Carnegie Mellon University

Taking the "Art" Out of Artificial

A Study of Artists' Perspectives on AI Art Algorithms

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Abstract

Art has always been something that we have considered to be innately human. It allows us to express our creativity and our imagination. However, with advances in technology, like generative algorithms, neural networks, and other artificial intelligence algorithms, the way people look at art is beginning to change. Although research has been done in the past regarding how consumers have difficulty differentiating between human created and computer generated artworks, the goal of this research paper is to present the opinions of those most directly affected by the introduction of this software into the world of art: artists. By surveying and interviewing art professionals and students around the CMU campus, I was able to analyze their opinions on the expansion of generative algorithms and AI software into the art industry, determine whether or not they viewed it as a benefit or a threat, and see from their eyes, what the future of the art might look like. Although opinions were divided, many were unperturbed by the introduction of this software into art, and some even saw it as a benefit. All looked forward to the future where AI algorithms could be leveraged as another tool artist could use to express their opinions and the human condition in the future.

Introduction

Creativity: the ability to generate ideas or consider possibilities that provide us with new perspectives of the world around us (Franken). It is a huge buzzword in our daily lives. From students to scientists, nearly everyone in our current society has been taught to value creativity. Creativity is what lets find solutions to complex problems, to communicate our ideas to others, to discover fields and worlds we never knew existed (Franken). Creativity is a powerful tool and ability. Some may even say that it is what makes us human.

But our definition of humanity has been shaken with the advent of artificial intelligence (AI). AI is able to do the things we humans are unable to do in the blink of an eye. Calculations approaching infinity, recognizing a face out of millions, and even translating between hundreds of different languages are all trivial with the use of AI. It begs the question: are humans really that special compared to AI?

Here is where creativity comes into play. AI is fundamentally just a program. It cannot synthesize by itself. It cannot be creative like we can. Even if AI can do calculations involving huge numbers, it cannot create something like art, which is reliant on creativity. Even if you create an AI that can recognize art styles or materials used to create an art piece, you could never program an AI that could make art that is more meaningful, more creative than a human, right?

This common line of thinking can be a little misleading. It relies on the idea that art is appreciated because of its creativity, because of the intention of artists. But this idea is not necessarily true. An artist's creativity or intentionality is not the only factor in judging the value of art -- another important factor is the viewer's perception (Kolak). When one views a piece of art, the meaning they derive from it is not based solely on how the piece looks or how the artists

may have wanted the viewer to perceive the artwork -- the meaning is heavily based on the viewer's own experiences (Kolak). Thus, oftentimes, a person's perception of the intentionality or value of a visual art piece is actually their projections of their experiences and emotions onto the art piece.

If this is the case, does having a human touch in art matter? If viewers can find meaning in art pieces based off of their own perspectives, how does computer generated or AI art then compare to man-made art? Is there such a difference in the value of man-made and AI art?

While these questions are provoking enough to a consumer of art, perhaps they are more relevant to those who are directly impacted by AI in the art industry -- current artists. Yes, these questions raise important philosophical questions about the nature of humanity, but for artists, these questions directly impact their livelihood. It is thus imperative to ask artists their opinions on AI in the art industry to draw conclusions about how technology impacts traditionally human crafts, how it changes the way these crafts are viewed by professionals, and how the art industry might change as a result of these technologies in the near and distant future.

