificial intelligence in order to investigate uncharted creative domains and enhance their creative methodologies. Nevertheless, the concern regarding the potential for artificial intelligence to surpass human inventiveness cannot be disregarded (Minh *et al.*, 2021). It is crucial to achieve a harmonious equilibrium where artificial intelligence functions as a facilitator rather than a substitute for human creativity and resourcefulness. Ensuring transparency on the involvement of artificial intelligence in the creative process is essential for upholding trust and recognizing the value of both human and machine contributions (Zhang, 2021).

Ultimately, effectively addressing the ethical considerations surrounding artificial intelligence in the creative arts necessitates a collaborative endeavor involving artists, engineers, and policymakers. To fully use the capabilities of artificial intelligence in the arts, it is important to tackle issues related to authorship, social influence, and collaboration. This will allow us to utilize artificial intelligence's potential to enhance artistic expression while ensuring that the fundamental principles of creativity and diversity, which are crucial to human artistic pursuits, are preserved (Suchacka *et al.*, 2021).

CONCLUSION

The use of artificial intelligence in the creative arts offers a promising yet ethically complex terrain. This review focusses on three major concerns: the reinterpretation of authorship and originality, the societal implications of artificial intelligence on inclusivity and bias, and the role of artificial intelligence as a collaborative partner in the creative process. It is essential to clarify the uncertainty regarding authorship and the rights to intellectual property. The existing legal frameworks are insufficient to address the intricacies presented by artificial intelligence-generated art, thus requiring the establishment of new norms that acknowledge the distinct characteristics of these artworks. Moreover, whereas artificial intelligence facilitates widespread access to artistic tools, it also poses the danger of perpetuating societal prejudices that exist in the data used for training. To address these biases, it is necessary to implement proactive measures that promote equal representation and inclusiveness. The potential of artificial intelligence to augment human creativity is significant, but it must be counterbalanced by the preservation of human artistic contribution. Open and honest communication regarding the utilization of artificial intelligence in the creation of art is crucial for upholding trust and recognizing the importance of both human and machine contributions.

In order to successfully incorporate artificial intelligence into the arts in an ethical manner, it is essential for artists, engineers, and policymakers to work together in a collaborative manner. To effectively manage the challenges posed by artificial intelligence in the creative arts, it is crucial to establish strong ethical rules and frameworks. This will help us ensure that this influential technology enhances, rather than undermines, the innate human capacity for creativity. By employing deliberate and all-encompassing strategies, artificial intelligence has the potential to become a highly beneficial partner in the continuous development of artistic creativity, promoting a wide range of perspectives and a vibrant artistic future.

Conflict Of Interest

The author declares that they have no conflict of interests.

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REFERENCES

Al Naqbi, H., Bahroun, Z., & Ahmed, V. (2024). Enhancing Work Productivity through Generative Artificial Intelligence: *A Comprehensive Literature Review. Sustainability, 16*(3), 1166. mdpi. https://doi.org/10.3390/su16031166

Ameen, N., Sharma, G. D., Tarba, S., Rao, A., & Chopra, R. (2022). Toward advancing theory on creativity in marketing and artificial intelligence. *Psychology & Marketing, 39*(9), 1802–1825. https://doi.org/10.1002/mar.21699

Ashritha, P., & Reddy, P. S. (2023). IMPACT OF ARTIFICIAL INTELLIGENCE ON MANAGEMENT DECISION-MAKING. *International Journal of Advances in Business and Management Research (IJABMR), 1*(2), 10-18. https://doi.org/10.62674/ijabmr.2024.v1i02.002

Bahroun, Z., Anane, C., Ahmed, V., & Zacca, A. (2023). Transforming Education: A Comprehensive Review of Generative Artificial Intelligence in Educational Settings through Bibliometric and Content Analysis. *Sustainability, 15*(17), 12983. https://doi.org/10.3390/su151712983

Bozkurt, A., Karadeniz, A., Baneres, D., Guerrero-Roldán, A. E., & Rodríguez, M. E. (2021). Artificial Intelligence and Reflections from Educational Landscape: A Review of AI Studies in Half a Century. *Sustainability, 13*(2), 800. https://doi.org/10.3390/su13020800

Cetinic, E., & She, J. (2022). Understanding and creating art with AI: Review and outlook. *ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM), 18*(2), 1-22. https://doi.org/10.1145/3475799

Dogan, M. E., Goru Dogan, T., & Bozkurt, A. (2023). The Use of Artificial Intelligence (AI) in Online Learning and Distance Education Processes: A Systematic Review of Empirical Studies. *Applied Sciences, 13*(5), 3056. https://doi.org/10.3390/app13053056

Epstein, Z., Hertzmann, A., Akten, M., Farid, H., Fjeld, J., Frank, M. R., Groh, M., Herman, L., Leach, N., Mahari, R., Pentland, A., Russakovsky, O., Schroeder, H., & Smith, A. (2023). *Art and the Science of Generative AI. Science, 380*(6650), 1110–1111. https://doi.org/10.1126/science.adh4451

