About *AI and Arts*

Workshop *BattleRoyal*

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Good afternoon!

From a technical point of view, one can say that there have been extraordinary developments in the broad areas of Artificial Intelligence and Data Science that increasingly determine our lives. Think, for example, of the many intelligent assistants that are playing an ever greater role in road traffic, in hospitals and in many other areas of application.

Art is affected by this as well, because the computer-assisted and AI-supported implementation of creative ideas and thoughts and experimentation with new things have led to innovative results.

Most recently, the head of the German Telecom proudly informed us - through a major German newspaper and various social networks - that *the 10th Symphony* of Ludwig van Beethoven could finally be composed with the help of Deep Learning. That is interesting, however, I must confess that the implicit general assertion "the 10th symphony" bothers me a lot here and "a version of the 10th symphony" would fit better.

I am sure that not all of you welcome this new kind of collaborative creativity. For some of us, art still means creating art through our own efforts alone - that is, without intelligent, computer-assisted help. For others, however, an artificial creativity is allowed, eventually explicitly desired, even with such means like Deep Learning that is currently on everyone's lips.

There is one advantage of artificial art: whereas van Gogh, Picasso, Shakespeare, Mozart, Beethoven and all the other masters created their works partly or perhaps even predominantly at night or in connection with extraordinary emotional states such as infatuation or suffering, “AI and Art”-systems actually offer the possibility of producing an output 24 hours a day.

Perhaps there is an acceptable compromise in between and perhaps one should see the intensity of collaboration from a gradual point of view in an interval from 0 to 1. And, maybe, we should think about labelling artefacts by using expressions like "Made by Human" and "Made by Robert, the artificial painter".

Lots of innovations in AI have been performed since its (official) birth in 1956 and many novelties have been achieved in the following years in different disciplines - like in the Arts. But we should not forget Thalos, the robot made entirely of bronze by Hephaestus, to protect Crete from invaders.

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In the following, I firstly would like to present briefly some projects. Then, I will discuss some general activities as well as spend some words about the PhotoBooth project. The talk concludes with referring to one of our contributions to Esch2022: the CORNERSTONE projects, some of which we are demonstrating today.

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In 1973, for example, Harold Cohen, a former researcher and a painter from UC San Diego, collaborated with a program called "AARON". This program was able to make pictures autonomously - and for many years – Harold Cohen made jokes that "he was the first artist who would ever be able to have a posthumous exhibition of new works created entirely after his own death".

He questioned whether the pictures, which the evolving program has made, are works by himself (Harold Cohen), independent creations by the machine called AARON, or perhaps collaborations? He understood this was (and still does) a delicate problem: AARON has never moved far out of the general stylistic idiom, in which he worked in, for example in the 1960s, when he was a successful exponent of color field abstraction. But he often mentioned that AARON has been somehow his "student".

Harold Cohen raised some of the unresolved questions about ->*Machine Art*, for example: "What is its potential?", "Can – irrespective of the quality of the work produced – the produced work be described as 'creative' or 'imaginative'?" These are problems, profound and fascinating, that take us deep into the mysteries of human art-making...

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The "Painting Fool" is from Simon Colton, a professor of Computational Creativity at Goldsmith College London, who suggested in 2013 that "if programs are to count as 'creative', they will have to pass something different from the Turing test".

He suggested that rather than simply being able to converse in a convincingly human manner (as Turing proposed), an "AI artist would have to behave in ways that were skillful, appreciative, and imaginative".

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In 2015, Alex Mordvinsev and the Google Brain AI Research team published some fascinating results. After training to identify objects using visual cues and inputting photos of skiers and randomly shaped objects, their programme began to generate digital images reminiscent of the combined imaginations of Walt Disney and Pieter Bruegel the Elder. Among them was a hybrid "pig snail", a "camel bird" and a "dog fish". This was a new art form called "inceptionism", named after the "inception" algorithm, in which a neural network gradually zooms in on an image and tries to see it in the context of what it already knows. The inception-algorithm is based on a convolutional neural network for assisting in image analysis and object detection; it got its start as a module for GoogleNet.

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I refer to an article from ArtNews about Holly Herndon: she is one of several musicians to champion the laptop as an instrument and who has relied on the software's vocal manipulations in her debut album Movement (2012), calling the device "**the most personal instrument the world has ever seen**".

