

Critical Paranoia and Neural Networks

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While surrealism is at least partially rooted in the sciences of the mind in the time of its emergence, whether it is the psychiatry of the preceding century or the remarkable introspections of Paul Valéry¹, it does not seem that the recent developments in neurosciences have attracted much interest in their relations with some aspects of surrealism.

Although some current developments in the sciences of the mind², including those considered here, have a long-established origins³, the abuses of the term "high-tech" have made it appear as a particular arduous or even incomprehensible field, which, in this case as in many others, is probably correct when considering the technical side of things – that is, the professional question of knowing *how* (to make it) – but things are much less difficult if one is only interested in ideas and principles – that is, in the much simpler philosophical question of knowing *what* it is. In the specific case of the developments discussed below, it has recently become possible to make the reader perceive what is involved and what may be at stake because things have now reached a degree of visibility which makes presentations easier.

Let's have a look at it... **Photo 1**, was taken in a forest for being used as a basis for a paranoiac critical exercise, to which old strains are just as adequate as the images of old ruined walls that were recommended by Leonardo da Vinci.

At first glance, **Photo 1** and **Photo 2** seem identical. But a little attention makes it possible to realize that some strange animals appear in **Photo 2**, which do not appear in **Photo 1**. This is exactly what one may expect from a mind that would submit itself to a critical paranoiac vision, of the first photo. With the difference that no human mind has been indulged in the kind of exercise proposed by Salvador Dalí, but rather *a network of formal neurons*. That is to say, not real and biological neurons, but extremely simplified models of biological neurons, that were simulated through using a computer.

1 Cf. Treize savants redécouvrent Valéry

2 A wording that may be preferred to the misleading and restrictive "neuroscience" wording

3 More than 70 years as regards neural networks, that will be discussed here.



Photo 1



Photo 2

In its public version, the formal neural network in question is called *DeepDream*⁴™. Google created this program from the *Inception* network that was presented by the firm, as its participation in the 2014 edition of the annual Competition for Large Scale Visual Recognition Challenge⁵ (ILSVCR-Imagenet Large Scale).

Indeed, formal neural networks do not, strictly speaking, constitute devices of artificial intelligence, but rather devices of *form recognition*, that is to say *artificial perception* – which means that they are devices of a truly *aesthetic* nature. Their main current uses in industry or research are the recognition, identification and classification of shapes and forms that may be visual or graphic, fixed or animated (e.g. video), but also sound forms (recognition of speech) or quite other forms as in biochemistry for the recognition of DNA sequences, medical diagnosis, or even alas for stock market speculation.

On the other hand, although formal neural networks are usually simulated using software and computers, it is important to understand that this is mainly for questions of ease and flexibility in implementation, and above all in experimental studies. It would be entirely possible (but far more expensive) to build formal neural networks in the form of electronic circuits, train them based on software algorithms but further on, their operation is not essentially software-based, nor even based upon computation in a conventional sense. For example *DeepDream* does not work by comparing the images that are presented as its entries to those that would be contained in a huge database. It does not either project onto the images that are presented as its inputs, some ready-made diagrams stored in its memory. It interprets what it “sees” - what is presented to it - on the basis of the training process (i.e. learning) to which it has been submitted. And the results are not just “somewhat” undetermined but exhibit a much more radical indetermination.

So when the same image is presented twice as an input to *DeepDeam*, the results of *DeepDream* interpretation will be slightly different. Some animal shapes that appear as results of the processing of a given image will not appear in the results of the processing of the same image when applied to a subsequent experiment.

This is the case in **Photo 3**, which results from the input to *Deep Dream* of the same **Photo 1** picture that was previously interpreted as **Photo 2**. For instance, the bird in the upper left quarter of **Photo 2** has been re-interpreted in **Photo 3** as another animal that may no longer be a bird. Similarly, the small animal that is located at the bottom left quarter of **Photo 2** is no longer visible on **Photo 3**, and the dark animal in the hollow just above has slightly changed shape.

We should get accustomed to the fact that neural networks are not obedient slaves.

4 DeepDream - <https://en.wikipedia.org/wiki/DeepDream>

5 ILSVCR - https://en.wikipedia.org/wiki/ImageNet#ImageNet_Challeng



Photo 2



Photo 3

Learning for a formal neural network, consists in *adapting the intensity of connections between neurons*. In a way, insofar as one wants to speak of memory regarding this subject, similarly as Gaston Bachelard had clearly seen with regard to human memory, a neural network is pure *action*, it is only *activity*. A neural network does not “have” a memory, better than that, *it remembers* !

