Can the outputs of AI systems qualify as artworks?

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What is an artwork?

What is an artwork? Philosopher Monroe Beardsley provides one of the most widely accepted definitions in the philosophy of art thus far. He says that an artwork is "either an arrangement of conditions intended to be capable of affording an experience with marked aesthetic character or (incidentally) an arrangement belonging to a class or type of arrangements that is typically intended to have this capacity" (Beardsley, 1982). Yet, our understanding of what an artwork is, including its necessary or sufficient conditions, cannot be satisfied by this vague definition. It is impossible to fully define the objective properties of aesthetic objects because when we make an aesthetic judgment, we do not rely on the knowledge of the presentations of the object; rather, we imagine a subject's feeling of pleasure or displeasure as to the presentations of the object. (Kant, 1790) Although some objective standards for recognizing artworks may be reflected in a certain cultural ethos of the period, avant-garde artists within the period would deliberately neglect such standards in favor of new emphasis which, if successful, would initiate a new period with new aesthetic ethos and standards. (Aldrich, 1963)

We are in an age where artificial intelligence (AI) can produce outputs appearing as artworks shown in art exhibits. AI systems can create images we have never seen before. Therefore, these images supposedly have originality. But nonsense can also have originality. Are there some good reasons for judging certain AI system outputs as artworks and not nonsense? If there is creativity in AI art, how is AI art creativity different from traditional art? Is the artist behind AI art the human designers, the machine algorithms, or both? If AI system outputs are avant-garde art reflecting the cultural ethos of our period, how should we understand them? This essay attempts to provide an understanding of how AI system outputs can qualify as artworks and answer these questions.

I. Recent Technological Developments in AI Art

One of the key characteristics of modern AI technology is its ability to detect feature associations from large training datasets. Various models can be trained to emphasize different associations. To the extent data about human reactions to various art can be captured, similar reactions to similar art can be predicted. In visual art, a large collection of images throughout history are known as great works, and these images, or some of them, are used to train the various AI models. Some AI models are highlighted as follows.

Generative adversarial networks (GANs) were designed by Ian Goodfellow and his colleagues in 2014. A GANs system simultaneously trains two competing machine learning models: one aims to generate images that can be mistaken as real images; the other model aims to accurately identify generated images. As each model gets better, the first model at generating images that evade detection by the second model, and the second model at catching generated images by the first model, the result is that GANs can produce images which even human eyes sometimes cannot tell that they are generated by AI neural networks. The images generated by GANs are new yet similar to known images. Mario Klingemann, an AI art pioneer, has an installment piece, Memories of Passersby I (2018), based on GANs. In this

work, brand new portraits are generated by machines in real-time in an endless feedback loop. Klingemann's GANs AI artworks have been exhibited at MoMA New York, the Metropolitan Museum of Art New York, the Photographers' Gallery London, ZKM Karlsruhe, and Centre Pompidou Paris. He received the British Library Labs Artistic Award 2016 and the Lumen Prize Gold Award 2018.

DeepDream was created by Alexander Mordvintsev at Google in 2015. It uses neural networks to find and enhance patterns on existing artworks; the patterns being enhanced are based on the human tendency to see meaningful images out of chaos. That is the same tendency for humans to see shapes of animals or objects from clouds in the sky. With DeepDream, an existing artwork can get enhanced such that it contains many different other images. For example, DeepDream enhances Leonardo da Vinci's Mona Lisa contains numerous animal faces and eyes. The potential for DeepDream is limitless, as a vast number of DeepDream effects can be applied to each painting for vast different effects, e.g., instead of animal faces, fruits, or other objects can be found and enhanced. Each new creation upon a different DeepDream effect is a new artwork, and one could evaluate it based on taste. Gaining in popularity, DeepDream has become a new form of psychedelic and abstract art. 8

