Exploring the Impact of Machine Learning on the Art Market Implications for Artists, Collectors, and the Future of Art

Justin Newman
Department of Computer Science
James Madison University
Harrisonburg, Virginia
justin.newman@metalinguist.com

ABSTRACT

This analysis has the focus of acknowledging the perspectives of Artists, Collectors, and the General public as machine learning makes an impression on the Arts as shown in figure 1.
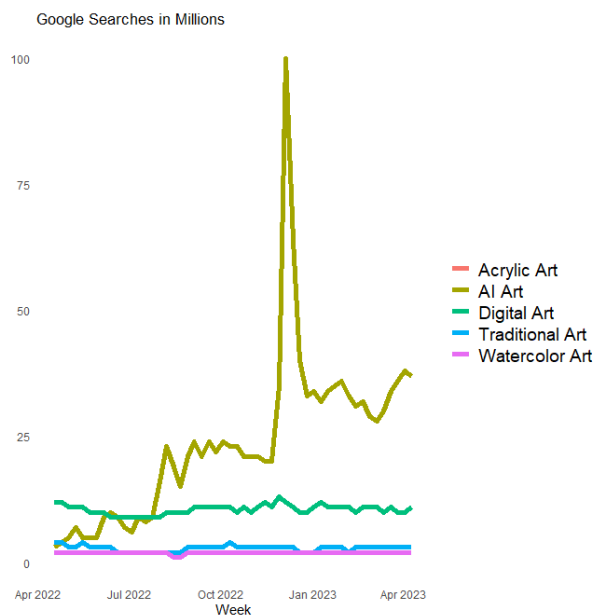
Figure 1: **Google searches for art terms in Millions.**

I will explore a wide variety of advancements and applications such as Midjourney, DALLE2, and Stable Diffusion. I also empathize with stakeholders such as art galleries, art collectors, investors and auction houses. All in all this paper provides a comprehensive understanding of the role of machine learning in the art market and its potential to shape the future of artistic expression.

KEYWORDS

AI, Midjourney, Machine learning, Stable Diffusion

Introduction

This paper will explore the implications of artificial intelligence on the art market, providing an in-depth analysis of the pros and cons presented by the integration of machine learning in art creation. The paper will discuss the ethical, legal, and social aspects of AI-generated art and its impact on artists, collectors, galleries, museums, and the art community. Technology has had a profound impact on the world of art, much earlier than most people would expect. Some of the earliest examples of generative art were not created by artists but rather by mathematicians. In the later nineteen hundreds computer scientists and mathematicians began to push the limits of computation by computing visualizations of what they called "Mathematical Monsters" also known as fractals. Visualizations of geometry such as the Mandelbrot set were terrifyingly fascinating and some programmers wanted to see how high the rocket would fly. In the 1960's Harold Cohen created a program called AARON. His program was one of the first examples of generative art as it was programmed to create drawings and paintings.

Later on in the 1990's MIT rolled out a software product called Design by Numbers (DBN) which was a text editor allowing users to create polygons and lines with code. Since then many open source developers have created similar graphic libraries using newer programming languages such as Java and Python. Recently, several generative art AI's began combining the functionalities obtained through these graphic libraries and machine learning techniques trained on massive data sets of existing art. By 2015 machine learning had its foot in the door of the art industry, Google had released their DeepDream project and for the first time people really saw the potential machine learning had to offer in the world of art.

A few years after its release; deepdream creations found their way into the media, for example the popular band Foster the People decided to use DeepDream to enhance their music video for the hit song "Doing it for the money".

With the new technology gaining attention in the media and open source machine learning platforms like TensorFlow being released to the public; many developers wanted their own piece of the pie as shown in figure two.
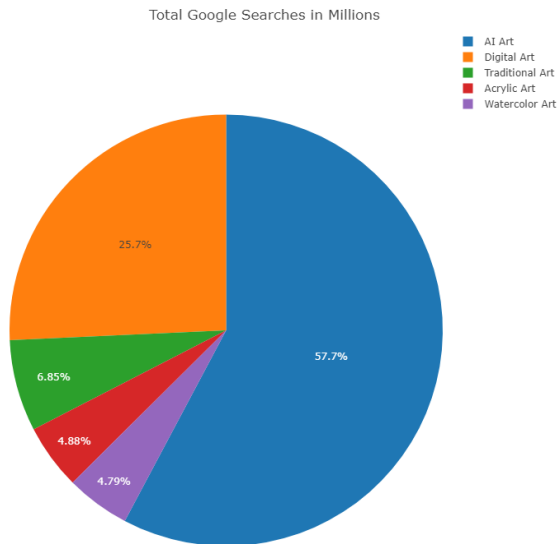

Figure 2: **Google searches in Millions Pie Chart**

AI Art techniques and Applications.