Literature Review

Perhaps the easiest way to analyze the role of AI art in the industry is to analyze it through the perspectives of the two main stakeholders in the art industry: artists and consumers (buyers of art). For artists who use AI, the introduction of AI into the art industry challenges what they have traditionally considered to be art. Many argue that computers and AI are just tools and mediums of art (Humphries, Kugel). They allow artists to modularize the art-making process, letting them observe the pros and cons of each step of the process (Kugel, Elgammal et. al.). Thus, some believe that those who use computers or AI to create art are the true artists -- they are just using technology to express their creativity in a different way (Neutres). However, others believe that those who use AI are not the artists. Many generative algorithms used to create art "artificially" require little to no input from humans. For this reason, when using AI to generate art, some artists choose to give credit to the AI program itself (Elgammal). However, what does it really mean to give credit to AI? If one sells an art piece made by AI, who receives the money? To determine the owner(s) of AI-generated art, one must consider the owners of the inputs/seeds fed to the software, the developer of the code of the learning algorithm, and the developer of the code of the trained algorithm (Fjeld & Kortz). Judging the true ownership of AI art is thus incredibly difficult. In nearly all aspects, although AI art is considered to be an innovative tool by artists who use them, it often adds a confusing facet to their definitions of art and ownership.

In the eyes of the consumers of art, the introduction of AI art is equally as complicated, especially in terms of the valuation of art. Generally, consumers seem to have an inherent bias against AI art -- art enthusiasts tend to devalue art that is a product of AI or computer software

(Chamberlain et. al.). This devaluation has its roots in the idea of "intentionality" -- people tend to prefer work that has mind or motivation behind it, since it gives it meaning (Chamberlain et. al). However, in experiments where humans are asked to discern between AI-generated and human-generated artwork, humans can hardly discern the difference -- in one case, 75% of people believed AI generated art was art created by a human (Elgammal). In many cases, people find AI art to be more intentional and more novel than human art (Elgammal et. al).

Interestingly, no conversation has been held regarding AI art with artists who do not use AI or computer generated graphics. It seems normal, nearly trivial, for artists who use AI to consider it as an aid rather than a threat, and for the average art consumer, the creator of a modern art piece is often not of great concern. But what about those who create art without using or depending on the power of AI? Do they feel that AI is simply a mode of art creation or is it a threat to their livelihood? Is AI art intentional and novel or does it seem like a regurgitation of others art styles to them? My research seeks to answer these questions by presenting AI-generated art pieces to art professionals, specifically art/design professors and students at Carnegie Mellon University, as well as curators of art galleries throughout Pittsburgh. By mimicking Elgammal et. al.'s experimental style, I hope to find conclusive evidence as to whether or not AI art is discernible by artists who do not use AI. I also hope to find out more about these artists' opinions about AI art and how it is affecting and will affect the art industry.

Methodology

My methodology partially drew from Elgammal et. al.'s methodology in their research paper regarding art consumers and AI art. Collecting art pieces that were created by the AICAN, NoArtist, and other generative AI algorithms, as well as human artists like Mark Rothko, Kathryn Mapes Turner, Cayce Zavaglia and Jane Troyer, I developed a digital survey that was sent to art and design professors at Carnegie Mellon University. Specifically, I contacted Professor Kim Beck, Professor Andrew Ellis Johnson, Professor Clayton Merrell, Professor Devan Shimoyama, Professor Susanne Slavick from the Painting, Drawing, Print Media, and Photography staff at the School of Art at CMU. I also contacted Professor Johannes DeYoung, Professor Golan Levin, and Professor Everest Pipkin from Electronic and Time-Based Media staff at the School of Art at CMU. In an attempt to broaden my scope from the academic side of art, I contacted the head curator from the Miller Institute for Contemporary Art and the Carnegie Museum of Art. All of these aforementioned professionals received the survey in an email, and those who responded had their responses anonymized. After seeing a lack of response from these professionals, however, I decided to contact students who were part of the BXA program (since their emails were readily available) and sent them the survey as well.

It is important to mention that as part of the email and survey and successive interview questions, the term artificial intelligence was used in place of generative algorithms, a type of machine learning algorithm that currently represents the cutting edge in AI technology when it comes to generating art. There is a lot of contention in the industry as to whether or not AI exists or whether or not it will ever exist, however, I decided to use AI to refer to these generative

algorithms to remove any confusion that survey takers and interviewees might have had if they lacked the proper background in computer science.