A little bit of mathematical intuition makes it possible to understand why it is more adequate and extremely powerful that memory – or better said *learning* - is localized at the level of the *connections* between the neurons (called synapses) rather than at the level of the neurons themselves. The human brain is made up of 86 to 100 billion neurons, which is already enormous, but in addition each of these neurons is connected on average to 10,000 others, which represents a number of truly phenomenal possibilities. Comparatively, current formal neural networks are very simple and well below these numbers.

The learning abilities of today's formal neural networks are in line with this huge difference in the numbers or neurons involved... These networks certainly learn, but they must be fed by thousands and thousands of examples, millions of examples even. This is the reason why their industrial uses are only really developing now. Huge image databases were required for their training, image databases that could only be created at a reasonable cost through the use of the Internet.

Although useful from a pedagogical point of view, the representation that learning, (memory) in biological neural networks is located at the level of connection between neurons (synapses) is probably inaccurate. For instance, it is known that in the case of biological networks “memory” – memory of places visited, for example - corresponds to the configurations of connections of groups (assemblies) of neurons. This and some other important “details” has been the subject of studies that were awarded the Nobel Prize in Physiology or Medicine in 2014. This means that potentially two assemblies of neurons that would differ only in *one neuron, or only in some synapses* may correspond to different memories.

In fact, as noted above, not only the results of the activity of neural networks are undeterminable, which makes them relatively unsuitable for slavery, but also and moreover, they are opaque. This means that we do not fully understand what is happening inside the network. This is because the functioning of a network of neurons is not a mechanism, it does not result from the addition of the individual activity of the neurons, but it is *an emergent property* that only has meaning and a reality at a collective level, at the level of the network itself. Similarly, boiling water is an emerging property of billions of billions of water molecules. Does a single molecule of water boil?

Current formal neural networks actually consist of *multiple layers* of interconnected neurons networks – similar to the layers of neurons in the brain. It is precisely because we do not really understand what is happening within the neural networks that Google has undertaken to visualize it, giving birth to *DeepDream* ; whose true initial objective is to make visible the activity of different levels and layers of neural networks involved in the different stages of pattern recognition.

From this point of view, not of scientific research specifically, but rather from the point of view of an *experimental aesthetic*, it becomes interesting to play with the results of the visualization of these different levels...

The more the processing deepens the more the image is populated with imaginary, unknown, strange animals...

I had cleaned up some of the wild overgrowth invading the back of my garden with the intention of placing a couple of beehives there (**Photo 4**). Since the bees arrival was delayed, the place looked somewhat empty, hence I used *DeepDream* to populate what I felt looked much too barren.

I wasn't disappointed, just a few birds at first (**Photo 5**), then a whole array of fantastic animals (**Photo 6**) comparable to some of Hieronymus Bosch's fevers – almost.



Photo 4



Photo 5



Photo 6

As for art, neural networks open up *experimental* possibilities that would be irrelevant to explore here. It is however reasonable to speculate, that they will develop further in the future. Yet concretely, from an artist's point of view – the artist with or without turpentine, as Marcel Duchamp would say – what is possible? Given a certain ambient technophobia, the first reactions will undoubtedly be rejection⁶. Much the same or a similar rejection, as the one that took place at the beginning of photography. The same sort of rejection as well which continued later on to exclude all post-war technical inventions from surrealist playgrounds.

However, the situation opened by the emergence of networks of formal neurons is particularly troubling because they are a form of *imagination*, a very rough and primitive form of imagination indeed, but real. If men no longer even have the privilege of the imagination, then what shall remain for them ? Everything!

On one hand, if formal neural networks - which I here refuse to call *machines* in the usual sense of the word – produce interesting images, these images may be used at will as *found objects*. They are in no way different from the photographs that provide the basis of collages, nor are they different from the spontaneous images that appear in our minds from the vision of old walls, clouds, and decalcomanias, or from the shadow of some leaves delineating Voltaire's portrait on a wall in Figueras. Art then resides in the *choice* of images, in their transformation - or not - according to all available means and methods, and in their composition into potentially fascinating works. The fact that some components may easily be obtained by means of “machines” (neural networks or others) doesn't matter. From a surrealist point of view, the passion that comes out of an artwork has never depended on the amount of sweat required for its elaboration.

⁶ “Matta has repeatedly said that art and science are moving at the same pace. This was one of his contributions to Surrealism, and a reason for his exclusion”. J-P. Domecq - Catalogue de l'exposition Matta Centre Pompidou 1985 P 70



The Last Days of Corinth Revisited - Bernard Dumaine - Photo Matthew Lessart

But there is better, and there is more of course. From an artistic or more widely *experimental* point of view, computers when equipped with suitable software, besides the fact that they become like “seven league boots” in terms of easiness, scope and speed, are similar to magic cauldrons where everything can meet and merge, whether it is of digital origin or of any other. Reciprocally, nothing prohibits transporting in “real”, non-digital works, components derived from a little bit of digital witchcraft.

