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Can Artworks by Artificial Intelligence be Artworks?

Abstract: The thinking power of Homo sapiens made human beings the lord of all creation. The ability to reason is also the premise of human existence. We, however, now know that this is not confined only to human but to Artificial Intelligence. Over the history of humankind, human beings have attempted to create an immortal being that could surpass their abilities and complements their inferiorities. We are making something immortal and transcendent, which are different properties from our own. Artificial Intelligence may be able to evolve on its own like humans have been doing. As a kind of numerical being, humans are able to be omnipresent with the technology provided. This new kind of existence makes us think about and see things differently. Humans are attempting to create 'beings' that can generate art, take care of weak human beings, talk and discuss human issues, and even fall in love with humans. As our minds can run beyond the boundaries created by our body limitations, we would like to infuse our creativity into AI that might evolve from its original state. Similar to what Prometheus did, humans are attempting to share their legacy with another existence. Recently a research team from Rutgers University in New Jersey proposed a system named CAN: Creative Adversarial Networks for generating art with creative characteristics. The team demonstrated a realization of this system based on a novel, creative adversarial network. Their proposed system possesses the ability to produce novel artworks which make people believe human artists produced them. The data the team proposes proves that AI now attempts to do something considered as a creative activity. With this research, the definition of art should be reconsidered. Since the *Fountain* (1917) by Duchamp, open concepts toward artworks have been embraced by many artists and their colleagues. However, it is time to contemplate the new phase. When we regard something as artwork, should it be created, selected, and combined by human beings? Is it possible that the thing that is accepted as artwork by people can be art? This paper seeks to propose several opinions regarding these questions.

Keywords: artificial intelligence; creativity; creative adversarial networks; processed accumulated information; producing artworks by AI.

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Introduction

AI pervades in human life, forms new relationships with us, and processes the information much better than humans do. Living with AI, culture and the way we think toward our society and humanity have been changed. Today, we live in an information-oriented, media-saturated society and face a sort of de-realization of reality and material in every area of life. It is because communication technologies replace direct contact with the physical environment and because the mass media form their own world, the hyper-reality.

In this hyper-real world, the gap between image and reality disappears because all of the information we obtain from the mass media is a simulation of the original event. We are hardly exposed to the physical actuality of unedited actual events and information. The actual events transform into images, messages, and symbols in the information network of the entire society, and the actuality eventually disappears.

If there is no significance for the substance in our highly developed civilization, what will be the fate of our kind, Homo sapiens? With the premise that artworks can be considered as accumulated information, is it adequate to limit the validity of artworks only by humans? It seems that we accept the artworks generated by AI as another flow of art in the new era. The creation of AI appeals to viewers and provokes sensation as they appreciate it. Thus this paper discusses the latest issue regarding producing artworks by AI and its traits. By doing so, I would like to propose questions that are when we regard something like artwork, should it be created, selected, and combined by human beings? Is it possible that the thing that is accepted as artwork by people can be art?

Message from AI

In the 1990s, the evolution of personal computers, more user-friendly computer hardware, and the introduction of the World Wide Web added speed to globalization. It is the time known as the "Digital Revolution". The Digital Revolution means reading and receiving with two numbers, 0 and 1, which means that we can reduce all information to numbers. Therefore, by lowering all external data to a numerical system of 0 and 1, the human has built the communication system between human and machine. During the period of the Digital Revolution, aesthetics, as well as the arts and their creation, were affected worldwide, and by the end of the 20th Century, digital computer technology began to exist in almost all parts of our lives.[1]

To clarify the relationship between these media and human societies, Marshall McLuhan argues that through interaction with the human senses, media initiate the interaction, and, by transcending the mere means of information transmission,

[1] Steve Dixon, *Digital Performance. A History of New Media in Theater, Dance, Performance Art, and Installation* (New York: MIT Press, 2007), 87–89.

media act as the power that determines the communication structure and patterns of human perceptions, or more broadly, the nature of the entire social structure.[2] McLuhan thought that media acts not as a mediator but as an active participant. With the dynamic influence of the media, the message receives "the physic and social effects of the media."[3] It suggests that the medium plays a vital role as a means rather than merely transmitting the content of a message. The new medium is not just the conscious and mental extension, but the extension of human beings, that is, the expansion of real human capabilities.

Besides, this development of physical function also affects the domain of human consciousness. In this time, the medium becomes a substance that, beyond its functional meaning, can change human culture and society in general. If we accept the hypothesis that technology is the expansion of humans, so does an extension of the whole experience. In the entire experience, all media are influencing the way we perceive the world, regardless of the message they contain.