The survey that was sent out had a random assortment of 9 art pieces, with 5 AI art pieces and 4 human-created art pieces. For each image, the following question was asked: Who do you believe made this art piece? There were two responses to choose from for each question: Artificial Intelligence Algorithm, Human Artist.

At the end of the survey, participants were asked: Are you available to hold a 15-30 minute conversation regarding your thoughts on AI in the art industry?

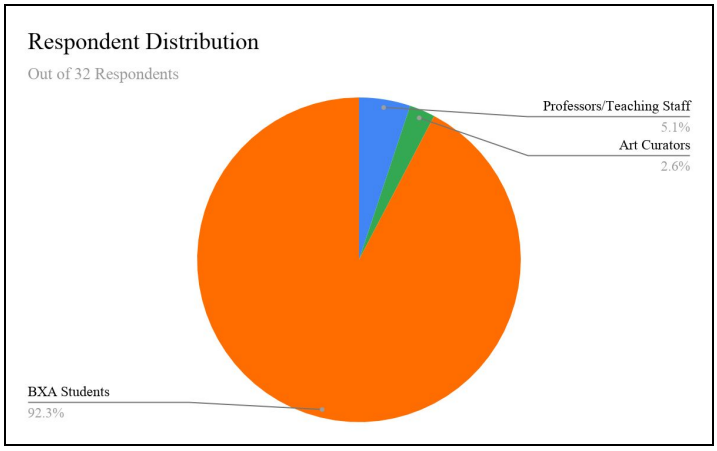
If the surveyor answers yes, I contacted the participant to set up an interview. When interviewing the participants, I first gained consent to use their quotes in the paper and record our conversation. I then asked the following questions in the style of an informal interview:

1. What do you know about AI in the art industry?
2. Do you believe AI is a tool/medium or an artist?
3. Has AI impacted your perspective of the art industry?
4. Do you believe AI will impact the art industry in the future? If so, how?
5. How do you feel about AI in the art industry? Is it something to embrace or something to be wary of?

After collecting all of this data, I analyzed the survey results and compiled the notes I took from each interview to determine trends amongst the respondents and interviewees.

Survey Results

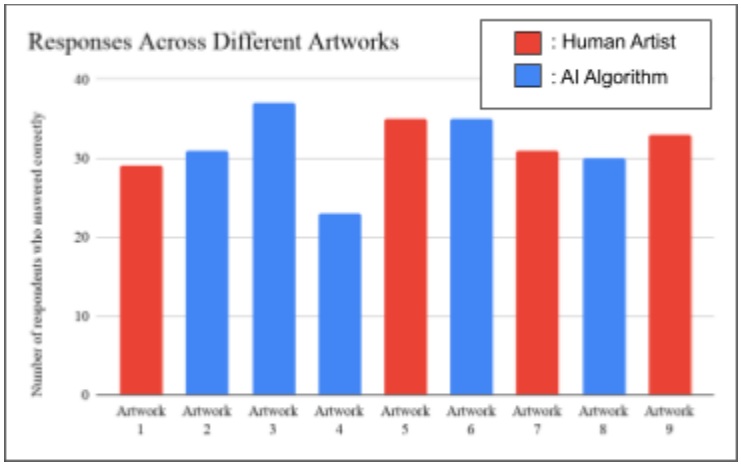
Respondents



I received a significant amount of response from the survey I sent out to art professors, art curators, and students associated with the arts program at CMU. The majority of the respondents came from the art students, specifically students who were part of the BXA program (which involves double majoring in the School of Art and another institution at CMU). Out of the 39 respondents, 36 were BXA and School of Art students (comprising 92.3% of the entire body of respondents). 2 of the 39 were art professors at CMU (making up 5.1% of the entire body of respondents), while only 1 art curator responded to the survey (which made up 2.6% of the entire body of respondents). Of those who responded, only students agreed to interviews, and in total, 6 interviews were conducted, specifically with students (about 15.4% of the respondent body was surveyed).