Yet beyond that, the old dialogue between man and tool, between man and machine⁷ remains. The same alchemical dialogue that the painter builds and by which himself is built within the space of his canvas, colors and brushes is still there. Nothing has changed. Everything moves, continues to move, from and through this magical intimacy that elaborates through the voluntary practice and reflection between man and his tools. Art in the old sense of the word, in the sense of *Ars* – beyond the disciplines and the diversity of techniques – is precisely this dialogue and this intimacy.

However, what is irremediably new, is the company where we are henceforth of *aesthetic* “machines”, machines that perceive and see, capable of bringing forth forms out of regions of reality and mind, hitherto unknown or opaque. It becomes possible to create representations that visually reveal forms from *other* – i.e. *non-visual* – domains ... sound, physical, chemical, biological, social, temporal etc.

⁷ But a kind of machine which has hitherto been nothing more than something *literally made* of man ; machines that are actually a form of solidified, standardized and frozen *man*.

Roberto Matta saw these possibilities where the visual emerges from what is *not* visual. He recognized the potential riches of it:

“Without vision of the eye all representation remains blind. And the reasoning that ensues remains insufficient, impotent”⁸. [...]“We have no maps, in the geographical sense, of the morphologies of social materialism; similarly, we have neither a geometrical convention nor an algebraic convention. Among the traditional disciplines of the verb “*To See*” there are others than the ones that are called Optics. With these other disciplines the verb “*To See*” could elaborate a social geography and could see what we do not see ... We should see the social space, draw up a first map of social navigations in the economic ocean”⁹. [...] “It is said, isn’t it, that nature is always at work. Today, it is social nature”. [...] “A map of the social. To show people what they have no idea of seeing, or that they seek in vain to see: their solitary navigation in the community, in this seemingly treeless landscape, where zones of economic pressure hover in a nonflat geometry, streaked with the lines of political decisions, etc.”¹⁰

Matta's vision is now realized and at work – for better or for worse as usual. In the wrong hands, the use of neural networks can be highly toxic, or open to wonders in better-intentioned hands. But the constantly renewed ordeal, where the worst and the best are played with each new technique, is our own. Not to be missed. The danger would be to refuse it. For, as Brecht said, “he who fights may lose, but he who does not fight has already lost.”

Beyond this struggle, which is a struggle for us all, there is a special responsibility for Art and Surrealism, far upstream from the emergence of any fresh, new technique, which Matta will have more fully acknowledged, and deeply worked on, than any other¹¹, that is to (attempt to) act poetically in order to influence the course of things:

“Poetry must provoke the scientific spirit in the manner of a seduction, a corruption. A seeing Oedipus could have seen the space of the species. This space where browsers are the artists.”¹²

It is possible that perception, that some forms of intelligence may not be human characteristics, even that of animals, or specifically even of a life form.

The question then arises of what kind of relationships we want to have with non-life forms. It is in fact already raised regarding “machines” as crude as those currently studied. The media rants about supposed competition between man and machine, such as has happened for the game of chess, and more recently for the game of Go, create an unpleasant feeling as regards the way things are headed.

Instead of taking advantage of the chance that we have built ourselves, to see, from now on, through other eyes. Instead of taking hold of these strange foreign eyes in order to perceive in the universe abstract, non-visual forms, we give ourselves, like an erroneous program that loops, to the sterility of asking ourselves unceasingly the question of which, of man or machine is “the strongest”. As if this question had the least interest, the least relevance as regards the stakes of a generalized perception and knowledge, as regards the stakes of another automatism, *an automatism that would be extended to the automata themselves.*

Matta knew better:

8 Catalogue de l’exposition Matta au Centre Pompidou 1985. Page 76.

9 Carnets de Matta – In catalogue de l’exposition Matta au Centre Pompidou 1985. Page 78.

10 Catalogue de l’exposition Matta au Centre Pompidou 1985. Page 78.

11 ... with the obvious and notable exception of Marcel Duchamp.

12 *Carnets de Matta* – Catalogue de l’exposition de Matta au Centre Pompidou 1985. Page 77

“If every noise already contains a meaning, automatism is the method for drawing order out of disorder, out of every situation of disorder, and it is not a creation of disorder.”

Some (re)sources :

- Pour La Science n°465 – Juillet 2016 – La révolution de l'apprentissage profond - Pages 42 à 49
- Deep Dream Generator : <https://deepdreamgenerator.com/>
- La Recherche Hors Serie n°18 juin-juillet 2016 – Notamment l'interview de Yann Le Cun Page 79 et « Qu'attendre de l'apprentissage profond » Page 90.

