Artificial Intelligence and Neural Style Transfer in the Context of Art and Design: Ethical and Anticipated Ethical Issues

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Abstract: From the shape of our cellphones, the colorful packaging on our foods, to the material in our clothing, every object around us typically has some kind of element of design associated with it. Design is concerned with how users interact with the objects around them. This analysis will be concerned with identifying how AI is being applied in three main categories of design: functional design, visceral design, and behavioral design. Functional designs prioritize the function of objects over form. Visceral designs are concerned with issues of the pure aesthetics of objects. Behavioral designs influence users to act based upon the design of an object, whether it pertains to purchasing the item or using the item in a preferred way. In this analysis, an overlap of these categories will be analyzed through the lens of traditional paintings. A painting reflects a story told by an artist which allows for a variety of interpretations by the perceivers of the artwork. However, what happens when Artificial Intelligence (AI) is used in conjunction with painting? AI when applied to painting uses art-related generative algorithms, and neural networks, which are adapted from models for processing data. AI relies on this type of model to complete in the case of painting, the use of a Neural Style Transfer (NST) to compose a new object of art while employing the style of another artist. Through the lenses of generative AI's current application and implications related to its future use, this analysis will provide an extensive overview of the convergence of technology, art, and design. This discussion will also address potential ethical and future ethical concerns about authorship, originality, the value of AI-generated art, and the impact on traditional practices of Art and Design from the perspective of painting. As AI technology related to the creation of art continues to develop, anticipatory ethics will attempt to identify ethical issues with this continued development of generative AI in the area of art.

Key words: Artificial intelligence, Neural style transfer, Art, Design, Ethics, Anticipatory ethics

1. Introduction

Design is a process which involves the intentional creation of solutions to problems that address specific functions and in the case of art, the aesthetic goals of designers. This analysis will investigate the three categories of design, which include functional design, behavioral design, and visceral design. Functional design prioritizes the practicality of the designed object, an example of this is the Casio Watch, which emphasizes timekeeping function over aesthetics. Behavioral design focuses on engaging the user of the designed object such as the Apple Watch, which invites interaction with the user through examples such as notifications and health tracking. Visceral design appeals to the emotions and aesthetical attitudes of the users, evoking deeper feelings. An example of this is seen in the playful design of the 'A perfectly Useless Afternoon' watch. However, design and art can also create deeper emotional resonance with objects over time. Donald Norman introduces the concept of reflective design in his book, *Emotional Design: Why We Love (Or Hate) Everyday Things*, describing how people interpret and connect emotionally with products and art through their individual experiences and reflections. This reflective engagement with objects allows both art and design to create lasting meaning and value for the user. Following Norman's concept of reflective design, the value of a work of art lies not only in its aesthetic quality of the work, but in how people connect with it over time. In the context of AI-generated art, the issues related to design of objects has an additional issue related to who receives the credit for the design of an art object such as a watch. If reflective value emerges from the interplay between AI tools, the original style, and user input, then attributing authorship solely to one party—be it the artist, AI Company, or the user—overlooks the collaborative framework of how AI influences contemporary works of art.

2. Technical Issue

Historically, the invention of the camera created a shift within the art industry from Realism (1848-1915) to Impressionism (1867-1886) where artists focused "more on light, colour, and movement." (Kiama Art Gallery, 2015) If we focus on the technology employed in the creation of a work of art, Neural Style Transfer (NST) is currently producing a similar shift in the art world. Neural Style Transfer (NST) demands higher computational costs which consists of raising processing power, memory, and the reduction of time needed to create an artwork. NST relies on balancing two key components: content and style loss, which influences the computational creation of a 'perfect' image. Just as we can ask about how the technique of stopping action with the use of a camera, which allowed for artists such as Edgar Degas to utilize photography as a creative toolset

when he explored sketches of racehorses, we can now ask can the artist in today's world utilize or rely on NST to achieve their goals? If this is the case, then by the time traditional techniques are replaced by NST, artists may need to develop programming skills as well as further develop profound knowledge of AI use.

3. Ethical Issues

Based on the traditional system of how the art marketplace operates, the artist sells artwork to a dealership, which is then auctioned off to consumers. As a result of this transaction, the artist would then receive a share of the profit from the sale. However, with the current use of AI (Neural Style Transfer) in the creation of an artwork, there is a problem related to who gets credit for the creation of a work of art? If Leonardo DaVinci used the software from an AI company to create the *Mona Lisa* in the style of Picasso's *Weeping Woman* (see Figure 1), who should receive credit for creating the work of art, Leonardo DaVinci, Picasso, or the AI company? Each of these stakeholders plays a role in the creation of the work of art. What now adds additional confusion to the situation is, about individual artists managing the software, does this entail that both the artist and AI company should receive credit for creating the work of art? Or does everyone in this process have to receive some degree of credit? Based on our response to these questions an important question would then revolve around who gets paid when artworks are created and sold? If a painting is formatted into the style of another artist, whose artwork it?

