The Creativity and Ownership of AI-Generated Art*

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Abstract—In this paper, I differentiate between creativity and ownership of AI-Generated Visual Art. Then, using existing literature in the field, I argue that original artists and collectors should receive credit for both ownership and creativity, while AI-designers and users should only be receiving the credit for creativity. I also recruit 20 individuals from two different age groups and perform a simplistic survey to confirm whether current literature in AI-ownership and copyright laws is consistent with real-world perspectives. Lastly, I summarize and synthesize my overall findings and interpretations, discuss potential gaps in my arguments, and discuss what the future holds for AI-generated art.

Index Terms—AI-generated art, creativity, ownership, copyright law, GANs, diffusion models

I. INTRODUCTION BACKGROUND

The topic I am pursuing this semester is AI-generated art. Specifically what is it used for, what are its advantages and disadvantages, and most importantly what makes it potentially unethical and harmful for creative digital artists and making profit from their own work. This paper discusses my opinion on who should get ownership and creativity credit for AI-generated visual art based on current literature.

A. What is AI art?

Before I discuss AI-ownership and creativity, it is important to first understand what AI art is and how it is made. Currently, most research in AI visual art is being performed in the realm of machine learning [1]. And while many different types of machine learning models exist in a plethora of applications, the general process of machine learning usually looks something like this:

1) Assemble a training set.
2) Pick a machine learning model architecture.
3) Train the model on the training set.
4) Deploy the model on a test set to get accuracy.
5) Repeat steps 2-4 until model is accurate but also not too overfit.
6) Model is able to take input and generate output.

When it comes to AI-generated art, one of the most popular types of machine learning models used the generative adversarial networks (GANs) [1]. In the context of the process above, a GAN model is one that for 1) has a training set of images and for 2) uses a convolutional neural network (CNN) that is able to use the pixel data from the images to perform classification and clustering tasks. For example in their study, Cetinic & She use GANs to create AI generated visual art with high speed and effectiveness [1].

Furthermore, GANs are not the only the only current method to work with AI-generated art. Other more recently popular types of machine learning models are the diffusion models [2]. Due to their overall simpler design and architecture, they require much less training and testing data than that of GANs and thus can perform visual output tasks in a more computationally efficient way. While the output is simpler as a result, the pixel count and resolution is simply scaled up and filled in to look like a proper image.

Outside the context of AI-generated art, these modeling techniques can also be used more generally as image classification models. One such application as described by Yi et al. is in medical imaging: being able to determine similarities and differences across thousands of medical images such as X-rays and scans [3]. Another study by Jalal et al. looks at the machine learning concept of fairness in the context of image generation of human faces and using the various accuracy metrics is able to determine more precisely the potential limitations of eliminating bias [4]. As this work in machine learning evolves, even more potential methods of using modeling strategies for visual AI-art may emerge.

B. Existing Harms of AI art

One key point of discussion for these image generating models is the potential ethical implications they pose: both good and bad. One one hand, it is it important for technological development that these models be made widely and easily accessible. However the downside of this is that it also means this technology, in this case the machine learning model that makes AI-generated art, can more easily fall into malicious users' hands. In their study, Shan et al. look at potential ways diffusion models are used to mimic existing artists styles, or ways to modify art to render them 'unusable' by further diffusion models [5]. And while research in this field is still rapidly unfolding, the ethical problems that have already been discovered are proving much strife for AI-user ownership and creativity credit.

C. Copyright Law, Fair Use, and Patents

The discussion of ownership and creativity naturally leads its way to laws that define copyright, fair usage, and patents. However when comes to using AI as a creative tool, existing

literature on ownership and creativity of AI, it is still unclear how to adapt current copyright and ownership laws to fit with a more expanded group of potential stakeholders.

To further discuss copyright and how it pertains to ownership, the United States Constitution links copyright with promoting "Progress." [6] However, the current state of copyright law tackles not only creative incentive but also economic and sociological impacts of infringements [6]. With additional factors such as these, it becomes less clear as to how one is to approach implementing them for their own work. The idea of what 'progress' is is also less clear here. It could mean economic progress, it could mean creative progress, or it can mean both. This is where the line between ownership and creativity is less clear.