In recent months, humanity has made several significant breakthroughs and advancements in the field of generative art. With deep learning now at the fingertips of all developers thanks to TensorFlow; new generative models are taking social media by storm as the general public seems to be incredibly interested in what machine learning can now do to improve their productivity rate. Measuring the levels of success of AI-generated art is rather difficult since the excellence of a piece of art is entirely subjective. Recognizing good art is a bit like recognizing elegant code, it's very hard to define but you know it when you see it. Likewise, the level of elegance in the art made possible by deep learning, GANs, and style transfer, is seen as a major breakthrough due to the increased attention on social media.

Machine learning and its impact on the art industry has recently seen a lot of controversies. On one hand, the new technology allows users to accelerate their productivity. For example, this is great for game developers who want to add artistic assets to their games. On the other hand, this is extremely detrimental to the artists since they will no longer need to be contacted. Some artists acknowledge generative

art tools as a method of improving and assisting the artist in their creative process while others reject the idea altogether and have even gone as far as to sue the developers of generative art tools.

In 2014 Ian Goodfellow and his team created a class of machine learning frameworks called Generative Adversarial Networks (GANs). These frameworks consist of two neural networks, the generator and the discriminator, which compete against each other. The generator produces randomly generated data and the discriminator is trained to distinguish the generator's data from real data. Through this method, both networks get better and better. The generator learns to produce more realistic randomly generated data while the discriminator is trained to better detect the generator's data. GANs are really interesting because they make it possible to create new data instances which resemble the training data. This is what has made it possible to create hyper realistic human faces which don't belong to any real human. This technology is impacting the world of criminal justice by making it easier for eyewitnesses to curate more accurate simulations of suspects.

Generative Adversarial Networks are a game-changer for the art industry. They're opening up new possibilities for creativity and innovation, and that's something that we should all be excited about. By using these complex algorithms in combination with other techniques like Neural Style Transfer; programmers are beginning to push the boundaries of human creativity and explore new possibilities. This development represents a profound shift in the nature of artistic creativity, as it challenges traditional notions of authorship, originality, and the role of the artist in the creative process. I think Kant would argue that using GAN's and Neural Style transfer could be ethical or unethical. This would be depending on whether or not they are being used to enhance human creativity or merely make a quick buck. Considering the scenario in terms of virtue ethics I think that it's more about whether or not the AI is helping the person grow or preventing them from improving.

Have you ever wondered how a generative art program can take an image like the Mona Lisa and then make it look like it was painted by Vincent Van Gogh? The generative art program is using a technique known as Neural style transfer. Style transfer works by passing the input images through a convolutional neural network. This routine extracts information about the images making it possible to merge the images and blend the pixels in targeted regions to emphasize style and texture. Just like GAN's I think that Kant would probably tell you that using a technology like this one might be really amazing for adding a new creative

spin on some existing work but it would never be ethical to claim that style as property of the algorithm. There is nothing inherently wrong with showing off an innovative creative new algorithm but it is important not to let the increased complexity convolute the credit due to the artists responsible for creating the training data.

Training ML algorithms is very computationally expensive due to the vector arithmetic required for processing a single high-resolution pixel matrix. Recently more and more of the algorithms are using multithreading parallelism and GPU processing to keep up with the computationally expensive demands of these networks. It is also important to consider the potential environmental impact, and the virtues demonstrated by those deciding to use these computational resources in this way. It's crucial to consider these aspects to ensure that the development and use of such algorithms are aligned with ethical standards and societal expectations. Some of the most popular generative art tools that are currently taking the market but storm include but are not limited to Stable Diffusion, Firefly, Midjouney, and DALLE2. Of these new tools Midjourney seems to be gaining the most attention shown by figure 3.
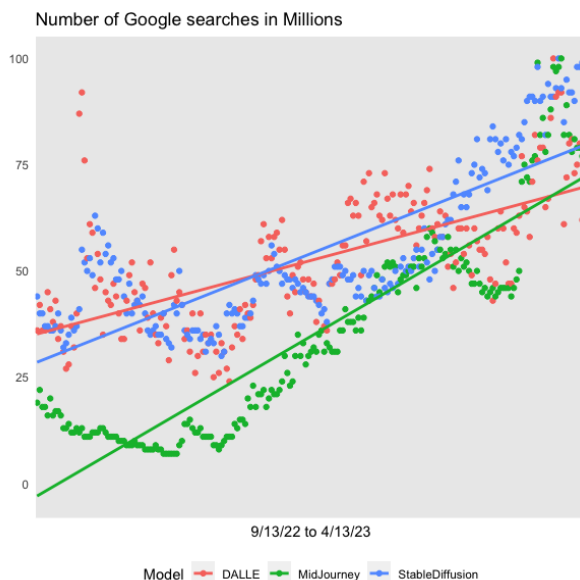

