

Is AI-generated Art an Enemy or a Friend to Artist?

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Abstract

The essay argues that AI-generated art is not the enemy of artists. The development of AI technology will free artists from repetitive and mechanical labor and encourage creativity, intelligence and humanity implied in man-made art. The first section of the essay introduces *Portrait of Edmond Belamy*, a proclaimed AI-generated painting created with an open-source algorithm called GAN (Generative Adversarial Network). It was sold for an unexpected price of \$432,500 during a Christie's auction in 2018. The second section reviews the history of AI-generated art by focusing on some key inventions, such as AARON, the first computer program able to produce basic shape in 1968 and Google's Deep Dream Program in 2014. The third section categorizes art-related AI into three types according to their impact. The first type includes software that benefit artists in general, such as image recognition, color specification, and auto 3D construction. The second type are programs that generate new image based on selected style, which will eventually outperform the beginner level designer in terms of speed and quality, only preserving art jobs that require true creativity. The third type is represented by GAN algorithm, which generates its own subject by learning from the fed data, removing human's critical role of consenting the subject. It is now limited by the "catastrophic forgetting" trait of GAN system.

An Unexpected Auction Price of the *Portrait of Edmond Belamy*

During the *Prints & Multiple* auction at Christie's on October 23, 2018, a painting named '*Portrait of Edmond Belamy*' was sold at an unexpected price of \$432,500. The painting depicts a man with round face and burly body. The painterly brushstrokes summarize the figure into a few geometric shapes without much detail. The black coat and the white collar suggest his affiliation with church. The main body of the portrait is positioned up-left to the central canvas, leaving the right bottom in an unusual blank. Judging from the unidentifiable face and the scratchy style, the price of half million dollar seems curious.

In fact, the answer is implied within the artist's signature at the right bottom of the canvas – ' $\min G \max D x [\log (D(x))] + z [\log(1 - D (G(z)))]$ '. Composed of a series of letter and number, it was the algorithm that generated this portrait painting. The idea came from a French artist group 'Obvious' formed by three college students. They used an AI model called Generative Adversarial Network (GAN) to create the painting. Invented by Ian Goodfellow in 2014, GAN contains two algorithmic systems: a generative part trying to create a new image based on fed data; and an adversarial counterpart trained to distinguish whether the image was created by man or machines. The generation-test-regeneration process keeps looping until the work produced by the generative algorithm successfully "fools" the adversarial discriminator into judging its work as made by human. The work is thus considered as an AI-generated art.¹ In this case, the Obvious fed the database of the generative algorithm with more than 15,000

¹ <https://www.theverge.com/2018/10/23/18013190/ai-art-portrait-auction-christies-belamy-obvious-robbie-barrat-gans>

portrait paintings from the 14th-20th centuries as learning target. The GAN-generated images share some common features such as unclear boundaries, indistinct definition of components, and disproportionate anatomy. AI engineers and artists jokingly named this odd style caused by algorithmic flaw as “GANism”.

Before the auction, the estimated price of the *Portrait of Edmond Belamy* was around \$7,000 to \$10,000. The half-million-dollar auction price was nearly 45 times higher than the estimation, making an astonishing news to the experts in fields of art and science. One explanation is that the Obvious advertised the painting as an artwork completely created by AI by putting the algorithm as signature. The misleading announcement has contributed to the excessive price. Hugo Casellees-Dupre, a member of the Obvious claimed, “we found that portraits provided the best way to illustrate our point, which is that algorithms are able to emulate creativity.” Many AI engineers and artists accused the Obvious of false advertising since the GAN operation contains considerable amounts of human intervention. According to them, the painting is AI-generated, but not ‘created’ by AI with subjective intention.

However, some supporters of the Obvious has argued that the signature should be considered as an art manifesto instead of marketing hoax. They compared the signature with Marcel Duchamp’s “R.Mutt” on the *Fountain*. Duchamp’s signature changed a readymade urinal into one of the greatest landmarks in modern art. Similarly, the algorithm signature emphasizes conceptual inspiration rather than physical authenticity, thus converts the painting into a proclamation—‘welcome to the age of artificial intelligence’. Regardless of the distribution over the signature, the inflated price of the

‘*Portrait of Edmond Belamy*’ reflects art market’s enthusiasm toward the field of AI.