Identification of Artwork

A total of 9 artworks were shown on the survey, with 5 randomly chosen from artwork generated by generative computer algorithm (referred to as AI



algorithms within the survey for clarity), while the other 4 being a random selection of modern abstract art. When shown these pieces of art, the responses ranged from 0 artworks identified incorrectly to 5 artworks identified incorrectly. The average respondent incorrectly identified 1.69 pieces of art, or 18.7% of the artwork in the survey. The piece of art identified most incorrectly was Artwork 4, a piece generated by generative algorithms, with only 23 respondents (58.97% of respondents) identifying it as art created by an AI algorithm. The piece of art that was identified the most correctly was Artwork 3, another piece generated by generative algorithms, with 37 of the respondents (94.87% of respondents) identifying it as art created by an AI algorithm. On average, 82.05% of respondents identified the human-created artwork correctly, while 80.00% of respondents identified the algorithmically created artwork correctly.

The results from the survey indicate several things. For one, there does not seem to be a clear "winner" in terms of the kind of art artists and those studying art tend to identify correctly. In a majority of the cases, at least 80% of the respondents were able to attribute the pieces of artwork to the correct category of creator (human artist vs AI algorithm). This indicates that artists can make a distinction between human-developed art and art developed algorithmically. However, this does not mean that identification does not pose a challenge to artists. Artwork 4, and algorithmically generated piece, was misidentified by more than 40% of respondents. Although this is significantly less than the number of respondents who incorrectly attributed AI generated art to human-generated art in Elgammal et. al.'s study, it still indicates that even for those who are privy to the world of art, the line between human-created art and algorithmically created artwork may seem blurry.

Interview Analysis

Background of Participants

Of the people interviewed, all of them were part of the BXA program. Most had been involved with art from their childhood and had realized their passion for it in high school, with some involved with art in traditional medium (sketching, painting, sculpting, etc), and others involved in more modern medium (digital sketching, coding art, etc). Two of the interviewees were studying majors that were more distant from the traditional visual art definition -- one was studying music while the other was studying architecture. However, each person I conversed with had had their own experience with creating art and studying variations of art.

Metrics of Differentiation

When asked about the way they differentiated between human created and algorithmically generated art pieces, many of the interviewees gave similar responses. Four of the six interviewees mentioned the specific idea of strokes and variation in pressure being markers of human creation.

> "If it [the artist] was a human...there would be some pressure diversity."
>
> "I was looking for brushstrokes as a sign of humanity."
>
> "I remember there was one painting that looked kind of like paint strokes and stuff so I was like that seems a bit more hand-made."
>
> "I was looking at an artist's single strokes...seeing impasto...and seeing the brush marks...I could see the variation in pressure of the brush or the chalk whereas in the AI ones, there was this perfect blur…"

As artists, the interviewees were looking at the artwork I presented them as if they were making it themselves. Studying the process behind creating such an artwork allowed them to have insight into whether or not a human painter could generate the artworks they were seeing. Many students I interviewed mentioned how an art piece is not the product of a single action -- layers and layers of work and texture and ideas go into creating the final piece, and this building, this process, this deliberate thought was missing to them in the artificially generated pieces. As a result, the artificially generated pieces lacked texture and were "too smooth."Interestingly, this idea of smoothness or blurriness was another benchmark that others I interviewed cited as a distinguishing factor.

> "Generally the artwork you see done by AI tends to be...not as well-defined, so like some of the images that were a little more blurry I felt like those were the ones that were created by AI."

Some students even mentioned AI art looking like filters applied to normal art pieces.

> "Some of them looked like they were filters on top of original pictures which I thought was somewhat of an indicator [of being AI art]."

Once again, thinking in terms of the process, the interviewees could not see how a human artists could have created the artificially generated pieces because of the lack of texture. The artificially generated pieces had a smoothness that seemed unnatural to them simply because they know that an art piece typically contains some indication of texture or imperfections from experience.

