Is artificial intelligence set to become art's next medium?

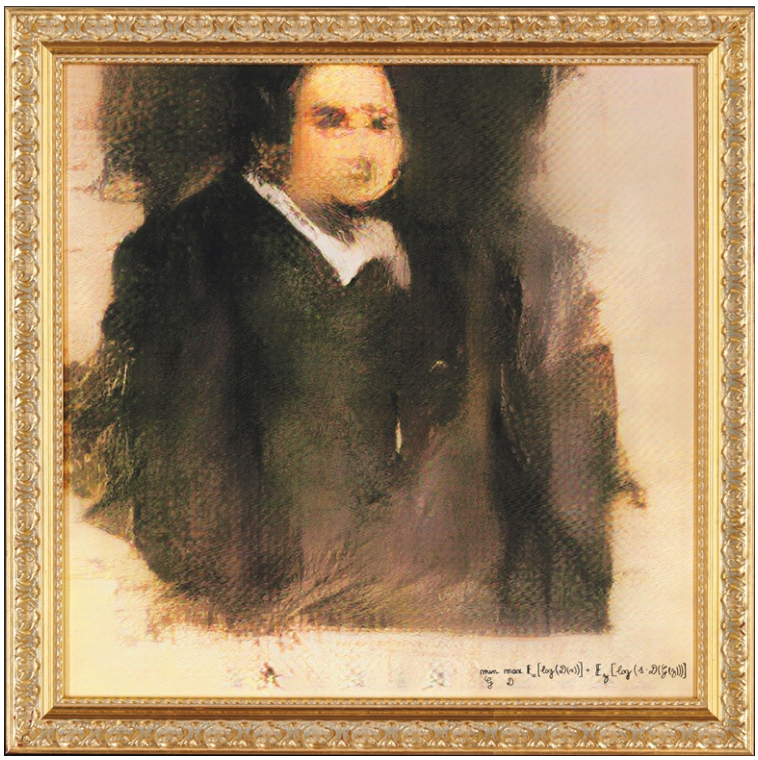
AI artwork sells for $432,500 — nearly 45 times its high estimate — as Christie's becomes the first auction house to offer a work of art created by an algorithm

The portrait in its gilt frame depicts a portly gentleman, possibly French and — to judge by his dark frockcoat and plain white collar — a man of the church. The work appears unfinished: the facial features are somewhat indistinct and there are blank areas of canvas. Oddly, the whole composition is displaced slightly to the north-west. A label on the wall states that the sitter is a man named Edmond Belamy, but the giveaway clue as to the origins of the work is the artist's signature at the bottom right. In cursive Gallic script it reads:

$$\min_G \max_D \mathbb{E}_x[\log(D(x))] + \mathbb{E}_z[\log(1 - D(G(z)))]$$

(Formula obviously flipped, FN)

This portrait, however, is not the product of a human mind. It was created by an artificial intelligence, an algorithm defined by that algebraic formula with its many parentheses. And when it went under the hammer in the Prints & Multiples sale at Christie's on 23-25 October, Portrait of Edmond Belamy sold for an incredible $432,500, signalling the arrival of AI art on the world auction stage.



Portrait of Edmond Belamy, 2018, created by GAN (Generative Adversarial Network).
Sold for $432,500 on 25 October at Christie's in New York. Image © Obvious

The painting, if that is the right term, is one of a group of portraits of the fictional Belamy family created by Obvious, a Paris-based collective consisting of Hugo Caselles-Dupré, Pierre Fautrel and Gauthier Vernier. They are engaged in exploring the interface between art and artificial intelligence, and their method goes by the acronym GAN, which stands for 'generative adversarial network'.

'The algorithm is composed of two parts,' says Caselles-Dupré. 'On one side is the Generator, on the other the Discriminator. We fed the system with a data set of 15,000 portraits painted between the 14th century to the 20th. The Generator makes a new image based on the set, then the Discriminator tries to spot the difference between a human-made image and one created by the Generator. The aim is to fool the Discriminator into thinking that the new images are real-life portraits. Then we have a result.'