Following with the theme of copyrights, there is also the discussion of fair use and more specifically: what counts as infringement of fair use. In their essay 'Fair Use Across Time', Hughes discusses the history of the meaning of the term 'fair use', and how infringement claims have been handled over time [7]. According to U.S. Supreme Court:

"Codified in 1976... To judge whether a party's otherwise infringing activity is a "fair use," 17 U.S.C. § 107 provides that courts are to consider four factors:

1) the purpose and character of the use; "
2) the nature of the copyrighted work; "
3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole;"
4) the effect of the use upon the potential market or value of the copyrighted work;"

[7]

While the first three factors can largely be described on an individual basis more straightforwardly, there has been much debate over factor 4) over time. This is because there is no way to preemptively predict the 'economic effect' of using a copyrighted work [7]. Thus, taking the first three factors into account, it appears that as long as the work remains used on a small-economic scale.

However, since there is no way to accurately predict a future market outcome of one instance of fair usage, this leads to several blurry lines of what does and doesn't count as fair use. For example, Hughes brings up an example with the domestic video camera and how at first 'the activities of any one user of a home video recorder will have de minimis effects on the demand for any audiovisual work... Yet over time, the cumulative effect of such uses, as they became widespread, could be great.' [7] And this is exactly what we have seen unfold since the publishing of this article in 2002: videos can now become 'viral' on social media and potentially generate money, with similar videos then being flagged as violating copyright and/or fair use as a result.

Copyright and fair use are not exactly the same, but they are discussed here in a similar manner of protecting an artist's original work from further use. These arguments of permission of usage in particular, and how they are used to protect ownership leans to the argument that they are in fact ways of determining ownership in our society.

Along with copyright and fair use, it is also important to understand patent law and how it applied to inventions in AI to see if the current patent laws are suitable for working with AI-generated creations. One such article that discusses this is Schuster where the intersection of AI invention and patent law is addressed and what current gaps there are currently in the American Patent Laws [8]. Patents are critical in industry, especially for big-tech companies because 'owning a patent serves a signaling function in the entrepreneurial financing market.' [8] This means that one company can own all inventive output from a specific research lab, and thus the collective human and robot components that make up the lab. The problems arise when the patent applies to agents that consist only of AI workers, or AI-generators. The question then arises: who should the patent be assigned to if there are no humans present?

This may appear as a small issue, but this creates an ambiguity 'towards determining what party should be entitled to AI patents to maximize economic efficiency' [8]. The patent ultimately becomes attributed to 'who in the AI invention timeline has the highest probably of engaging in commerce associated with AI-produced invention¿ Besides the AI itself, those that use it to create new inventions are most likely market participants, and thus should be the ones receiving the AI patents [8].

Despite all of these suggestions, ultimately, 'the question of whether, and to whom, patents can be granted for AI inventions has yet to be addressed by the legislature or courts, 15 though several countries plan to do so in the near future' [8]. This question to me seems different since it is asking "Who should be given creative permission?" instead of "Who should be given ownership?" If one day AI-agents are able to outperform humans in patent litigation tasks, there may be a time when AI patents will be attributed to AI. But as of the present moment, most 'AI-patents' are actually patents to humans who use the AI since they are participants of the economic market. And to further support this argument of giving the AI-user the patent, other common patent practices like direct communication and 'cross-licensing relevant portfolios to each other, such that both can operate without the threat of infringement litigation' [8] can keep both parties aware of both the potential and actual outputs. This is at this point in time much more effectively done with humans, not AI-agents as AI output can still be difficult to parse through.

It appears unlike copyright and fair use, patent law is more interested in determining socio-economic potential and how a certain artifact can change society. This approach is instead more focused on giving individuals permission to be creative based on their own "potential of creativity", rather than based on the permission of those individuals who have already created before, and thus is a different metric that an individual has to produce something good for society.

II. WHO SHOULD GET CREDIT FOR AI ART?

Using this knowledge of AI-art and current ownership and creativity rights, this leads into the discussion of ownership

and creativity and ultimately who should be getting credit. In this section, I first define what the stakeholders for AI-generated art are. Since ownership and creativity are different concepts, one more focused on copyright and fair use laws and the other focused more with patent law and permission to work respectively, I then divide my arguments for which stakeholders should have rights into separate discussions below.

A. Stakeholders Involved

In order to pick someone who can be attributed credit from a group, we first need to determine this group of existing stakeholders in context of AI-generated art. In their work, Avrahami & Tamir discuss this very question of ownership of AI-generated output [9]. For potential stakeholders of ownership, they mentions six potential stakeholders for AI-generated output, listed below, and how the credit should be distributed among them [9]:

- Owner of original data.
- Collector of dataset.
- The programmer of the model.
- The user of the model.
- The AI (ML model) itself.
- No one/public domain.