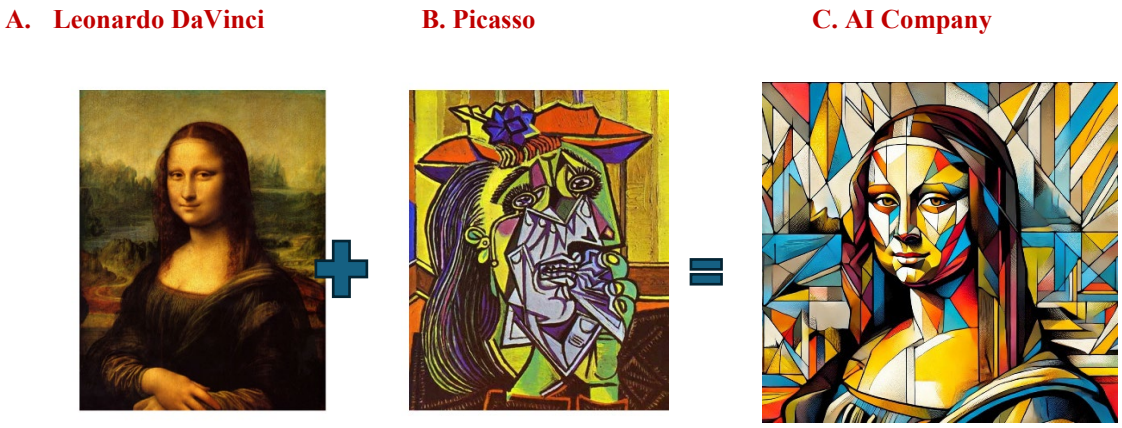

Figure 1: AI

If we apply the notion of copyright to these issues which grants creators of their original works exclusive rights over the use and distribution of those pieces, current laws prevent AI from being considered the author (Caldwell, 2023). This makes the end user or company the rightful copyright holder for the work of art. Today, consumers must purchase a subscription to get access to the process for the creation of AI driven Art, such as Neural Style Transfer. If an artist pays for this software, and creates 'Art' to sell in auctions, will the artist who used the software get paid or will it be the artist of the style image?

4. AI in Art: Painting

In the traditional sense of painting, an artist picks up a brush and places the brush in a preferred medium and begins their art process with full control of the process of the creation of a work of art. With the insertion of AI into the creative process, the relationship between Artificial Neural Networks and grading functions such as content loss and the style of loss, are essential in Neural Style Transfer. Within one of the branches of machine learning, unsupervised learning, an input image is provided, which would then become analyzed through feature extraction relationships, optimization-based relationships, and non-linear relationships. The unsupervised learning process will focus on finding interwoven relations between hidden patterns and groupings of image features, that are required to provide a desired output. In the technique of unsupervised learning, the "data scientist merely provides photos, and it is up to the system to examine the data and determine whether or not" the provided images fit under a specific category of images (Naeem, Ali, Anam, & Ahmed, 2023). The main goal "of learning the algorithm is to find patterns in the dataset and rate the data points according to those patterns" (Naeem, Ali, Anam, & Ahmed, 2023). In non-linear relationships in a deep learning structure, there are layers of artificial neural networks, specifically convolutional neural networks (CNN), that aim to find and recognize relationships through feature extraction that influences content loss and the style loss that transfer from the

images provided, to the image that is generated through the process of Neural Style Transfer. CNNs have in each layer units that "can be understood as a collection of image filters, each of which extracts a certain feature from the input image (Gatys, 2015). Neural Style Transfer undergoes rigorous training, where there are two competing loss functions that grade the output image: one for the content and the other involving the style. The network then iteratively grades the synthesized image through the two grading functions simultaneously (Gatys, 2015).

5. Case 1: Prisma App

Prisma App, a photo editing app, applies photo effects using Artificial Intelligence. The app has a database of over 500 various styles, some of which are created from the artworks of renowned painters such as Picasso, Van Gogh, and Munch (Butler).