Neural Style Transfer (NST) was introduced by Leon Gatys et al. in 2016. It uses convolutional neural networks to blend two images, one as content and the other as a style reference. The style reference image is often an artwork by a famous painter. The output image looks like the content image is painted in the style of the style reference image. For example, one can use the image of a dog as a content image and Wassily Kandinsky's Composition 7 as the style reference. Upon applying NST, the output image is shown a dog painted in Kandinsky's style. NST can potentially turn many photographs into artworks. 9

Artificial Intelligence Creative Adversarial Network (AICAN) was introduced by Ahmed Elgammal et al. in 2017. Like GANs, an AICANs system trains two competing neural networks models. One model aims to create new images similar to existing artworks in terms of forms, subjects, and styles, and the other model aims to reject images that are too similar to known artworks. A current AICAN system is trained on 100,000 of the greatest works in art history. As a result, AICAN can produce novel artworks similar to yet different from great artworks. It is said that AICAN art passes the Turing test for art because, most of the time, human observers cannot tell AICAN art apart from art created by human artists. With AICAN art becoming increasingly popular, more and more AICAN artworks are being sold at auctions. 10

DALL·E was introduced by OpenAI in 2021. It creates images from text prompts, such as "a green leather purse shaped like an apple." The text prompts are interpreted by the GPT-3 transformer model. The images generated by DALL·E are ranked and curated by another AI technology developed by OpenAI, called Contrastive Language-Image Pre-training (CLIP). The result is that DALL·E can create images with various concepts and combinations of concepts. The text prompts can be any novel combination of concepts, and the artworks can be of various combinations. However, it will remain a great challenge for AI to learn to present art from concepts, especially abstract concepts. The existing technology does not equip AI with the ability to grasp complex concepts, let alone present complex concepts as art. The text prompts processed, and images generated by DALL·E are currently at 11

a rudimentary level.

In addition to these important developments of AI technology in art, some artworks are created due to the AI system's unique ability to process millions of images. For example, artist Refik Anadol uses large datasets and machine learning to create mesmerizing dynamic images from large collections of images. He turns millions of New York city photographs into a machine hallucination movie. Such images are unique to machine outputs because human artists would not be able to create them without machines. Anadol's Machine Hallucinations series is based on NFT and GANs and has become widely sought after. Several projects try to associate images with aesthetic judgment by developing large-scale datasets that contain images annotated with subjective scores of aesthetic evaluations and sentimental reactions. (Cetinic al et., 2021) Training AI models with such datasets will further improve the models' ability to predict aesthetic evaluations and produce images with a higher probability of being deemed aesthetical. 12

II. Judging AI Art 13

Kant classifies aesthetic objects into the agreeable, the beautiful, and the good according to their different relations to the subject's feelings of pleasure and displeasure. In terms of these different relations, the agreeable gratifies us, the beautiful what we just like, and the good we esteem or endorse. Agreeableness does not require rationality, only sensory satisfaction; beauty requires both sensory satisfaction and rationality; the good requires rationality alone. (Kant, 1790) Firstly, of the three types of art, an AI system can be most easily modeled to produce artworks agreeable to our senses. In other words, once we can identify images or other forms of art that are agreeable to our senses, something similar produced by AI has a high probability of being agreeable as well. In addition, AI artworks can be generated to be agreeable to an environment where harmony with existing art or objects is desired. Secondly, under Kant's classification, it is more unpredictable for AI systems to generate something beautiful. The greatest art is formally expressive on the one hand and conveys concepts on the other. While AI art can be modeled to create various novel combinations, generating beautiful art that combines expressive forms and great concepts is more difficult. To achieve beautiful art in this sense, human artists with taste will need to curate AI system outputs by identifying aesthetic ideas based on the presentations. Finally, under the current technology, there is a low likelihood for AI systems to generate something good in terms of concepts that we esteem and endorse as Kant means. As AI systems lack rationality and concept comprehension, it is not likely to create an AI model to generate art that is "good." 14

Aesthetic judgments are judgments of taste. A judgment of taste is subjective and individual. Because of its subjectivity, a declaration of an aesthetic object from a judgment of taste is conditional. The declaration calls on others to agree and permits other opinions. (Kant, 1790) An agreement on a judgment of taste is based on common sense and common understanding. Art reflects the culture and has an important function in human socialization. Producing and appreciating art afford, for most, ways of being a part of society. Through being the topic of culture, the currently avant-garde AI art will become more and more accepted. Some future 15

standards for appreciation of AI art will be achieved through common sense and common understanding.