However, the opinions of other interviewees were a little different.

> "Seeing things that I had seen in the past that had been done but in a specific way, like a filter...like someone particularly applying like a filter from an app...I would be like yes, this is human generated because I have seen this so much."

Although this may seem like a surprising conflict in opinion, the backgrounds of those I interviewed may help explain this dissonance in thought. This interviewee was actually a specialist in code art, a type of digital art that, although is not directly related to generative algorithms, relies on technology to create art. In this kind of art, the use of filters is common, and as a result, it is not unusual to see why this interviewee's opinion would be this way. On the other hand, the other students I interviewed were more involved in art that used traditional media, like charcoal or paint, and for this reason, the presence of a filter-like painting would be more of an oddity to them.

Generally, it seems as though many students and professionals studying art can easily differentiate between human generated and artificially generated art, simply because they have experience creating art. These artists or studying artists have the ability to put themselves into the shoes of other artists and imagine what the creative process behind a piece of art might look like, and for this reason, upon witnessing art produced by generative algorithms, they immediately notice that it is not something humans would be able to make with traditional media. However, at the same time, this distinguishing ability is dependent on the artist's background -- to those more well versed in the technological realm, such creations may be possible using non-generative technology.

Perspectives on Algorithms that Create Art: Tool or Artist?

When presented the question as to whether or not algorithms that generate art are a tool or an artist, the answers from the interviewees were a resounding yes.

> "[It's] definitely a tool. I don't think there is ever going to be replacing the actual artist behind the scenes."

Some students saw computer algorithms as a tool because of the idea of a control. To them, no matter what level of abstraction these algorithms applied to create new art pieces, the original creator is always the human (artist or programmer).

> "It [AI] feels more like a tool that is under control…after calculations, art is generated by the AI and people accept it and they think that is something that the computer helped me to accomplish but that the designer is still the human being...like they are the experimenter who have come up with it."

> "I think it's a tool...it still can't work on its own, all the input and all its architecture is designed by humans."

Interestingly enough, to many, algorithms were similar to traditional tools in the way that they are directly leveraged by artists to create something. Many likened the use of such algorithms to the use of traditional tools like paintbrushes:

> "I think it [AI] is a tool/medium because a person is actually behind everything creating it. It's kind of like a paintbrush."

> "I mean, then why isn't a paintbrush an artist? It affects the output but it's still used by artists."

These opinions are heavily influenced by the purpose that fuels many of these interviewees. When interviewed about what they considered to be art, many cited that it served as a way for the artist to communicate his or her ideas to the outside world. In this sense, the tools used to do so may not matter, even if they may be generative algorithms that create these images on their own. In the eyes of artists, since the seeds (existing art) fed to the algorithm are created by human artists, and since the artist is the one who decides which piece of art generated serves their purpose, the art produced by generative algorithms are actual the vision of the artists behind the algorithm. Thus, the person controlling the algorithm is the artist, not the algorithm itself.

AI and Art in the Future

Many of the students interviewed indicated that because algorithms could be used as a supplement to traditional art tools, they could slowly be adapted into mainstream art. Many expressed some form of excitement for the innovations it may introduce:

> "I think it will impact the art industry...it will be a way of imagining concepts in a new way. It's like a new medium that's exciting."

Some students believed the digitalization of the world may directly affect how AI impacts the art industry. The increased digitization of our society could become an important factor in the acceptance of AI technology by artists in the industry.

> "Since right now, a lot of the art is shifting to a digital direction, I do think there are a lot less artists that are willing to focus on traditional media. I think AI and artistry will intersect as technology becomes more advanced."