Figure3: **Multiple Regression predicting more searches for Midjourney.**

Stablitity.ai recently released an open-source linear algebra-based text-to-image framework called Stable Diffusion. Stable Diffusion is widely used and known to produce high-quality and detailed images with accurate lighting, textures, and shapes. However, it requires more computational resources and expertise to use compared to DALL-E 2. The wonderful thing about Stable Diffusion is that

it is open source and available for developers to modify and improve. The model is capable of generating some very creative works and it definitely has the potential to disrupt the job market for digital art. With thousands of developers currently working on projects that implement and improve stable diffusion, new methods for increasing image resolution and improving stylistic qualities are now available for everyone. I think Stallman would absolutely love the idea of Stable diffusion since it's open source and available to anyone.

DALL-E 2 by OpenAI is the most well-known and widely used AI art generator that uses text prompts to generate realistic images with a high degree of accuracy. It can create complex images with several objects, textures, and colors based on its training dataset. What I noticed that set this text-to-image resource apart was how closely it adheres to the prompt. While other models maintain a nicer overall style, DALLE2 seems to always seem to capture the general idea conveyed in the prompt a bit better. While other platforms push the boundaries of legal art and creativity, DALLE does so with respect for originality, societal norms, and the potential impact on the art world.

Midjourney is in my opinion the most impressive of the latest text-to-image developments. The Midjourney discord bot has become known for its ability to generate photo realistic images. The bot also offers various features such as command modifiers and text weights, which allow users to adjust the emphasis and focus of the generated images based on their prompts. Additionally, the Midjourney community has compiled a database of over 2,000 artist styles that can be used in prompts With these features, artists like Peter Mohrbacher can explore and experiment with new ideas and styles, ultimately enhancing their creative process.

Stakeholder Analysis.

Peter Mohrbacher is a concept artist and illustrator, he has shared his thoughts on using Midjourney during one of their live streams. He and many others have reportedly used Midjourney to generate ideas, inspiration, and composition for his artwork. One of the primary use cases was to generate patterns, textures, and fractals to be blended into sections of his digital art. This technique increases the detail in otherwise empty sections of color such as shadows. Many artists are thrilled at the idea of text-to-image, as it is an opportunity to explore new areas of creativity. However, some artists are apprehensive about the potential impact of AI on traditional art practices and employment opportunities.

Many art students are concerned about their futures and wonder if they should continue to pursue their dreams. When Peter Mohrbacher was asked if he was worried about the future of art he claimed that "for someone like him he thinks he will be okay since he had established a style unique to his work, however for the newer generations of artists establishing a unique style will be a lot more difficult." He also emphasized that the majority of his sales were made standing in front of a fold-out table and there will always be a market for human-created work.

Collectors and investors are showing increasing interest in these new forms of digital art, with some investing in deep learning-driven art startups and collecting works by AI assisted artists. In 2016 Memo Akten's GCHQ, an AI-generated artwork, sold for 8,000 USD at a charity auction hosted by Google. As the demand for art increases, it is likely that more collectors and investors will enter the market. The growth of AI in art can boost creativity and make art more accessible. But, it could also be misused, may overshadow human artists, and could turn art into a commercial product. Everyone, especially art collectors and investors, needs to think about these ethical issues when interacting with AI art.

One of the biggest challenges is the lack of a standard method for evaluating and valuing art, which makes it difficult for art investors to assess the market value of these works. The use of deep learning in art-making has raised concerns about the role of the artist and the authenticity of the work. While some argue that utilizing AI tools to create art is part of the human effort to innovate artistic practices, others worry that the use of deep learning in art-making could diminish the value of human creativity and skill. Deep learning in art creation has created a lot of very complex issues. AI generative art platforms have the potential to both enhance and undermine the value of art.

Deep learning has allowed for the creation of AI-generated art that is now being sold at auction houses. For instance, "Portrait of Edmond de Belamy" was sold for almost half a million USD in 2018. In addition, machine learning has also impacted the way galleries and auction houses conduct business, particularly in the area of data analysis. For example, auction houses can use machine learning to analyze historical sales data to predict future trends and identify emerging artists. This can help them make informed decisions about which works to sell and for how much.

Text-to-image services are changing the game for the regular Joe and Jane out there who want to create some amazing art without having to be an "artist". Some people argue that these services are cheapening the value of art and that is an understandable claim. I will elaborate further in the marker analysis section. Others claim that art should be accessible to everyone, not just the people who can afford to hire an artist. These text-to-image services are making it possible for people to express themselves and create something beautiful, and that's what really matters. These text-to-image communities are not just creating any old pictures, they're creating masterpieces. text-to-image is not the only way machine learning is making an impact on the humanities. Algorithms are now being used to analyze vast amounts of cultural data, such as paintings, photographs, and music, to identify patterns and make predictions.