There are a variety of stakeholders involved in the creation of a work of art through Neural Style Transfer. This analysis will examine the stakeholders involved in the use of Neural Style Transfer for the creation of a work of art. The stakeholders who will be analyzed here are the artists whose styles have been applied as a filter, Prisma Labs, and the app users. From the perspective of the artists whose styles are being applied as a filter, the following ethical principle can be applied for computer generated art. Act consequentialism which states "An act, X, is morally permissible if the consequences produced by doing X result in the greatest good for the greatest number of persons affected by Act X." (Tavani, 2009) The legacy's of artists (Picasso, Van Gogh, and Munch) will be affected by the influence of AI and AI Art companies taking their style of art or at the very least, the digital format of their art to create a "new" work of art for the end user. From the perspective of a user of Prisma App, original and edited photos will not be held responsible for copyright complications; rather the company would be more focused on the profits they receive through a subscription plan for the use of their app. Therefore, act consequentialism suggests that Prisma's act of using artists' styles should aim to benefit people as much as possible. Another ethical principle that can be applied to this situation from the perspective of artists, is negative rights. Negative rights, "restrains other persons or governments by limiting their actions toward or against the right holder" (Alabama Policy Institute, 2020). Through the lens of negative rights, artists have rights revolving around their creative work and when negative rights are applied to this situation other persons have to have limited access to the right holder's artwork so an artist's work does not get stolen, misappropriated, or restrained without proper respect adhered to.

To address ethical issues from the perspective of the company, Prisma Labs, Kant's Categorical Imperative I can be applied. "So act as if the maxim of your action [that is, the principle of conduct underlying the action] were to become through your will a universal law of nature." (Ciulla, 2013) When this principle is applied to the situation, the company, Prisma Labs, should respect the rights of consumers and artists and not deliberately use them as a means for the economic gain of the company. However, a lawsuit was filed against Prisma Labs for collecting biometric information from their users without their permission in 2023. Prisma Labs also owns an app called, "Lensa A.I. where it transforms a selfie into a "magical avatar" and where users have described how the app inserts biases within body images without the user's consent (Dafoe, 2023). The complaint turned out to be about how this app illegally extracts user's facial geometries to train their algorithm-based models. Therefore, Prisma Labs' history of public scrutiny forces the users of the app to decide whether to continue trusting apps that use style transfers for the fear of manipulation of personal data.

From the perspective of app users, positive rights can be applied to the situation. Positive rights "provide the right holder with a claim against another person or the state for some good, service, or treatment." (Alabama Policy Institute, 2020) Here, the users should be entitled to receive continuous access to the services that Prisma offers for the subscription cost and to receive updates for fixes and customer support. Another ethical principle, negative rights has been applied which "restrains other persons or governments by limiting their action toward or against the right holder" where the users expect a certain expectation of security of their personal data, where the software should not misuse or distribute one's data without permission. Although Prisma Labs has a history of not protecting their user's information, the users will now be wary of using an app like this.

The Association for Computing Machinery (ACM) code of ethics can also be applied to the same primary stakeholders. We employ this code because it applies to anyone using computing machinery and Neural Style Transfer involves the use of computing machinery. To use AI to create art requires the use of computing machinery. For the artists, whose styles have been applied as a filter, rule number 1.5 of ACM can be applied. This rule states that there is a need to "respect the work required to produce new ideas, inventions, creative works, and computing artifacts." The creative efforts involved in the creation of artistic artwork need to be respected, and artists should be able to gain value for the work they have created. In the case of Prisma app, an

artist's work might not be explicitly described due to copyright, but the style or the title of the style is rewritten. For Prisma Labs, rule number 2.1 of ACM can be applied to the situation where there is a goal to "strive to achieve high quality in both the processes and products of professional work." The company is concerned with finding continuous improvements in the styles and techniques through the users' feedback, which could be further added to the existing database of styles. Providing endless possibilities for the use of artistic styles allows users to fully experience what the Prisma app offers. For app users, rule 2.3 of ACM is applied which states, to "know and respect existing rules pertaining to professional work." Prisma owns everything including the images and illustrations which are all licensed to the company, Prima Labs. App users also agree with Prisma's policy when using their app and so are (or should be) fully aware of the rules about Prisma.