Three of these stakeholders correspond with stakeholders brought up in similar literature by Epstein et al. and Agarwal [10] [11] that also discuss potential stakeholders for AI contexts: the original owner of the data, the collector, and the user of the model. The remaining three that haven't been mentioned have likely been ignored because they almost certainly cannot receive ownership credit, those being: the AI itself, the model programmer, and no one/public domain. The reasons Agrahimi & Tamir must still consider all of them as valid stakeholders is because they are proposing a machine learning model, a KNN model in particular, that will ideally be able to determine ownership based on specific metrics and input [9].

For the purposes of determining my own pool of stakeholders for AI-generated art, I have decided to include only stakeholders that are:

1) human (since lawmaking applies primarily to humans)
2) countable (there a specified number of individuals so that they can all be accounted for)

I decided to have these two conditions because non-human like animals or inanimate objects cannot possibly be expected to abide to human laws of copyright or fair use [6] [7]. Similarly, there is no possible way to keep track of a potential stakeholder if there is no way to keep them in track [6].

Thus, I have decided to use the stakeholders mentioned in [9], but only the owner of original data, collector of dataset, the programmer of the model, and the user of the model. The first of these three stakeholders are already mentioned in [10] [11], and they meet my two conditions as well. I have also included the programmer of the model as a fourth stakeholder simply because it is a human stakeholder and thus should be considered. I did however discard the AI model itself and the "no one" options since they are non-human stakeholders [9].

While many arguments can be made on whether I have picked enough stakeholders or already have too many, since I have decided to use only singular and human stakeholders, I will be determining my potential stakeholders to only focus on the following four from [9]:

- Owner of original data.
- Collector of dataset.
- The programmer of the model.
- The user of the model.

B. Shared Ownership

For the ownership argument, which primarily focuses on copyright and fair use laws, there are many arguments for which stakeholders should get the ownership rights in the context of AI. Still, it appears most existing literature is leaning in favor of giving the ownership rights to the original creator of the AI model. However, these same laws are still quite somewhat indecisive to which singular stakeholder the ownership rights should be attributed to [6]. Thus, I propose for the context of AI-generated art ownership there would be two joint stakeholders:

- Owner of original data.
- Collector of dataset.

I have decided on these two stakeholders because this aligns with how most ownership within AI is determined by preexisting copyright laws and legal cases that were written before advancements in AI. Two examples include:

- Seen in [11], where Agrawal cites how The Indian Copyright Act will give the copyrights to either the owner or the user of a certain AI-generated artifact based on how much AI-tool usage is occurring, similarly to how one uses a certain template or art-style.
- Discussed in [12] when Guadamaz argues using the case of English case of Nova Productions v Mazooma Games [2007] that users of AI-tools should not be given rights since they are simply a vessel that uses the tool.

Even thought [11] leaves room for case by case decision, both of these examples more or less tent to attribute, often at the discredit of those further down the product chain, to those who are closer to the AI-input. Essentially the processes before the AI is involved are favorably for the arguments of ownership than those who are close to the AI-output, because they happened earlier in time which is a way most existing copyright laws determine ownership. This essentially just eliminates the stakeholders more directly involved with the AI by arguing that since they are further down the process chain, they cannot have ownership rights. So now if we only include stakeholders that don't directly interact with AI, this attributes the ownership rights to not just a single stakeholder, but to two.

This naturally leads to the discussion of shared ownership. Even outside the field of artificial intelligence: the idea of a piece of art having shared ownership is not novel. There are plenty of authors, paintings, etc. that are made by a team of creators [7]. In fact, most product designs are done as team

projects in the present days, and we have corresponding laws and policies to address this [12]. However, these same laws are also the same ones that limit creators to obtain ownership in limited ways, and especially in the context of AI where there is still much debate and discussion about if there are ways to expand or create a new set of ownership decision metrics. And while the field of AI not fully certain, it continues to expand and the emerging stakeholder that should be assigned ownership credit appears to be the original owner of the work.

This argument is based on a common consensus that appears in the current literature and copyright laws that the common agreed upon consensus for ownership credit to the earliest human stakeholder in the "chain of human agents" [11]. The "chain of agents" is essentially all the possible human agents that can or could have interacted with a work from the start to the final completion of the work. Thus, even if new potential stakeholders may emerge, the ownership rights are attributed to a more constant and longstanding stakeholder. In the context of AI-generated art, this stakeholder would be the original artists or the collector who owns the art. No one involved in creating the AI model nor using it should be given ownership. More discussion on how the AI model creator and user should still be given creative rights will be discussed next.