Unlike what we experience in the real world, we go through these data experiences in a digitized state of information. Through various editing processes such as abbreviation, editing, or overlapping, this information is a transformed version of the original data. The development of digital media and its application in our daily lives make us no longer consider the gap of physical distance or time as obstacles or limits to the development of human society.

The changed perception by this new medium is shaking the roots of our thoughts about fixed and immutable beings, allowing us to experience things and people that go between presence and absence as well as reality and imagination. The application of new media plays a dominant role in almost every aspect of human culture and economy. Digital media allow us to experiment with humanized media by dreaming up a human-like machine and constructing technical infrastructure so that human beings can exist as the information itself.

Human as information

In most cases, the 'self' refers to consciousness or idea about oneself. For a generation accustomed to talking through the social networking system (SNS), people have accepted the virtual self as another personality. The self in cyberspace may be a social or concealed self. A virtual self broadly refers to a being that works in cyberspace and refers to a surrogate self- working in cyberspace on behalf of a user of the physical world.

In this paper, I discuss the virtual self in this general sense and AI that is a number of selves blended with positive and desirable standard human selves. AI is not a

[2] Marshall McLuhan and Eric McLuhan, *Law of Media: The New Science* (Toronto: University of Toronto Press, 1998), 37.

[3] Ibidem.

substitute for any one of our virtual selves or those derived from someone else. AI is a synthesized entity generated by accumulating data and experiences of the researchers who produce it and of various people rather than one person. Thus, it is an implementation of a universal and ordinary human model. To the contrary, the self, in reality, is dominated and developed in the physical environment to which we belong.

The difference between the physical world where our self is revealed and cyberspace is that the identity of our experience unfolds differently. In other words, time and space are relatively experienced in the physical area, and this relative experience cannot be separated from the subjects of the experience. The space and time of cyberspace, however, deviate from such attachment and, in many cases, depend on our own intentions. It is because, from the beginning, the time and space of cyberspace operate only by human manipulation. Thus, as long as cyberspace also includes the being- the virtual self – it has its own time and space unfolding, but the concrete way of this unfolding can be 'selected' and 'changed'. In this space, all beings are based on the first being and are distinguished from the real world, in which material is the basis of the being.[4]

The virtual self can legally resume a new life that is not related to our own lives in the real world, and it is possible to move or delete the place of existence at the desired moment and to return without any restrictions when necessary. However, the virtual self cannot be entirely established from virtuality or fiction. That is, one's understanding of oneself is similar to the situation in which a person uses maps to navigate to places. It is because when a person is looking for a direction, one cannot find the right destination unless one knows one's current location and situation. Therefore, if I understand my position in the real world – my present positions, I can properly set the direction for my identity in the virtual world.[5] Therefore, cyberspace and the real world are inter-penetrating and overlapping, even though both are heterogeneous.

Now, human beings- physical beings- can exist as an information body in cyberspace, and the point at which people maximize this information is the artificial intelligence system. As the digital medium visualizes the human imagination, the connection between the machine and the human becomes a natural imaginary context, and artificial life is composed of so-called artificial intelligence-cybernetics[6] which is thought, invented and operated by oneself.

Now no one doubt cyberspace has almost the same influence and effect that can change not only the physical environment but also human thoughts and cultures. Rather than an identity embodied by the human body, people regard this new human identity as a flow or patterns of information. It lets people visit everywhere they want to go because, without bodies, and with being the states of encoded being, people can go beyond their boundaries. Besides, as people can accumulate far more information

[4] Hyun-jung Park, "Ontological Review on Virtual Reality," *Ontology* 37 (2015): 135.

[5] Lars Løvlie, "Is There Any Body in Cyberspace? On the idea of a cyberbuilding," *Utbildning & Demokratic* 14, 1 (2005): 120.

[6] Norbert Wiener, *Cybernetics, or Control and Communication in the Animal and the Machine* (Cambridge: MIT Press, 1948).

together in one place that we call net society, they have learned how to use the information and attempted to apply it to AI. Absorbing the whole data in the net, AI attempts to generate things humans consider as art. In humanity's case, we may call it as displaying human creativity.

What can be the artwork?

As discussed, the goal of producing AI is to make a "being" similar but different from humankind. Humans have attempted to build AI that transcends the limitations and faults of human beings and that displays mechanical consistency, accurate and fast calculation, and optimizing a vast amount of information. Moreover, AI can evolve by learning itself because it was made to combine the best techniques from machine learning and systems neuroscience to build powerful general-purpose learning algorithms.