6. Case 2: "Edmond de Belamy"

An AI generated portrait, "Portrait of Edmond de Belamy", from 2018 was the first AI generated portrait to be sold at an auction and it sold for $432,500. This portrait was one in a group of portraits of a fabricated family, Belamy. The members of the group that created the artwork, "Obvious", used Artificial Intelligence through Generative Adversarial Networks (GANs) which "are trained to seek patterns in a specific dataset and then create copies" (Jee, 2018). The machine learning algorithm used by GANs has two neural networks, the generator neural network and the discriminator neural network. The generator creates images based on a trained data set. The members in "Obvious" fed the generator 15,000 portraits from paintings created between the 14th to 20th centuries. The discriminator evaluates those generated images and determines whether the created images are realistic. The discriminator would then continue to provide feedback back to the generator to improve on its output image or images. The overall goal of the process was to convince the discriminator neural network that the new images were realistic portraits.

The stakeholders in this situation that will be analyzed on include, "Obvious", the auction house, and the bidders on the artwork. From the perspective of the artist group, "Obvious", Kant's Categorical Imperative II can be applied. This ethical principle states, "Act so that you use humanity, as much in your own person as in the person of every other, always at the same time as an end and never merely as a means." When this principle is applied to the situation, it can be argued that the artist group should be treated as ends in themselves possessing intrinsic worth and that the same thing should hold true for other artists. The ethical problem stems from the artist group, Obvious, where they did not properly attribute credit for the creation of the artwork. The creator was Robbie Barrat who is an artist and programmer and shared his code through an open-sourced license on the platform, GitHub (Jee, 2018). Barrat has mentioned, "when he was 17 years old, he did a project using the exact same type of neural network and an identical data set" (Kinsella, 2018) This displayed a lack of an appropriate identification of ethical boundaries related to who should receive credit for the creation of the artwork.

For the auction house, social contract theory can be applied to the situation. In this case, a "persons' moral and/or political obligations are dependent upon a contract or agreement among contracting individuals to form the society in which they live". The auction house that sold the AI-generated portrait was Christie's Auction House, where they function as an intermediary between the artist and the bidders on the artwork. Auction houses receive the artwork, prize the piece, and present the piece to bidders with the intention of auctioning off the artwork. Auction houses use professional experts such as university and museum scholars who are "actively involved in the marketing process." In addition, they thoroughly investigate through 'significant due diligence' the legitimacy and authenticity of objects offered for sale" (Brodie, 2019). An auction house is involved in a social contractual agreement with all the parties involved in art auctions.

From the perspective of bidders on the artwork, virtue ethics can be applied to the situation. Virtue ethics argues that "we concentrate on being good as persons. Be honest, just kind, and honorable…would have us ask both what kind of person we want to be and how we want to be seen by those we care about." Bidders on artworks are dependent upon the virtuous qualities of those who assess the value of the artwork that is up for auction. The piece, "Portrait of Edmond de Belamy" was bought at 43 times its estimate, which reflects a fluctuation in the value of AI generated artwork and the important role bidders play in establishing the economic value of this type of art.

The ACM Code of Ethics can also be applied to this situation. Rule number 2.1 can be applied to the artist group, "Obvious". Rule 2.1 states to "strive to achieve high quality in both the processes and products of professional work" (Association for Computing Machinery). The group, "Obvious" claimed to have used AI to train a generator based on a data set of pre-existing portraits. These images were then compared with the discriminatory neural network, while trying to fool the discriminatory neural network in trying to make it seem as if the artwork was

a real-life portrait. The intricate work that went into the production of Belamy family portrait reflects the high quality the artist group, "Obvious", or Robbie Barrat strove to achieve, to present the artwork to the auction house and to have the artwork placed up for auction.

For the auction house, rule 1.5 of the ACM Code of Ethics can be applied. Rule 1.5 of the ACM Code points out a need to "respect the work required to produce new ideas, inventions, creative works, and computing artifacts". Here the auction house considered the piece worthy of being auctioned. Based on the formal procedure of sourcing art, Christies Auction house judged this piece worthy of being sold to bidders at auction. Under the impression that there are currently no restrictions about the role of AI in Art, it reflects how Christie's Auction House perceives the use of AI in the creation of works of art.

From the perspective of the last group of stakeholders, the bidders, rule number 2.3 of the ACM Code of Ethics can be applied. Rule 2.3 of the ACM states to "know and respect existing rules pertaining to professional work." For the bidders, this application is quite questionable because it raises questions of who the artist is, which also suggests that the artist group, "Obvious", should be perhaps perceived as marketers, rather than as artists creating original artwork. But this also raises concerns with bidders purchasing this type of art in a creative industry because they will become subject to ethical implications that the debate of "what is considered art" raises.

