NEURAL NETWORKS & AESTHETICS

Frieder Nake
Summer 2020

Outline & Credit

(FN version 2, 14 July 2020)

Since a few years, computers have become powerful enough to allow a certain type of network structure to be applied to image generation where the resulting images may even gain the reputation of being fine art. It was a great sensation when, in December 2018, the auctioneer Christie's in New York sold a portrait under the title, "Edmond de Belamy", for $432,000. Christie's is one of the top art sellers of the world. The picture has as its signature a mathematical formula,

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

which is complex enough so that not many can read it, let alone explain what it means. The artists in real life are three students of Paris, and what they did was to let a GAN do a job of what is often called "Machine Learning".

The acronym GAN stands for "generative adversarial network". That's an artificial network operating in two phases, a "learning phase" and a "generative phase". During "learning", the system is fed with more and more portraits (in this case) from which it extracts data that will, at generation time, control the setting of pixels in what is to become the painting.

We will, in this one-week workshop, take this event as our starting point to then work into two directions. One will be *algorithmics* including a good deal of necessary mathematics; the other direction will be *aesthetics* as the philosophical background of art. And there you have it: algorithmics and aesthetics are the parents of digital media. You could also say, digital media is caught between aesthetics and algorithmics.

In the workshop, we will look at neural networks from perspectives of history, mathematics, design, and art. We will recapitulate a bit from the beginnings of Artificial Intelligence, when networks appeared to be an alternative to applying formal logic; networks lost. And we will read something from the current front of the *singularity* when computers will finally surpass humans (if you believe).

Whenever this will appear to be too boring or strenuous to us, we will take to art, algorithmic art.

VAK 03-06-M-309 | Summer term 2020 | one-week workshop under special conditions | 2 SWS | 4 ECTS | at changing places
M.A., M.Sc. Digital Media | Module Topics in "Media Informatics" or in "Digital Media" | from 20 to 24 July 2020, 10 to 16 |

Frieder Nake | nake@uni-bremen.de | (0421) 218 64485 | Uni MZH room 1330 | https://compart.uni-bremen.de | meet me upon personal arrangem

Credit Points

You are supposed to actively take part during the entire week. That's the basic pre-condition for you to gain credit. On top of this and after the seminar has closed, you must decide:

You can opt for credit points either for "Topics in Media Informatics" or for "Topics in Digital Media". Your work for "Media Informatics" will be a software project whose topic we will agree on; it includes a written report. Your work for "Digital Media" will be an essay on a scientific publication in the fields of aesthetics and algorithms.

I will prepare lists for both options for you to choose from.

The assumed number of credit points is 4. In case you want to go for 6 CPs, the complexity of your project will be increased.

If you choose the *software* path, you develop Processing code. The code must be well-structured, greatly parameterized, and well documented. The report should be up to 4 pages in length. If you choose the *essay* path, your text should be clearly structured and formulated. It should be 10 to 12 pages in length. You deliver pdf and pde files, by email, respectively. Submission deadline is September 10, 2020.

Schedule for the Week (subject to changing conditions)

Monday 20 July 20	Hello! Neural Networks; Edmond Belamy & Generative Adversarial Networks 10 to 12 on the lawn in front of MZH 12 to 13 lunch break 13 to 14 individual work on assignment 14 to 16 online
Tuesday 21 July 20	Neural Networks When Artificial Intelligence started 10 to 12 at the university / on the lawn 12 to 13 lunch break 13 to 14 individual work on assignment 14 to 16 online
Wednesday 22 July 20	The place of Neural Networks in Artificial Intelligence 10 to 12 at the university / on the lawn 12 to 13 lunch break 13 to 14 individual work on assignment 14 to 16 online
Thursday 23 July 20	Artificial Art, from the history of "computer art" 10 to 12 at the university / on the lawn 12 to 13 lunch break 13 to 14 individual work on assignment 14 to 16 online
Friday 24 July 20	Aesthetics in times of the artificial. Goodbye! 10 to 12 online 12 to 13 lunch break 13 to 14 individual work on assignment 14 to 16 at the university / on the lawn

As you see from this rather schematic schedule, each day has its main topic, setting a focus. And it divides the day into certain sections. They are my attempt to deal with the situation. We should all be ready and willing to deal with that situation in a way that allows everyone to get something out of this experiment (or even a lot). As of now, it looks as if we were around sixty participants, which will put some measure of responsibility on all of us in order that we gain and don't lose. We will have to be aware of the others, perhaps, to a higher degree than usually. I count on you!

Each one of the five days will have a scientific paper that we study. They will be announced early enough, and they will be available to all of you. We meet daily at 10 a.m. and adjourn at 4 p.m. If needed, we allow ourselves to run overtime. We will also study a small selection of outstanding works of algorithmic art.

As you may have noticed, the plan for each day follows the same time schedule, however the locations will vary. We will try a mixture of online meetings and meetings at the university. I hope that we can arrange for them to be inside the building, or else on the lawn just outside. To meet inside, certain conditions must be satisfied that I do not know precisely yet. The weather forecast for the week is not terribly exciting. So, our schedule is still a bit shaky. We may have to fix it according to changing situations.

We will start into this:

Monday, 20 July 2020
at 10 a.m.
on the lawn in front of MZH.

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