Humanized AI shows characteristics of all types of competencies, and is able to be self-conscious and is self-aware in interactions with others. Coline Mrtindale proposed a psychology-based theory that explains new art creation: He hypothesized that at any point in time, creative artists try to increase the arousal potential of their art to push against habituation. Creative artists would eventually break the forms of established styles and explore new ways of expression to increase the arousal potential of their art.[7] The creative power of humans has been granted to AI, an artist that generates seemingly 'creative' artworks.

A research team from Rutgers University in New Jersey proposed a system, which is named CAN: Creative Adversarial Networks for generating art with creative characteristics. The team demonstrated a realization of this system based on a novel, original adversarial network. Their proposed system possesses the ability to produce innovative artifacts because the interaction between the two signals that derive the generation process is designed to force the system to explore creative space to find a solution that deviates from established styles but stays close enough to the boundary of art to be recognized as art. This interaction also provides a way for the system to self-assess its products.[8] AI autonomously evaluates its products. Does it mean it can discern aesthetic attributes of things and people or it can 'express' something?

An essential component in art-generating algorithms is relating their creative process to art that has been produced by human artists throughout time. The team thinks this is important because a human creative process utilizes the prior experience of and exposure to art. Thus, the system is trained using an extensive collection of art images from the 15th to the 21st century with their style labels. For the training they used 81,449 paintings by 1,119 artists in the publicly-available WikiArt data set. (Figure 1) With the exposure, the system accumulated information about artworks

[7] Ahmed Elgammal, Bingchen Liu, Mohamed Elhoseiny, and Marian Mazzone, "CAN: Creative Adversarial Networks Generating 'Art' by Learning about styles Na Deviating from Style Norms," 5 (the extended version of a paper published on the *Eighth International Conference on Computational Creativity*, 2017, acc. January 30, 2017).

[8] Ibid., 20.

and learned about their features. The system can generate art by optimizing a criterion that maximizes stylistic ambiguity while staying within the art distribution. The system was evaluated by human subject experiments which showed that human subjects regularly confused the generated art with human art, and sometimes rated the generated art higher on various high-level scales.[9] (Figure 2)

Moreover, to generate artworks that seem to be created by human artists, the researchers have applied to "Arousal Concept" by Daniel Berlyne. This psychophysical concept has great relevance for studying aesthetic phenomena.[10] The term "arousal potential" refers to the properties of stimulus patterns that lead to raising arousal. Besides other psychophysical and ecological features of stimulus patterns, Berlyne emphasized that the most significant arousal-raising properties for aesthetics are the novelty, astonishment, complexity, ambiguity, and unexpectedness. He coined the term 'collative variables' to refer to these properties collectively.[11] When respondents were asked to rate how intentional, visually structured, communicative, and inspiring the images were they rated the images generated by CAN, artificial intelligence higher than those created by real artists.

However, what the system generates is the accumulated and processed information of human artists. Of course, what human artists produce can be seen as information that has been experienced by human artists, but human artists feel, sense, and filter with their sensory organs that are eyes, ears, nose, and hands, etc. Artworks are not numerical information. Even art, such as "Brillo Pad Box (1968)" by Andy Warhol or "Fountain (1917)" by Marcel Duchamp, resulted from their sensory reactions toward life experiences, art history, aesthetics, and artworks from their predecessors.

Those everyday objects make viewers ponder why those artists introduce them as art. However, the paintings generated by CAN are the calculated and combined information that was not from sensory reactions nor based on aesthetical perception. Works that cause profound aesthetic questions and make people seek the proper answers can be defined as art. One of the main characteristics of the proposed system is that it learns about the history of art in its process to create art. However, it does not have a semantic understanding of the art behind the concept of style. It does not know anything about the subject matter, or explicit models of elements or principle of art. The learning here is based on exposure to art and concepts of styles.

In that sense, the system can continuously learn from new art and would then able to adapt its generation based on what it learns.[12] Learning and experiencing art

[9] Ibidem.

[10] Daniel Berlyne, "Arousal and reinforcement," in *Nebraska Symposium on Motivation*, Vol. 15, ed. David Levine (Lincoln: University of Nabraska Press, 1967), 1–110.

[11] Novelty refers to the degree a stimulus differs from what an observer has seen or experienced before. Unexpectedness refers to the degree a stimulus disagrees with expectation. Unexpectedness is not necessarily correlated with novelty. Unlike novelty and unexpectedness which rely on inter stimulus comparison of similarity and differences elements in a stimulus grows. Ambiguity refers to the ambiguity due to multiple, potentially inconsistent. Elgammal et al., "CAN," 4.