Review of the Development of AI-Related Art

Throughout modern history, human has put in much effort exploring the connection between art and artificial intelligence. In 1968, British artist Harold Cohen created ‘AARON’, the first computer program which can produce shapes with mixed materials. After 23 years of research, AARON was able to autonomously generate images based on computer memory. The programmed machine could do basic actions such as drawing lines, mixing colors, and putting on brushstrokes.² In 1991, *Aaron’s Code*, a book studying the work of AARON and Cohen’s contribution to the art-AI field, was written and published by Pamela McCorduck.

In 2001, a British computer scientist Simon Colton started to develop ‘The Painting Tool’, an AI website designed to “one day be accepted as an artist in its own right”³. The Painting Tool had a groundbreaking function of detecting human facial expression and creating portraits through AI visual software. In 2007, the program won the British Computing Society Machine Intelligence Award and became a popular topic on media. Later the program learned to create new objects using 3D modeling from its virtual gallery. The Painting Tool arranges the learned visual patterns in a hierarchal system and randomly selects and combines elements. The non-repetitive construction enables the uniqueness of each generated model. In 2011, a chair generated by the software was

² <http://www.scinetphotos.com/aaron.html>

³ https://en.wikipedia.org/wiki/Simon_Colton

exhibited at La Maison Rouge in Paris.⁴

In 2014, Google launched the well-known Deep Dream Program. In February 2016, art exhibition “*Deep Dream: The art of neural networks*” was held by Google, presenting works generated by Deep Dream with various pattern and style, such as the recreation of Van Gogh’s *Starry Night*. Other tech company has also showed interests in the intersection of art and AI. In April 2016, Microsoft and ING successfully applied Rembrandt’s portrait style on a Caucasian male photo with AI system. The team used algorithm and facial recognition to study Rembrandt’s 346 painting in terms of composition, lighting, and facial feature. The generated painting was printed by 3D printing printer.

The review is only a tip of the iceberg of human’s enthusiasm toward creating a true artificial intelligence—a creature that has its own emotion and spirit. However, in the meanwhile, human feel threatened and even grossed out by man-made intelligent creatures as the similarity increases. In *A Cyborg Manifesto*⁵, Donna Haraway points out the ‘uncanny valley phenomenon’ and states, “cyborgs signal the disturbing and pleasurably tight coupling”.(Haraway, p.11) The ability to create art and convey self-expression are often considered as the key difference between human and machine. Machine used to be regard as “not self-moving, self-designing, autonomous...could not achieve man’s dream, only mock it.” (Haraway, p.11) Nowadays, human’s attitude toward AI is complicated by the ever-changing technological revolutions. *Portrait of Edmond Belamy* serves as an example which manifests the complex cognition -- the

⁴ <http://www.thepaintingfool.com/galleries/growth/index.html>

⁵ Donna Haraway, *A Cyborg Manifesto*

excessive price embodies the market's interest in AI, while the negative comments reflect artist's vigilance to new technology. After all, is AI-generated art an enemy or a friend to artist?

Three Categories of Art-related AI

The first category of art-related AI serves as helpful tool to all-levels artists. Google's Deep Learning art project makes a perfect example of this category. Deep Learning is a branch of machine learning methods that roots in data representation, and its neural network has been used in fields including visual recognition, audio translation and language processing.⁶

The programs encourage artists to explore a full range of AI assistance during art creation. One of the algorithms is designed for image recognition and categorization. It allows automatic searching of the uploaded image. After uploading an unknown painting to the search engine, the user will be provided with not only the basic information such as the name, time, and artist, but also works identified as the same category for further study. The software greatly accelerates the process of art study for scholars. Another useful program identifies major color components of the uploaded image, then summarizes them into a harmonious color palette, and find other images with similar palette in the database. It is a great tool for color study. In addition, AI has been applied in 3D modeling and digital construction. Many non-governmental organizations use relative software for digital reconstruction of ancient architectures,

⁶ https://en.wikipedia.org/wiki/Deep_learning

most of which were damaged during war or natural disaster.

