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ARTIFICIAL INTELLIGENCE AND ARTISTIC CREATION
WHAT DO MACHINES WANT?

Anne-Marie Boisvert

Editor in chief – Post doctorate fellow in philosophy of artificial intelligence (UQAM)

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"The devil, commenting on the first man's first drawing on Earth, whispered into his ear: "That's good, but... is it art?" (Orson Welles, *F for Fake*, 1972).

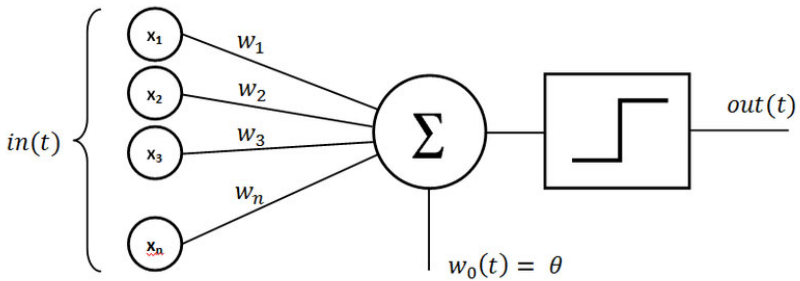


Portrait of Edmond of Belamy, 2018, by AI artist "min G max D x [log (D(x))] + z [log(1 - D (G(z)))]".

Throughout the twentieth century, many artists have taken on the task of questioning and constantly stretching the limits of what art is, or could be; especially so in so-called conceptual art. Less an artistic movement as such, the latter corresponds with the artist's adoption of a critical point of view that leads him to take position in his work, or rather to make the work itself a positional stance with respect to the art world, and to the world itself. The border lines between art and business, in particular, between the object traditionally called "art object" and the manufactured object, have been examined and their legitimacy questioned. But

what makes a work of art a "work of art" in this context is the flawless simplicity of the typical gesture of conceptual art at its best, as well as its innovative and provocative character. The value of the "work" here merges with the assurance with which the artist moves from intention to action. This value is also a function of the way in which said intention and said action are received perceived in the world of art in which they are embedded.

Artificial intelligence is best defined, in the widest sense possible, as the area devoted to the construction of "intelligent agents" who receive environmental perceptions and perform actions, and who imitate and sometimes surpass human behavior. Although artificial intelligence has its roots in logic and philosophy of mind, the field was officially born at a conference sponsored by the Defense Advanced Research Projects Agency (DARPA) in 1956, where the term "artificial intelligence" was coined. Artificial intelligence covers many sub-fields, the main ones being robotics, expert systems (knowledge-based) and machine learning.



Frank Rosenblatt's *Perceptron*, 1957. Inspired by neurons in the brain, it is the first artificial system capable of learning by experience.

In the early days of artificial intelligence, rule-based systems dominated the field. They have proven to be very effective at solving problems and performing tasks such as arithmetic operations which can be described as a list of explicit formal rules hand-coded by computer experts. But many more intuitive tasks, such as speech or image recognition, could not be approached this way, because they are difficult to describe formally. In contrast, machine learning systems (so-called "learners") do not need an explicit list of instructions to complete a task or solve a problem: they learn by themselves by identifying patterns, by making generalizations and inferences from the data, on the basis of which they are able to make precise predictions on material never encountered before. Machine learning is not a new idea. Precursors include Arthur Samuel's checkers program created in 1952 and Frank Rosenblatt's perceptron in 1957. Inspired by brain neurons, it is the first artificial system able to learn by experience. Machine learning systems have experienced a resurgence in recent years, thanks to the explosion of big data and the dramatic increase in computer power. Machine learning should not be solely assimilated to neural networks (and whose deep learning - "deep learning" - is a particularly effective form). Machine learning also encompasses other types of learning, each with its own languages and tools of choice.

In the art world, very recently (in October 2018), a sale at Christie's created a stir and raised a great deal of controversy. The cause of all this was the "portrait" of an imaginary gentleman, Edmond de Belamy, whose "author" is a generative adversarial network (known as GANs for short) (see the portrait at the beginning of this article). This type of system has been developed by Ian Goodfellow et al. in 2014. GANs take advantage of the fact that neural networks used in deep learning, and that are proven to be so efficient in many cases, in particular for image and language recognition, are nevertheless easy to deceive. Hackers have not been the last to notice. The originality of GANs is to use this weakness by transforming it into a force to improve the performance of the network. GANs thus put two neural networks into competition. The first network (the generator), trained with a massive database provided to it during learning as examples, generates an image. The second network (the discriminator) must determine the origin of the image: is it an image taken from the database, or an image created by the generator from the examples that have been provided? The goal is to generate an image as close as possible to the examples contained in the database, in order to trick the discriminator. In the case of the "portrait" of Edmond de Belamy, the generator was fed during its training with a huge database made up of painted portraits from the 14th to the 20th century. At the end of the process, the GAN generated thousands of portraits from which the one sold at Christie's was selected, printed, framed and signed using a fragment of the code used (" $\min G \max D \times [\log(D(x))] + z [\log(1 - D(G(z)))]$ ") by Obvious, a group of French students (Hugo Caselles-Dupré, Pierre Fautrel and Gauthier Vernier). The "work" was sold to an anonymous buyer for \$ 432,500.

The controversy was sparked by several factors. First, the members of the collective are not the authors of the code used in the production of the "work". The author of the code is Robbie Barrat, a young developer and artist who took the opportunity to start a discussion on Twitter about this.

The other controversial factors are of particular interest to us here, because they again raise the questions discussed above. Obvious members attribute the creation of their work to the algorithm. Their motto is: "Creativity is not just for humans."

But how true is this statement? And if it is true, does it change the nature of portrait painting? Can a machine be the creator of anything? And what does it feel like to be a computer that makes art? Can the machine be considered to have intentional states? Must a machine to be creative have to be considered to have intentional states? In what sense can computer generated art be considered representational? And what does it represent? What can computer generated art teach us about creativity?



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