> *'We found that portraits provided the best way to illustrate our point, which is that algorithms are able to emulate creativity' — Hugo Caselles-Dupré of Obvious*

But one of the beguiling things about the depiction of Edmond Belamy is that it departs from a human idea of an 18th-century portrait. There is something weirdly contemporary about him: he looks unnervingly like one of Glenn Brown's art-historical appropriations. Why might that be?

'It is an attribute of the model that there is distortion,' says Caselles-Dupré. 'The Discriminator is looking for the features of the image — a face, shoulders — and for now it is more easily fooled than a human eye.'

It must also surely be the case that portraiture is an extremely tough genre for AI to take on, since humans are highly attuned to the curves and complexities of a face in a way that a machine cannot be. It turns out that the difficulty was part of the collective's thinking. 'We did some work with nudes and landscapes, and we also tried feeding the algorithm sets of works by famous painters. But we found that portraits provided the best way to illustrate our point, which is that algorithms are able to emulate creativity.'

Elsewhere in the AI world, researchers are playing other art-historical games. Ahmed Elgammal, director of the Art and Artificial Intelligence Lab at Rutgers University in New Jersey, is working with a system that he calls CAN — a 'creative' rather a 'generative' network. The basic binary hokey-cokey is the same — maker and judge, artist and critic — but CAN is specifically programmed to produce novelty, something different from what it sees in the data set, which in this case consists of all manner of paintings from the 14th century on.

'I am surprised by the output every time I run it,' says Elgammal. 'An interesting question is: why is so much of the CAN's art abstract? I think it is because the algorithm has grasped that art progresses in a certain trajectory. If it wants to make something novel, then it cannot go back and produce figurative works as existed before the 20th century. It has to move forward. The network has learned that it finds more solutions when it tends toward abstraction: that is where there is the space for novelty.'

This raises the intriguing notion that AI algorithms do not merely make pictures, they also tend to model the course of art history — as if art's long progression from figuration to abstraction were part of a program that has been running in the collective unconscious for half a millennium, and the whole story of our visual culture were a mathematical inevitability.

No AI researchers are claiming that much just yet. They are still addressing the fundamental question of whether the images produced by their networks can be called art at all. One way to do that, surely, is to conduct a kind of visual Turing test, to show the output of the algorithms to human evaluators, flesh-and-blood discriminators, and ask if they can tell the difference.

> *'If you consider the whole process, then what you have is something more like conceptual art than traditional painting' — Ahmed Elgammal, director of the Art and Artificial Intelligence Lab at Rutgers University*

‘Yes, we have done that,’ says Elgammal. ‘We mixed human-generated art and art from machines, and posed questions — direct ones, such as “Do you think this painting was produced by a machine or a human artist?” and also indirect ones such as, “How inspiring do you find this work?”. We measured the difference in responses towards the human art and the machine art, and found that there is very little difference. Actually, some people are more inspired by the art that is done by machine.’

Can such a poll constitute proof that an algorithm is capable of producing indisputable works of art? Perhaps it can — if you define a work of art as an image produced by an intelligence with an aesthetic intent. But if you define art more broadly as an attempt to say something about the wider world, to express one’s own sensibilities and anxieties and feelings, then AI art must fall short, because no machine mind can have that urge — and perhaps never will.

Hugo Caselles-Dupré of Obvious readily concedes that ‘for sure, the machine did not want to put emotions into the pictures. And in research terms, the idea of a robot having an open-world experience, and using it to make something new — that is pure science fiction for now.’

