＜Research Overview＞

Pioneering the Future of Art with Digital Technology: The Potential of Art DX and Generative AI, and their Ethical, Legal, and Social Implications (ELSI)

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I. Introduction

1. The Innovation of Culture and Arts through Future Technologies and the Purpose of This Study

This journal, "*Globe, Universe, Next Future, Discussions And Mentions*" aims to realize hope by fusing social issues with "future technology" just like the future depicted in "Gundam". Based on this philosophy, the author focuses on the contemporary issue of "sustaining and developing culture and the arts".

In recent years, two technological currents, "Art DX" (Digital Transformation in the Arts) and "Generative AI Art," have been fundamentally reshaping the creation, distribution, and appreciation of art. While these trends offer new possibilities for culture and the arts, they also raise significant Ethical, Legal, and Social Implications (ELSI) that cannot be overlooked. This paper introduces the author's research, which comprehensively analyzes these prospects and challenges to explore a desirable future.

II. Art DX: A New Fusion of Culture and Economy

1. The Potential of Art DX (Prospects)

Art DX is a collective term for initiatives that use digital technology to expand the art appreciation experience and innovate its distribution[1-3]. Through these efforts, art is being liberated from physical constraints and is beginning to create new value[4].

First is the "expansion of the appreciation experience." Utilizing Virtual Reality (VR) and Augmented Reality (AR) technologies, users can participate in virtual tours of museums worldwide from their homes or superimpose digital art onto real-world landscapes[5]. This broadens opportunities for everyone to engage with art, regardless of geographical or physical limitations, leading to the cultivation of a new fan base.

Second is the "innovation in distribution and asset value." Specifically, Non-Fungible Tokens (NFTs), which employ blockchain technology, have enabled the verification of ownership for digital art—previously easily replicable—by assigning a unique "mark"[2]. This has established digital art as an asset, and the online market has experienced rapid growth. The circulation of many affordably priced works has also provided an entry point for younger generations into the art market.

2. Challenges for the Consolidation of Art DX

Despite its promising outlook, Art DX presents challenges that require careful consideration. The first is

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the issue of "preservation of NFT art as a digital asset"[6]. If only the location data of an art piece, rather than the artwork data itself, is recorded on the blockchain, the work could be lost if the linked server ceases operation. Ensuring the permanence of asset value is a significant technical and institutional challenge[5].

The second is the emergence of a new "digital divide." High-quality VR experiences and high-speed data communication necessitate investment in appropriate equipment and environments. This poses the risk of creating new disparities in opportunities to enjoy culture, contradicting the DX principle of universal access[7].

Third are the economic risks. The ability to conduct highly anonymous transactions has led to problems in the NFT market such as fraud, theft, and money laundering. To foster the sound development of this technology, the urgent establishment of rules for user protection is imperative[2].

III. Generative AI Art: Redefining Creativity and its ELSI

1. The "Democratization of Creativity" Enabled by Generative AI (Prospects)

Generative AI art, created using Artificial Intelligence, has seen a dramatic improvement in quality and diversity, particularly with the advent of "diffusion models"[8]. This technology functions by having the AI learn from vast pairs of images and texts. Based on user-input text prompts, it generates new images by gradually refining them from noise[9].

This technology accelerates the "democratization of creativity." It allows anyone to visualize the ideas in their mind without possessing specialized drawing skills, leading to an explosive expansion of the creative population[10].

Furthermore, for artists, it holds potential as a "creative partner." There is a growing number of cases where artists, by leveraging AI, are producing novel expressions unattainable by humans alone. This includes using AI as a sounding board for ideas, having it propose diverse visuals, or delegating tedious tasks to it so they can concentrate on conceptual development[11].

2. The Inherent ELSI in Generative AI Art (Challenges)

The proliferation of generative AI art confronts our society with fundamental ELSI. The most prominent issue is that of "copyright"[10]. Lawsuits are occurring frequently worldwide, alleging that the works of existing artists are being used in AI training data on a massive scale without permission. Current copyright law does not anticipate creation by AI, making it extremely difficult to delineate between "reference" and "plagiarism"[12].

Next is the problem of "ethical bias." AI honestly learns the societal prejudices—such as gender and racial stereotypes—contained within its training data. Consequently, there is a noted risk that AI-generated images may reproduce and amplify specific biases, potentially exacerbating social divisions[13, 14].

Finally, the risks of "authenticity and misuse" are severe. Deepfake technology, which can generate images and videos indistinguishable from reality, carries the threat of being exploited for disinformation and fraud. Moreover, the ability to produce countless works at the touch of a button challenges the

foundational values that have long supported art, such as "authorial intent" and "originality"[5].

IV. Discussion: Building the Future of Art through Interdisciplinary Collaboration

This research has revealed that Art DX and generative AI are not independent phenomena but are mutually influential, transforming the entire art ecosystem. Generative AI produces a large volume of attractive content (e.g., NFT art) that circulates on DX platforms, while the DX infrastructure, in turn, promotes the dissemination and marketization of AI art.

This monumental wave of transformation extends beyond mere technological advancement. It poses profoundly philosophical and social questions to us: What is art? To whom does creativity belong? What is the role of the human artist? There are no single correct answers to these questions. What is required is not a blanket rejection or unconditional praise of technological development, but rather a constructive dialogue.

To this end, open and interdisciplinary collaboration among diverse stakeholders—including artists, engineers, legal experts, ethicists, critics, and the public who enjoy art—is indispensable. It is my sincere hope that the research presented in this paper will serve as a catalyst for such a dialogue toward the future.

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