[12] Ibid., 21.

is beyond the enumeration of what an artist has learned. Empathy is a critical aspect. It occurs when we are aware of the context of the producing artwork. The background is more significant than the resulting artworks. Even though the subjects of the experiment rated the artworks by CAN higher than those by human artists, still the historical context of producing artwork is crucial and meaningful.

Conclusion: further questions

Accepting digital media and its sub-products, humans can exist as an encoded being in cyberspace and net society. Living and interacting in the net world, people can build up enormous information which becomes the seed of AI. Humans have attempted to raise something immortal and transcendent, which are different properties from our own. As becoming a kind of numerical being, humans can be omnipresent as long as they can employ the appropriate technology as if they did not have flesh and blood. This new way to exist makes us think about the definition of presence and to see things differently. Humans are attempting to create 'beings' that can generate art, take care of weak or ill people, talk and discuss human issues, and even fall in love with humans.

As our minds can run beyond the boundaries created by the limitations of our bodies, we would like to infuse our creativity into AI. AI CAN that can self-reflect and modify what it does generates various images from the learning system just like an art majored student does. Should we consider the images from CAN that provoke sensation or make the viewers think of nostalgia as art? I would like to extract the last passage from "The Future of Aesthetics" by Arthur Danto as my opinion about the questions I proposed in advance.

> I think the rediscovery of aesthetics is best understood as the rediscovery of the role that aesthetic qualities play in the use of art to present meanings by visual means. Ontologically aesthetics is not essential to art- but rhetorically it is central. The artists use aesthetics to transform or confirm attitudes. That is not the same as putting us in the mood of calm aesthetic contemplations- which has tended to hijack the concept of aesthetics. I don't say it is unimportant, but it is not the only important role aesthetics plays in art… The rediscovery of aesthetics means an enrichment rather that a transformation of current art historical practice. It shows how, in the domain of objective spirit, art has played an important role in society. So far as philosophy is concerned, it is probably a good thing for philosophers to be liberated from the ontological preoccupations that obsessed me and my contemporaries, it is to address art now pragmatically from the perspective of life.[13]

[13] Arthur Danto, "The future of aesthetics," acc. May 1, 2018, http://faculty.winthrop.edu/paulinoc/FALL15/ARTH%20680/Arthur%20Danto.pdf.

Figure 1: Example of images generated by CAN: Top ranked pictures according to human subjects; source and permission: Ahmed Elgammal: elgammal@cs.rutgers.edu

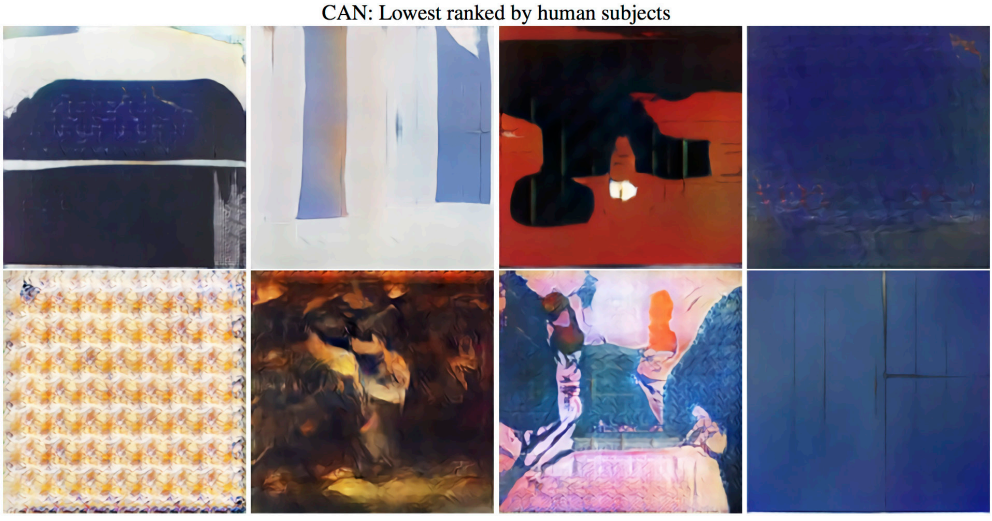

Figure 2: Example of images generated by CAN: Lowest ranked pictures according to human subjects; source and permission: Ahmed Elgammal: elgammal@cs.rutgers.edu

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