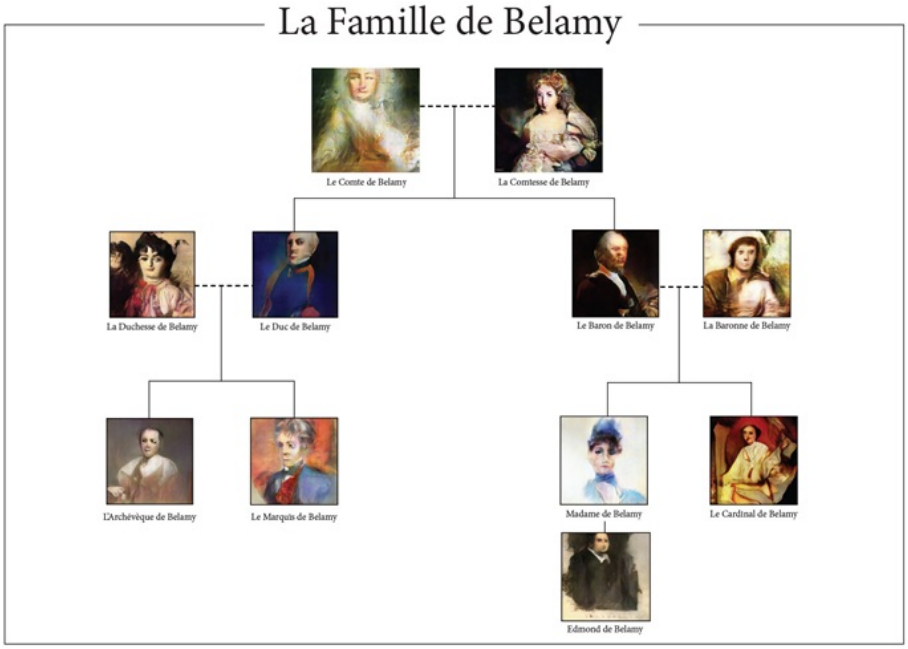
Portrait of Le Comte de Belamy, 2018, head of the fictitious Belamy family (and Edmond de Belamy's great grandfather) created by the GAN ‘mind’ © Obvious

Portrait of La Comtesse de Belamy, 2018, the fictitious wife of Le Comte © Obvious

That leaves open the question of authorship. Is it really the algorithm, as the signature on the Belamy portrait implies? ‘If the artist is the one that creates the image, then that would be the machine,’ says Caselles-Dupré. ‘If the artist is the one that holds the vision and wants to share the message, then that would be us.’

Elgammal, speaking about his own experiments, broadly agrees: ‘Yes, if you look just at the

form, and ignore the things that art is about, then the algorithm is just generating visual forms and following aesthetic principles extracted from existing art. But if you consider the whole process, then what you have is something more like conceptual art than traditional painting. There is a human in the loop, asking questions, and the machine is giving answers. That whole thing is the art, not just the picture that comes out at the end. You could say that at this point it is a collaboration between two artists — one human, one a machine. And that leads me to think about the future in which AI will become a new medium for art.'



La famille de Belamy — all the portraits in GAN's fictitious Belamy family tree. Image © Obvious

The auctioning of the Belamy portrait amounted to another kind of test for this new medium: does the market see a future in it? It appears it does.

In some ways the answer to that question was straightforward. 'It is a portrait, after all,' says Christie's specialist Richard Lloyd, who organised the sale. 'It may not have been painted by a man in a powdered wig, but it is exactly the kind of artwork we have been selling for 250 years.'

Obvious have acknowledged that there is something retrospective in their experiment by wrapping it in a little genealogical joke: all the portraits produced by their GAN mind have been assigned a place in a fictitious Belamy family tree. There is a Baron de Belamy in a military sash, a comtesse who looks like a distant cousin of Catherine the Great, a coquettish fin-de-siècle baronne in pink silks.

'AI is just one of several technologies that will have an impact on the art market of the future — although it is far too early to predict what those changes might be,' says Lloyd. 'It will be exciting to see how this revolution plays out.'

Earlier this year Christie's staged a symposium on the profound implications of blockchain for artists and collectors. The inaugural technology conference will be an annual event, and AI will very likely be one of the topics explored. Ten or 20 years down the line — who knows? — the subject of discussion could be virtual-reality performance art, or the oeuvre of some as yet undreamed-of robot Picasso.