Hagendorff, T. (2024, February 13). Mapping the Ethics of Generative AI: A Comprehensive Scoping Review. ArXiv.org. https://doi.org/10.48550/arXiv.2402.08323

Huang, C., Zhang, Z., Mao, B., & Yao, X. (2022). An Overview of Artificial Intelligence Ethics. *IEEE Transactions on Artificial Intelligence, 4*(4), 1–21. https://doi.org/10.1109/tai.2022.3194503

Iphofen, R., & Kritikos, M. (2019). Regulating artificial intelligence and robotics: ethics by design in a digital society. *Contemporary Social Science, 16*(2), 1–15. https://doi.org/10.1080/21582041.2018.1563803

Loureiro, S. M. C., Guerreiro, J., & Tussyadiah, I. (2021). Artificial Intelligence in business: State of the Art and Future Research Agenda. *Journal of Business Research, 129*(1). https://doi.org/10.1016/j.jbusres.2020.11.001

Minh, D., Wang, H. X., Li, Y. F., & Nguyen, T. N. (2021). Explainable artificial intelligence: a comprehensive review. *Artificial Intelligence Review, 55*. https://doi.org/10.1007/s10462-021-10088-y

Mondal, B. (2019). Artificial Intelligence: State of the Art. *Intelligent Systems Reference Library, 172*, 389–425. https://doi.org/10.1007/978-3-030-32644-9_32

Mukhamediev, R. I., Popova, Y., Kuchin, Y., & Zaitseva, E. (2022). Review of Artificial Intelligence and Machine Learning Technologies: Classification, Restrictions, Opportunities and Challenges. *Mathematics (2227-7390), 10*(15), 2552–2552. Mdpi. https://doi.org/10.3390/math10152552

Najjar, R. (2023). Redefining Radiology: A Review of Artificial Intelligence Integration in Medical Imaging. *Diagnostics, 13*(17), 2760. https://doi.org/10.3390/diagnostics13172760

Oksanen, A., Cvetkovic, A., Akin, N., Latikka, R., Bergdahl, J., Chen, Y., & Savela, N. (2023). Artificial intelligence in fine arts: A systematic review of empirical research. *Computers in Human Behavior: Artificial Humans, 1*(2), 100004. https://doi.org/10.1016/j.chbah.2023.100004

Olider, A., Deroncele-Acosta, A., Luis, J., Barrasa, A., López-Granero, C., & Mariacarla Martí-González. (2024). Integrating artificial intelligence to assess emotions in learning environments: a systematic literature review. *Frontiers in Psychology, 15*. https://doi.org/10.3389/fpsyg.2024.1387089

Shah, V., & Shukla, S. (2023). Creative Computing and Harnessing the Power of Generative Artificial Intelligence. *Journal Environmental Sciences and Technology, 2*(1), 556–579. https://jest.com.pk/index.php/jest/article/view/123

Stark, L., & Crawford, K. (2019). The Work of Art in the Age of Artificial Intelligence: What Artists Can Teach Us About the Ethics of Data Practice. *Surveillance & Society, 17*(3/4), 442–455. https://doi.org/10.24908/ss.v17i3/4.10821

Suchacka, M., Muster, R., & Wojewoda, M. (2021). HUMAN AND MACHINE CREATIVITY: SOCIAL AND ETHICAL ASPECTS OF THE DEVELOPMENT OF ARTIFICIAL INTELLIGENCE. *Creativity Studies, 14*(2), 430–443. https://doi.org/10.3846/cs.2021.14316

Wingström, R., Hautala, J., & Lundman, R. (2022). Redefining Creativity in the Era of AI? Perspectives of Computer Scientists and New Media Artists. *Creativity Research Journal, 36*(2), 1–17. https://doi.org/10.1080/10400419.2022.2107850

Yigitcanlar, T., Desouza, K. C., Butler, L., & Roozkhosh, F. (2020). Contributions and Risks of Artificial Intelligence (AI) in Building Smarter Cities: Insights from a Systematic Review of the Literature. *Energies, 13*(6), 1473. https://www.mdpi.com/1996-1073/13/6/1473

Zhai, X., Chu, X., Chai, C. S., Jong, M. S. Y., Istenic, A., Spector, M., Liu, J.-B., Yuan, J., & Li, Y. (2021). A Review of Artificial Intelligence (AI) in Education from 2010 to 2020. Complexity, 2021(8812542), 1–18. https://doi.org/10.1155/2021/8812542

Zhang, C., & Lu, Y. (2021). Study on Artificial Intelligence: The State of the Art and Future Prospects. *Journal of Industrial Information Integration, 23*(23), 100224. https://doi.org/10.1016/j.jii.2021.100224

Zhang, R. (2021). Exploration of Social Benefits for Tourism Performing Arts Industrialization in Culture–Tourism Integration Based on Deep Learning and Artificial Intelligence Technology. *Frontiers in Psychology, 12*. https://doi.org/10.3389/fpsyg.2021.592925