C. Shared Creativity

As for who should be given creative rights, this will be similar to the discussion of shared ownership. Since, going off of current literature such as patent laws that can be used as a basis for creativity credit, anyone that has made a significant input in the furthering of an artifact, AI or not, can be counted as someone who is pushing society, art, and/or science further [8] Thus, creativity rights can be attributed to all four of the stakeholders involved:

- Owner of original data.
- Collector of dataset.
- The programmer of the model.
- The user of the model.

In section I.C. 'Copyright Law, Fair Use, and Patents', I brought up how creativity differs from ownership in the sense that the person doesn't necessarily have to have the credit of ownership in order to be able to use an existing artifact and expand upon it. Thus, every stakeholder that is involved in the creative process of an artifact can claim credit for whatever component they participated in. This leads us into a slightly different discussion on how creativity rights is in some ways similar and in some ways different from ownership rights.

As discussed already, ownership rights are defined in our society by copyright laws and fair use: one must ask for permission from the original owner of a work in order to use it [6], [7]. Thus this 'original owner' is the one with ownership rights. Creativity rights are slightly different in the way that they are. When it comes to approving patents, the laws in place determine if an individual is eligible for permission to use certain tools based on "creative potential" [8]. The stakeholders that would be present here are those that need the permission to use the existing tools. If allowed

permission, these stakeholders would thus be able to say they have proven potential to provide further input that would be "for the common good". In the context of AI-generated art, these stakeholders would be the AI model creator and the AI model user, since they would have permission of creative use. In my opinion, they can thus claim creativity credit since they are acknowledged both before and after they make changes to an already existing art, science research, or societal project. And as discussed with shared ownership, the concept of the creativity being shared between two stakeholders would extend here as well since both can make arguments for their creative potential. In the context of AI-generated art:

- The AI model creator could argue their model uses a new technique that hasn't been used before, thus having the potential to create better/more efficiently an AI-art piece.
- The AI model user could argue that they ran the model using a specific set of parameters they themselves found through trial and error or by running on their local machine.

With these two stakeholders now having creative credit, this brings the discussion back to the other two stake stakeholders: the owner and the collector, both of whom already have ownership credit. Should they be given creative credit? One hand, it seems absurd: credit isn't given to the inventor of the paintbrush for every painting that have ever been commissioned. Why should then the AI model programmer have to credit the original artist and the art collector from whom they obtained the art? Ultimately, it depends when in the human timeline the work originates [8]. One could argue the reason the inventor of the paintbrush cannot be credited was because the paintbrush was invented too long ago, a time before there was patent laws, and thus there is no way to give creative credit to that individual.

Thus using this logic, and given the fact that patent law has existed before the invention of AI, creativity credit in this case can also be given to both the owner and the collector of the original works. Similarly in the context of AI-generated art, this means we can give credit two the owner and collector as well. Thus, while only two can get ownership rights, all four stakeholders should then receive creative credit for an AI-generated art piece.

D. Art Theft Using AI Techniques

The last thing I want to discuss is how AI-Art theft now possible using simple diffusion models mentioned in [2] comes into play with AI ownership and creativity. In a normal non-AI theft scenario, the original artist whose work is being stolen is the one with ownership credit. The problem here is their name is being unwillingly removed from their original work [2]. Similarly, an artists creativity credit is not safe either, since some diffusion models have the ability to copy a specific artist's "style" and then create new work in that same style without the original owners consent [5]. This is also problematic, since the artists creative rights are also infringed upon in this scenario. This could mean a rough outcome for a specific artist's revenue and/or public image. And while this

new era of AI-theft and work mismanagement is still currently being studied, it is quite clear that most current copyright, fair use, and patent laws can still in theory hold. It is still less clear how these function in reality, and ultimately more work will need to be done to determine what is and isn't possible in this regard. See section V. for more discussion on what type of work can be done to further explore these questions.

III. AI-Generated Art User Survey

To confirm for myself that my arguments for my selected stakeholders for ownership and creativity hold, I decided to conduct a small sample survey to determine of my inclinations based on existing literature is reasonable. To conduct this survey, I recruited a group of twenty individuals whom I know from my personal life. Of these twenty individuals, I recruited ten from the age of 40+ and ten from 39 and under. I decided to chose this age divide because individuals on differing sides of the Gen X-Millenial divide may have had a different upbringing when it comes to access to technology and as a result utililize technology in differing ways in their daily lives [13]. I thought observing how these two groups would answer my problem would provide not only insight into how my survey could be interpreted different by different populations, but also how different my answers can be depending on which individuals I ask.