> "I think that in the future, we're going to be seeing a lot more of this artwork happening...a lot more artwork representing AI, and maybe we should be doing these because artwork is also a critique of what is this technology and how is it impacting us…"

Many of the students interviewed saw the use of algorithms as an interesting new field of art that would be heavily explored in the future because of the increased use of technology, and many looked forward to what it would bring. This makes sense if one considers the background in which these students are growing up. As part of the information age, these students have experienced a rapid change in what could be defined as revolutionary technology throughout their entire lives. Seeing their societies and communities becoming more digitized and seeing how these technologies are helping improve aspects of everyday life pushes them to hold positive opinions and high expectations of new technology. Combining this with their view of generative algorithms as tools, it is not hard to understand how students see these algorithms becoming part of the art world in the future and how they foresee it facilitating the creation of new art.

Embracing or Rejecting AI Art

A majority of the students I spoke to were not only predicting that AI art would be more prevalent in the art industry in the future, but felt that it was something to be embraced by artists, whether it be in the visual art industry, architecture, or other realms of artistry.

> "I think it's something to be embraced because I do think it opens up a lot of possibilities and I personally do think that makes us understand art a lot better in the process of writing a program about it."

To artists, these algorithms highlight steps of the artistic process. Using such algorithms, therefore, may help them see where parts of the artistic process can be changed or improved. Additionally, these algorithms may help them get a better grasp of how they view or define art. Every artist has his or her own style, and writing or using a program to generate art in one's own unique style may help an artist identify what makes they art unique from others and may help them create a more personal brand or mark on the world of art.

Others had more practical views of the use of such algorithms.

> "I think it's definitely something to embrace...because I think AI helps people to get rid of certain assumptions...assumptions is something people all want to avoid in the design industry. I think AI helps collect data or even process the data that helps in avoiding the assumptions."

To some, the creation of art or designs can be filled with a lot of risk, and much of the process is based off of the artist's own intuition. As a result, there are circumstances where the artist or designer makes an error in the process, causing them to produce work that is unsatisfactory. The use of a generative algorithm or other AI technologies could help artists prevent these issues. Creating and using these program allows artists to create a well-defined process and allows them to avoid unforeseeable mistakes that could be made in their art or designs in the future. Although in the eyes of artists, such mistakes are what makes their art more

personal, for other artists, specifically designers or architects, such mistakes could risk their entire plan or project, and in this way, generative algorithms would be a useful aide.

As a whole, it seemed as though the use of generative algorithms is something artists see as a new outlet for expression and as a tool to think about art and the design process in a meta way.

Words of Caution

Although most attitudes towards generative algorithms were positive, there were some interviewees who felt that using such algorithms without thinking about the process could create problems for artists in the future. As a student focused on traditional media, S felt that fullying embracing AI art could be problematic:

> "Getting into a mindset where you don't use the integration of many different skills or tools that are offered to you is just as dangerous as embracing something like AI fully."

However, at the same time, although he expressed that he did not necessarily like the style of algorithmically generated art, S felt that generative algorithms could be something that others integrate into their art styles, as long as it is done the right way.

> " I think both sides of the scale are unhealthy or are non conducive to the art world. There is certainly a place for just AI and certainly a place for just strict classical art, but I think the best way is to find a place between those two and having a respect for both."

Even one of the interviewees, as a user of generative algorithms in the music field, felt that it is important for current artists to find this middle ground:

"[Artists should] look for ways to organically integrate it into the workflow. It's just another tool in the arsenal, it's not the silver bullet to create something new."

The discovery of this middle ground seems important to future artists. It allows artists to use the benefits of AI, like a meta-analysis of their individual processes, while also letting them leave a personal signature on the art produced. In this way, the creative process can become more efficient, but not lose the charm of hand-made craft.