Legal and Ethical Considerations.

One of the biggest legal concerns is the monetization of text-to-image generative works of art. Can the art created by Midjourney, Stable Diffusion, and DALLE be copyrighted? If so, who has the rights to the content? Those who use generative artwork to enhance their own work will typically argue that the image belongs to the human that wrote the image query. Others theorized that the work should belong to the creator of the algorithms and training data (source artwork). The copyright status of AI-generated art is currently a gray area, with valid arguments on both sides of the table. It's a complex debate that pertains to many aspects of ethics, including respect for individual contributions, the overall societal impact of different copyright arrangements, and the virtues demonstrated by the parties involved. As AI continues to become more integrated into creative processes, it's crucial that we continue to engage with these ethical questions to guide political policy and government regulation.

Sarah Andersen, Kelly McKernan, and Karla Ortiz have launched a class-action lawsuit against Midjourney, Stable Diffusion, and DeviantArt for severe copyright infringements. They lay claims of DMCA violations, abuse of publicity rights, unlawful competition, and fraudulent conduct. After reading deeper into the case, I was able to find one of the plagiarism claims posted on Karla Ortiz's personal blog. As you can see in Figure 4: Midjourney does appear to be copying the original to some degree however the works produced also appear to have noticeably different characteristics. For example, the hair appears to fall in a different way and the wrinkles in the fabric are adjusted. Certain characteristics in the face are also altered.

Figure 4: **Midjourney derivative works comparison.**

David Holtz, Midjourney's founder argues that a human artist could reference the original and repaint it well within the bounds of the law, how is his platform any different? This is a valid point, however in the end it might just be his arrogance that causes the judge to rule in favor of the artists. According to stablediffusionlitigation.com After he was asked about giving artists an option to opt out of the training dataset, he replied "We're looking at that. The challenge now is finding out what the rules are."

The rate at which these image-generation platforms are improving in their abilities to produce art is moving much faster than the legal system can keep up with. According to the Electronic Frontier Foundation (EFF) creating new non-infringing images from scraped images on the web is likely to be considered fair use. As it can be deemed transformative. However, if one single output image generated by the model resembles a copyrighted image in the training dataset, a court could rule in favor of the artist. Given that these platforms are raking in hundreds of thousands of dollars per year, it is understandable that a judge might want to send a message to the developers of generative AI products. DALLE has thus far avoided any significant lawsuits, but concerns have been raised about its potential to be used for copyright infringement.

The major customers in the art market are typically museums looking to expand their exhibits, institutions like schools and companies, and private collectors with a passion for art. The use of artificial intelligence in the art industry is impacting markets. Text-to-image services are changing the way art is produced, marketed, and sold. As technology advances and becomes more accessible, these services could potentially result in lower prices for traditional art pieces. On the positive side, it could increase creativity and accessibility to the art market, making it more inclusive for game developers and other content producers like YouTubers. On the negative side, it could put traditional artists and art dealers out of business and decrease the value of traditional art pieces.

Another trending topic lately is the idea of marketing AI-generated artwork on Etsy and other e-commerce platforms. Midjourney Version 5 was recently released and I have already stumbled upon trending "side-hustle" tutorials where people are selling one of the new features of Midjourney called tiling. This new functionality allows users to create seamlessly tiling images containing any prompted pattern. In my opinion, this kind of practice is deceitful and immoral since people are being used as a means to make a quick buck. Not only are they hurting the people who are not familiar with text-to-image services, they are also taking away from the original artist's potential revenue streams.

Currently, there are no laws surrounding text-to-image generated art and we should make sure to have some system to clarify the ownership of the content produced. Most importantly the law should also protect the rights of artists. Any artists who don't want to contribute their art to the machine learning community should have the option to opt their work out of the training data. Another system that could likely settle a lot of these debates would be a method for retrieving the distinct source images used to generate a

particular output image. As Midjourney was trained on over 6 Billion source images this would help narrow down a lot of copyright infringement claims. Promoting transparency in machine learning fields is essential and will likely result in the most optimal future for everyone.

It is imperative that text-to-image AI's are trained to be unbiased and on an ethnically diverse dataset. Despite all of the litigation surrounding Midjourney, one amazing feature of their most recent release is that it's trained on a more racially diverse dataset of source images. The global community archives on the public Midjourney server are very interesting and I recommend trying it out for fun sometimes if you haven't before.

The legal developments surrounding text-to-image platforms reflect the increasing concern about the ethical implications of machine learning models and the need for regulations to address these concerns. According to fortune.com over 1,200 prominent figures such as Elon Musk and Steve Wozniak have called for a worldwide pause on AI development. As the AI art market continues to evolve, it is likely that text-to-video and text-to-3d model services will begin to make a profound impact on the art world by transforming the way art is created, sold, and perceived.

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