7. Case 3: DALL-E 3

The most recent version of DALL-E, DALL-E 3 was released on August 10, 2023. This innovative technology is the company Open AI's advanced text to image model. DALL-E 3 is interwoven with Chat-GPT-4 which allows for the technologies ability to adjust image prompts to more of one's liking, through natural conversation. In the domain of image generation, DALL-E 3 undergoes a great deal of testing and experimentation while protecting ownership of the sources it references (OpenAI, 2024). It has developed a filter where it can decline any prompt that is related to propaganda and misguided information (OpenAI, 2024). As a 2nd example, we tried asking DALL-E 3 to "create an image of a jellyfish in the style of the artist, Piet Mondrian", however, it could not generate an image for this text prompt and instead provided us with this answer, "I wasn't able to create the image as requested because it doesn't align with our content policy." Although the artist, Piet Mondrian, has works that are no longer under copyright restrictions, DALL-E 3 is prevented from generating those types of images due to the possibility of how the end users might manage the generated images after they have been generated. DALL-E 3 also experiments with a provenance classifier, an inspector that identifies whether an image was generated by DALL-E 3 by tracing the image back to its source. When prompted to create the image provided of an Orca, a prompt was written, "an orca dancing" and it provided a cartoon image of an Orca dancing in the ocean. Then, DALL-E 3 was asked to "recreate it in the style of Van Gogh" and it produced the following image depicted in figure 2.

Figure 2: Image

Based on the explanation of this technology, the stakeholders analyzed will include the artists, OpenAI, and the DALL-E 3 app users. From the perspective of the artist, Distributive Justice as an ethical principle can be applied.

Distributive justice "provides moral guidance for the political processes and structures that affect the distribution, or benefits and burdens in societies, and any principles which do offer this kind of moral guidance on distribution" (Stanford Encyclopedia of Philosophy, 1996). Within DALL-E 3 an image cannot be generated, that is in the style of an existing artist due to their contents policy, but they could generate an image in the style of an artist such as, Vincent Van Gogh, whose artworks are in the public domain.

From the perspective of the company that owns both ChatGpt-4 and DALL-E 3, OpenAI, Kant's Categorical Imperative II can be employed. This ethical principle states, "Act so that you use humanity, as much in your own person as in the person of every other, always at the same time as an end and never merely as a means". This should lead OpenAI to help users of their platforms to achieve artistic autonomy based on the tailored prompts that are created by the artists creating artworks. When the company first released DALL-E in 2021, there were countless concerns revolving around deepfakes and how dangerous they could be in the domain of politics. Therefore, a "red team" was introduced several months after releasing this technology, and developed criteria for testing how this team of 25 external researchers would test ChatGPT for flaws. This included observing how racial bias accentuated certain stereotypes and overrepresentation of racial passing the red team testing. In addition to this, the red team recommended that OpenAI remove the ability to use DALL-E "to either generate or upload images of photorealistic faces" (Tiku, 2022). In the ensuing months, DALL-E agreed that users could post photorealistic faces on social media, but the consequence would all depend on the user. As these red team members were examining this technology, one of the red team members, Maarten Sap, concluded that "there's just a severe lack of legislation that limits the negative or harmful usage of technology" and that the decision "to install safeguards is up to each company" (Tiku, 2022).

For the app users, the notion of positive rights states that one must "provide the right holder with a claim against another person or the state for some good, service, or treatment." (Alabama Policy Institute, 2020) and negative rights "restrains other persons or governments by limiting their actions toward or against the right holder" (Alabama Policy Institute, 2020). Both types of rights apply to the users where they are entitled to receive continuous access to the services that DALL-E 3 offers for the subscriptions cost and to expect a decent level of security where their data is protected. The concept of deepfake "refers to a specific kind of synthetic media where a person in an image or video is swapped with another person's likeness" (Somers, 2020). The issue is with the level of security because of the incredible rise of deep fakes with realistic images of people's faces exposes the users to the possible risk of being victims of misuse, misinformation, and harassment.

Based on the ACM Code of Ethics, OpenAI will be analyzed. Rule number 2.2, "Maintain high standards of professional competence, conduct, and ethical practice," can applied to DALL-E 3 as this technology undergoes various levels of testing and adjustment based on the users' prompts. DALL-E 3 uses a classifier to make sure that all the prompts follow the contents policy of OpenAI. For the stakeholder group, OpenAI, rule 1.5 of the ACM Code of Ethics states, "Respect the work required to produce new ideas, inventions, creative works, and computing artifacts" where OpenAI has a contents policy where certain text prompts that are deemed inappropriate, are not permitted. OpenAI has allowed users to use this technology for a subscription fee. As a result, ownership of the generated content is given to the users, but for a cost. Finally, rule number 2.3 of the ACM Code of Ethics states to "know and respect existing rules pertaining to professional work" has been applied to the app users. Through the relationship between OpenAI and its app users, OpenAI ensures that their customers by abiding by their stated policies to protect users and while also enhancing their software further.