As for the survey itself, I focused on my four main stakeholders I determined from section II.A.:

- Owner of original data.
- Collector of dataset.
- The programmer of the model.
- The user of the model.

For each of my twenty participants, ten from each group, I met with each participant individually either in-person or over telephone. I described how a AI-generated painting called 'Edmond de Belamy' was auctioned for over 6-figures [10] [11]. I then explained how in this case, the person who made the money was the art collector who had the AI-generated images. After discussing this example, I then proceeded to ask the following two questions to the participant:

- Who do you think should get ownership credit for AI-generated art?
- Who do you think should get creativity credit for AI-generated art?

The participant could then choose from my list of four stakeholders (with the option to select more than one) for each question. Once this was done, I then debriefed each participant and thanked them for participating, and allowed them to ask any questions about my project.

I then gathered all the participant data, and presented the total results in two separate tables by age groups. Each is split into the questions of ownership and creativity. For each of these, the tables have four running totals for each stakeholder for all participants in the respective age group. This means that the minimum value for each stakeholder is 0 (if none of the participants in that age group selected it) and the maximum

value is 10 (if every single participant in that age group selected it). The tables are presented below:

Type of Credit	Creator(s)	Collector	AI-programmer	AI-user
Ownership	10	9	2	4
Creativity	8	5	5	3

Participants Age 40 & Older

Type of Credit	Creator(s)	Collector	AI-programmer	AI-user
Ownership	10	8	0	3
Creativity	10	8	9	9

Participants Age 39 & Younger

If going by my arguments, all the results should be 10s except the Ownership values for AI-programmer and AI-user, which I am arguing should not be given ownership credit and thus should both be 0.

These survey result tables tell us that my general intuition is correct: the totals are generally less for the AI-programmer and AI-user for the ownership row. This is consistent across both age groups. I also think the more varied numbers of the Age 40+ group is representative of the fact that this age is more likely less familiar with technology, and thus AI tools, and therefore less certain when picking the stakeholders. I also noticed I often had to rephrase the two questions for more of the participants in the age 40+ group, so this could have potentially also impacted the result in this way. Regardless of the variance, the overall trends from the survey results do in fact support my arguments. However, I do recognize that this survey is relatively simple, and draws from a small sample size. Performing more statistically involved studies would need to be conducted to further solidify my argument.

IV. Counterarguments of Shared Ownership & Creativity

Now, as for weakness in my argument, the greatest counterargument that is present in current literature is one similar to [12], where Dee argues that using current copyright laws is not feasible because under current copyright laws a lot of the AI-generated art will be allotted to the public domain. This will occur because neither the property protection nor individual rights of other potential stakeholders that would normally be in a non-AI settings are present [14]. While this argument might in fact hold true for other applications, I have determined under my own circumstances that the public domain should not be seen as a stakeholder in AI-generated art. I have also argued how shared ownership is still possible without assigning a work to public domain.

Another common problem with shared ownership is that there is no possible way to rewrite existing copyright laws, and that new AI-laws must be written from scratch, as suggested by works such as White Matulionyte [15] or Škiljić [16]. While these new AI-laws could potentially contradict the way I have determined my stakeholders, since these laws are still theoretical and not in existence yet, there is no way to incorporate them into my method of determination of

stakeholders. Still, I think this is an important area to revisit in the future depending on how AI-lawmaking will take shape.

V. FUTURE WORK

This leads us into the uncertain yet rapidly growing future of AI, where discoveries are occurring quite regularly. For example in their work, Isa et al. look into the neural networks in machine learning models that are able to predict embryo development and preemptively determine possible risk [17]. This is done with a system of convolutional neural networks (or CNNs) that are able to not only use the training data to train themselves, but also they are able to go in and change parts of the model architecture by themselves in order to get an optimal result.

This idea of a machine learning model not only being able to train on data, but also be able to fix itself is a fascinating approach, and models being able to perform more 'self-aware' tasks such as these might be setting up AI to be more autonomous. With autonomous AI, my original decision of only considering human stakeholders can potentially be revisited.

It will also be interesting to how other socio-economic developments such as globalization and privatization will impact individual rights and politics, and thus how they will affect technological, AI research, and the law. While at the present moment my argument for ownership and creativity may hold, it may be possible that I am not even considering a major stakeholder in my argument that in the future will be unanimously attributed credit for AI-generated art.

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