In his article '*Art in the Age of Machine Intelligence*'⁷, Google's AMI⁸ leader Blaise Aguera y Arcas proposes that artists should keep an open mind to new technology. He compares AI with photography, arguing that artists who resist AI-generated art put themselves in a similar absurd position as painters who rejected camera one hundred years ago. If only taking AI programs among this category into consideration, his argument seems perfectly self-explanatory, however, some AI programs have transcended the role of innocent assistants in the game.

The second type of AI program poses threat to beginner-level artists and art jobs heavily relying on mechanical and repetitive work. The Deep Dream program by Google serves as an example for its precise integration of subject and style. The user only needs to upload one image as the learning target of subject, another as the desired style. The program then analyzes data of the images, extracting the parameters of target subject and target style, and combines them to generate a new image. For instance, with a selfie and an image of a Van Gogh's painting, user will get a portrait painting with Van Gogh's touch of brushstrokes within a few minutes. The algorithm allows infinite possibility of pictorial combination. Moreover, the system keeps learning and expands its memory, optimizing the process. As more images have been uploaded to its database, evidence shows that the program is better at copying popular styles such as Van Gogh and capturing subjects like pets. While the Deep Dream prospers in the field of computer-based program, mobile phone applications have also picked up AI technology

⁷ <https://medium.com/artists-and-machine-intelligence/what-is-ami-ccd936394a83>

⁸ Artists and Machine Intelligence

in photo editing. For example, an App called Prisma has won an increase in downloading for its powerful picture editing function. After uploading the original photo, user is offered hundreds of options of installed style and filter, such as mosaic abstraction and vintage pencil sketching. The program applies such a major adjustment to form and style that the generated image tends look like a fresh new picture. As AI programs in this category improve, they will eventually outperform the beginner-level designer in terms of generation speed and image quality, thus, art jobs without much input of intelligence and creativity are much likely to be replaced by AI. However, the second category of AI are limited to the content chosen by the user and unable to create subject autonomously.

The third category of art-related AI is best represented by the GAN system. As mentioned, GAN generated its own subject by learning from the fed data-- “its chief innovation is precisely the removal of human from the critical role of the consenting subject.”⁹. The feature endows the AI with evolutionary potential, leading to a pessimistic prediction that human will let the machine play a major role in art evaluation, and aesthetics become obsolete. Fortunately, most AI developers agree on that the premature AI technology is far from threatening – it is at “somewhere between a really clumsy child and a really smart pet”¹⁰. Many of them scorned at the prompt from the Obvious, stating that it is a false propaganda that the algorithm is responsible for creating the *Portrait of Edmond Belamy* because they ignored the considerable amount human intervention during the process. Moreover, it is difficult overcome a

⁹ Mike Pepi, *Could There Ever Be an AI Artist?*, <https://frieze.com/article/could-there-ever-be-ai-artist>

¹⁰ <https://news.artnet.com/art-world/ai-art-comes-to-market-is-it-worth-the-hype-1352011>

technological problem called “catastrophic forgetting”, which means GAN need to completely erase its memory of the previous database in order to learn a new mode of image. For example, the GAN trained to create portraits cannot be used to generate landscape, unless it undergoes a time-consuming erasure of memory. ¹¹

Conclusion

Before GAN system overcomes the catastrophic forgetting problem and evolve its own subject-generating algorithm, the status holds still that AI needs man-made art more than art needs AI. There is no need to panic for qualified artists. Just as Duchamp’s perfectly shaped machine-made urinal did not destroyed the business of hand-made art crafts in 1917, it is unlikely that AI-generated art will edge man-made art into extinction. Some argues that easier access to the reproduction of art only boost the fetish of the originals¹². Based on the current socio-economic environment and the status of AI technology, the essay concludes with the prediction that the development of AI-generated art will emancipate artists from repetitive and mechanical labor and celebrate creativity, intelligence and humanity implied in man-made art.

¹¹ <https://news.artnet.com/art-world/ai-art-comes-to-market-is-it-worth-the-hype-1352011>

¹² Benjamin Walter, *The Work of Art in the Age of Its Technological Reproducibility*

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