Discussion

From the survey and interview results, we can see that visually, artists or those entering the art industry are relatively adept at identifying differences between art created algorithmically and art created through traditional mediums, like paint or charcoal. They often cite overabundance of uniformity as their distinguishing factor. However, despite the clunkiness of such algorithms, these artists can still see a use for such algorithms in the art industry in the future. Many cited using it as a step in the artistic process, similar to adding a layer of paint on a canvas. This speaks a lot to how these artists viewed art in general -- to them, having an entirely created piece doesn't mean that that piece in and of itself is art. Many stated during the interview that art was created for the purpose of the artist rather than for an audience, so these algorithms, whose sole purpose is to create a piece for the audience, cannot be considered as their own artists. So whether it be in the modern day on in the future, to these artists, generative algorithms and AI will continue to be a tool to harness rather than a competitor to beat, and many look forward to the new modes of communication that such technology can open up.

Interestingly enough, there was a lot of variety in how the term “AI-generated art” was interpreted. The use of this phrase was initially intended to allow those who were not familiar with terminology like “generative algorithms” to understand the questions asked in the survey and interview. I anticipated the interviewees to understand that images were fed into such algorithms and that through machine learning and understanding elements of the “good” seeded images, the algorithms would generate art. However, the interpretations of AI-generated art differed from person to person. Some treated such algorithms as a process through which art would be randomly generated by machines and hand edited by human artists, or algorithms by which several existing art pieces would be combined into one piece. One interviewee, who was an artist familiar with code art, a specific digitized part of the field of art, stated that she had identified some pieces as human-generated art when they were algorithmically generated because it looked like someone had applied a cheap filter to the art. From this, we can see that these differing definitions of algorithmically generated art, or AI-generated art, are actually dependent on what one believes traditional or human-created art is. While I intended human-created art to refer to art created using traditional media like paint or charcoal, the artists I interviewed viewed art as a much more diverse field that I initially presumed. This perhaps hints at the fact that perhaps questions should be asked as to what artists consider to be the line between algorithmically created art and human-created art, or perhaps, if there even is a line at all.

Limitations

Many of the conclusions made as a result of this study come with caveats. For one, it is important to understand that the population surveyed and interviewed was extremely limited. For one, the scope of people contacted for this study was restricted to Carnegie Mellon University. As a university famous for its integration of technology into nearly every field and for its forward thinking, contacting only members of this community may have resulted in inherent bias. Additionally, many of the professionals I contacted did not respond, meaning that a majority of my conclusions were drawn from a population of learning and developing artists, whose opinions may not represent current artists in the industry. Additionally, some of the wording of my survey/interview questions may have caused skewed responses. For one, my use of "AI algorithms" in the survey instead of "generative algorithms," while initially intended to prevent confusion, may have created more confusion for those who believe that AI does not or cannot exist (as this topic in and of itself is heavily debated within the technological community). However, despite these limitations, I believe that the conclusions drawn from my study do provide a good starting point for further research.

Conclusion

Through this research, I was able to gain perspective on artists' opinions regarding the use of generative algorithms and AI in the art industry, both currently and in the future. Most artists seemed to be able to clearly tell the difference between human-generated and artificially generated art, unlike the consumers from Elgammal et. al.'s study. Many of them also view the use of such algorithms as a tool and a beneficial step in the creative process rather than a threat. Perhaps this shows us that art as a field is modernizing quickly and that it is truly a reflection of the human condition -- as we grow to accept the integration of technology in our life, so do artists in their pieces. However, this study only brushes the surface of this investigation. With a greater population to survey and interview, these conclusions may further develop and evolve. Additionally, studying where artists feel the use of such algorithms is appropriate or determining where the use of such technology becomes inappropriate for an artist can help us determine how artists of our age define art and what makes our era of art different from other periods of art.

Annotated Bibliography

Chamberlain R, Mullin C, Scheerlinck B, Wagemans J. Putting the art in artificial: Aesthetic responses to computer-generated art. *Psychology of Aesthetics, Creativity, and the Arts*. 2018;12(2):177-192. doi:10.1037/aca0000136.supp (Supplemental).