8. Anticipatory Ethics

Anticipatory Ethics examines potential effects caused by the technical issues related to the application of emerging and innovative technologies and then attempts to identify the ethical issues that could arise from the technology being analyzed. According to Deborah Johnson, an important figure in anticipatory ethics, "anticipatory ethics is a new approach that integrates ethics into technological development". This type of ethics was created in with the hope that the development of new technology would be influenced by ethical perspectives to ensure the safety and privacy of customers and patients. In the realm of anticipatory ethics, according to Phillip Brey, it is critical that problems are identified in the early stages of development. There are 3 levels to the ethical analysis of technology, technology, artifact, and application level. The document, "Moral Responsibility for Computing Artifacts: 'The Rules'" was created by a group of scholars including Keith W. Miller to examine ethical issues with any artifact that involves an executing computer program and "to indicate that people are answerable for their behavior when they produce or use computing artifacts, and their actions reflect on their character". What is applicable within this analysis and with the AI technology, Neural Style Transfer, that is being employed to create works of art is an analysis based upon on anticipatory ethics. What applies from

the perspective of anticipatory ethics in this section explores copyright. Rule number 5 states, "People who design, develop, deploy, promote, or evaluate a computing artifact should not explicitly or implicitly deceive users about the artifact or its foreseeable effects, or about the sociotechnical systems" (Miller, 2011). Respectfully, NST based software should respect the rights of original artists by giving proper credit and addressing the concerns entailing unauthorized style replications in both artistic and personal contexts. Additionally, NST based art could also be falsely attributed to recent works to deceased artists or spread misinformation to consumers about the origin of an art piece through deep-fake technologies. Based on the current Copyright Law, it is written that in the case that Artificial Intelligence (AI) the creator, deeming it the author, AI cannot register for propriety rights. However, if the technique of AI art forensics is further developed to dissect the process of a certain piece, the artist could use AI as a mere tool, which would then allow the artist to receive ownership. If AI were only restricted to being used as a mere tool, then we could develop further deep learning techniques, learning the training process of artists to avoid future implications of copyrights issues. When a human and AI collaboration is considered acceptable in society and in the creative industry, there would need to be specific regulations within the spectrum of "what is considered art."

9. Recommendations

While Neural Style Transfer (NST) offers new possibilities related to creative freedom for artists, there is also a lack of an ethical framework for the responsible use of AI in the creation of works of art. To identify basic ethical issues with the use of Neural style transfer we began by employing standard ethical principles. What is required in addition to this analysis is that a set of recommendations for Neural Style Transfer should be developed that revolve around focusing on the need for transparency, proper attribution, and safeguards needed when artists create art works employing Neural style transfer. Currently, there is no official code of ethics for the use of AI when creating works of Art. In light of this problem the Association for Computing Machinery was employed as the foundation for code of ethics for the use of AI when creating works of Art. There must also be frameworks for compensating or providing credit to the original artists and their style of art and finding proper recognition for who the stakeholders are in how the art marketplace operates and addresses AI generated artworks. Our anticipatory ethical analysis is aimed at identifying an initial starting point for addressing issues related to the use of AI in the creation of future artwork. The creative industry should also encourage further AI and Artist collaborations where human artists guide the use of NST by looking at NST as a mere tool. Regarding the technical aspects of the software itself, Neural Style transfer should focus on enhancing the quality of the output by further developing sophisticated algorithms to reduce errors from disoriented artifacts, blurring, and/or loss of details from the grading functions. Ultimately, the integration of Neural Style Transfer within art requires a harmonic balance between human creativity, technological innovation, and ethical accountability. This calls for AI, functioning not as a substitute but rather as a tool that amplifies artistic expression through transparent collaboration and proper acknowledgement. While the preceding analysis has been focused on painting and visual art, future research is planned that will involve the analysis of additional fields of art including sound and music as well as art forms related to touch and smell. Augmented reality and virtual reality can also be explored and research into all these areas as they are related to artistic creativity and need to address the issue of the convergence of technologies and what issues arise when all of these subjects converge in the creation of artworks.

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