AI systems work within the parameters set by designers of the systems. The ”creativity” in AI systems lies in their limitless possibilities of expanding into empty mathematical spaces on a map where training images occupy latent spaces. A latent space is a mathematical representation that maps what a neural network has learned from a training image. As training images are represented as latent spaces on a map, unoccupied spaces are where novel images can be generated. As mathematical space can have multiple dimensions and be extended infinitely, the unoccupied spaces for creating novel images for AI artworks are endless. The unoccupied spaces with various combinations of dimensions represent AI art’s potential creativity. One could say that once AI designers set up the dimensions in the mathematical space and provide the training dataset to take up latent spaces in the mathematical space, all empty spaces, i.e., all potential new images, are anticipated. In other words, the AI systems simply render images that the designers anticipate. The anticipated images will change when the designers adjust the dimensions or provide different training images. In this sense, the designers of the AI systems are the ones who exercise creativity on the images. 16

The geniuses among human artists for traditional arts set rules to be followed by others. Such rules need not connect to any existing rules in any way. AI art’s capacity to make unexpected combinations is a kind of genius, especially when such unexpected combinations would not otherwise be achieved under human tendencies. For example, suppose that cubism artists would never import impressionism into their style because the two styles simply do not fit under human rationality or human tendency. AI systems have no such prohibitions and can produce these kinds of combinations. Human artists will accept some AI combinations, and a new trend can be set, both in AI art and traditional art. 17

III. AI Art Intentionality 18

To show that intentionality does matter in art, philosopher Arthur Danto (1988) provides a thought experiment of identical red squares in an art exhibit. He argues that depending on the intentions behind these identical red squares, each red square may or may not be an artwork. One of them is something from the workshop of Giorgione. Another is a mere thing - a red square never meant to be an artwork. We cannot assert that AI art contains concepts conveyed by its creator as intentionality. Thus, to judge AI art, we need to rely on the so-called expressive stance. (A. Linson 2016; Dennett 1987; Danto 1988) The expressive stance says that the intentionality of an artwork comes from the interpretation of the artwork as an expression and not from a notion of the artwork’s intrinsic intentionality as conveyed by its creator. 19

The designers of an AI system can provide intentionality for some AI art, e.g., an image of the dog painted in Kandinsky’s style. Other times, AI art’s intentionality has to be interpreted. Some AI art cannot be appreciated and is mere nonsense until intentionality is interpreted by human artists or art critics. Our analysis in the last section indicates that AI systems merely render images anticipated by designers, 20

even if the designers cannot predict the presentations of the images. Thus, we can agree with Danto and others that AI art should be understood as works by human artists, mediated by machines, and not by machines as artists. But in addition to that, with the need for human artists to identify AI art's intentionality for AI art to be appreciated, such AI art should be further viewed as requiring ingenuity from human artists. Thus, while the production of traditional art relies on the genius of artists, the identification of some AI art as artworks relies on the taste of artists.

IV. Conclusion

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In conclusion, while there are no objective standards to define what qualifies as an artwork, AI art is an avant-garde art form that will grow to reflect the cultural ethos of our time. AI art's ability to make combinations within the parameters set by the AI designers is a form of creativity, with the credit belonging to the AI designers. AI art intentionality may require interpretation from human artists. Without such interpretation, some AI art may be mere nonsense. Sooner or later, more AI art will be accepted as artworks reflecting the cultural ethos of a new period, and the art world will be better for it.

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