This article talks about how people respond to art pieces based upon the creator of said art. The research concluded that people tend to rate human-made art higher than art made by AI or computers. However, without prior knowledge of who or what created the art pieces, the subjects seemed to rate human-made art and "artificially made" art at a similar valuation, sometimes rating "artificially made" art higher. Showing subjects the process behind "artificially making" art seemed to improve their opinions of those art pieces.

Elgammal, A. (2019). AI Is Blurring the Definition of Artist. *American Scientist*. doi: 10.1511/2019.107.1.18

This article discusses how generative AI algorithms are being used to create AI art, from the perspective of a user of AI in the art industry. AI algorithms for art creation take in many seeds and go through many rounds of training to develop single art pieces, but these art pieces are optimized based upon novelty and uniqueness. The author argues that AI art should not be attributed to a single person -- credit for the creation of an AI art piece should be give to the AI algorithm itself.

Elgammal, A., Liu, B., Elhoseiny, M., & Mazzone, M. (2017). CAN: Creative Adversarial Networks, Generating. *Art" by Learning About Styles and Deviating from Style and Deviating from Style Norms" In arXiv preprint*.

This research paper analyzed the success of a CAN art generating network based upon feedback from art consumers. The first part of the paper describes how one can build and use a CAN algorithm, while the second describes the reactions of consumers when presented with AI art. The study showed that consumers actually prefer the CAN generated art to human-made art and believed it had more intentionality and purpose than many human-made art pieces.

Fjeld, J., & Kortz, M. (2017, November 21). A Legal Anatomy of AI-generated Art: Part I. Retrieved October 17, 2019, from https://jolt.law.harvard.edu/digest/a-legal-anatomy-of-ai-generated-art-part-i.

This paper describes the legal breakdown of the ownership of AI art. Legally, there have not been many chances to apply concepts of ownership to AI art (not many conflicts have occurred), but the ownership of AI art is dependent upon the algorithm used to create it. Ownership can be split into many parts, like the owners of the images that the algorithm is seeded with, or the creators of various parts of the algorithm. All of these aspects need to be considered when determining the owner(s) of AI art and profit divisions.

Franken, Robert E. Human Motivation. Pacific Grove, Calif: Brooks/Cole Pub. Co, 1994. Print.

This textbook is about human psychology, specifically what motivates people in decision making, socialization, and other human activities. Within this book, Franken describes what creativity is and how it is used in human society, which is a useful definition that I employ in my introduction.

Humphries, H. (2003). A Philosophical Inquiry into the Nature of Computer Art. *The Journal of Aesthetic Education 37*(1), 13-31. doi:10.1353/jae.2003.0004.

This article attempts to reconcile the changing definition of art as computer art and AI enter the art industry. The article splits the definition of art up into several subcategories, like tools or mediums used, and shows how computer art and AI art both fit into and differ from those subcategories. Through this analysis, Humphries concludes that one should think about the process of art creation rather than the final product.

Kolak, Daniel. "Art and Intentionality." *The Journal of Aesthetics and Art Criticism*, vol. 48, no. 2, 1990, pp. 158–162. *JSTOR*, www.jstor.org/stable/430907.

In this article, Daniel Kolak discusses a counterargument to his theory on the nature of art presented by another writer in the same journal, Jerrold Levinson. Kolak argues that pieces of art can be considered art without the artist ever having intended it to be interpreted that way. He also argues that the meaning of art is often closely related to the emotions evoked in the viewers of art rather than the intention the art piece was created with.

Kugel, P. (1981). Artificial Intelligence and Visual Art. *Leonardo 14*(2), 137-139. https://www.muse.jhu.edu/article/599831.

This article describes how AI is involved with art. For one, the article lists reasons why artists should use AI in the art-making process, specifically citing reasons like the ability to modularize the art-creation process. The article then goes on to describe how computer algorithms are developed to learn how to discern between good and bad outputs and concludes by answering whether or not creating AI for the purposes of computer art is feasible.