Some years later now, she takes a more critical view of AI. She uses it more to show her own limitations and at the same time to use her skills as a musical collaborator. Her goal is not to replace the human element, as she says, but to enhance it.

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Taryn Southern is a pop artist, has worked with several AI platforms to co-produce her debut album "I AM AI" in 2017. Her single "Break Free" is a human-AI collaboration. She says: "**using AI, I am writing my lyrics and vocal melodies to the music and using that as a source of inspiration. Because I am able to iterate with the music and because it gives feedback and parameters and because I can edit as many times as I need, it still feels like it is mine.**"

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Xander Steenbrugge is an engineer from Ghent, Belgium. He has developed an AI system that creates visualisations in time with music, achieving mesmerising results. The piece is part of the project "Neural Synesthesia", which is designed to use music to create visualisations in a number of different ways. Steenbrugge makes it clear that “he does not create these works, but that he brings them to life together with his AI models”. In his opinion, AI does not fully create the work, and neither does he. It is very much a collaboration.

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OBVIOUS is a collective of researchers and artists, who work with Deep Neural Networks to explore the creative potential of Artificial Intelligence in Arts. In 2017/18, OBVIOUS fed 15000 classical portraits into a generative, adversarial network (GANs) and let this Deep Learning technique autonomously create a series of new portraits.

From these, they selected some by themselves and thus "founded" the so-called "Belamy Family". The presented family tree is, therefore, completely fictitious.

The painting of "Edmond Belamy" was finally auctioned and sold at Christies' for more than 400,000 US dollars, almost twice as much as other auctioned paintings by Roy Lichtenstein and Andy Warhol together.

However, not everyone, who knew its artificial character, considered the painting "Edmond Belamy" as to be art.

For Pierre Fautrel, co-founder of OBVIOUS, however, there is no doubt as he explains: "even though the Generative Adversarial Networks have created the painting artificially, it is up to us (humans) to decide to compute and to print it on canvas".

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In 2012, Ranjit Bhatnagar, a programmer and artist, invented his Pentametron-machine, result of an art project in which he mined the Twittersphere for tweets in iambic pentameter.

First, using a pronouncing dictionary (he used the one from Carnegie Mellon University), he built a program to count syllables and to recognize meter. Then, with a separate piece of code to identify rhymes, he started to assemble sonnets. For the first National Novel Generation Month Competition 2013, Bhatnagar submitted "I got an alligator for a pet!", a collection of five hundred and four sonnets created with Pentametron.

Bhatnagar's code requires that each line be an entire tweet, or essentially one complete thought (or at least what counts as a thought on Twitter). It also did its best to abide by strict rules of meter and rhyme.

This is how "Good night! Tomorrow is another day :)" have become machine-written.

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The Turing Test has long been a standard for assessing Artificial Intelligence, but, in the context of making art - rather than simulating consciousness - it may not be the most valuable, or the most interesting, metric.

Mary Flanagan, a poet, artist, and professor of digital humanities at Dartmouth College, thinks the notion that machine-generated poems should be expected to pass the Turing Test is boring. "Humans are already good at producing human-sounding sonnets, so why get a computer to do that? Do something new!"

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Machines reflect our consciousness - Memo Akten is an artist, researcher and philomatist whose projects use Machine Learning to reflect on ourselves and explore how we make sense of the world. He uses technology to reflect on our humanity and explore how we make sense of the world. Memo Akten has trained an algorithm to 'see' using images that represent essential concepts of human life. To get images that reflect our common humanity, he downloaded photos from Flickr that were tagged with the given words (e.g., universe, flowers, life, etc.). He then programmed the machine to "imagine" new images based on all of them. The result is a journey through the "imagination of a machine".

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This is about several workshops taking place between January and May 2019 about body, movement, and language that have been given by Bill T. Jones. Bill T. Jones is a choreographer and Artistic Director of New York Live Arts in Manhattan has many activities that encompass an annual presenting season together with allied education programming and services for artists. A video accessible on YouTube includes some components and results of the workshops and shows a fascinating picture of his education style, the results he achieves, and the enthusiasm among his students. The link is given in the slide.

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Charisma is an interactive comic app that puts the user into a story where they talk to the characters and thereby influence the stories themselves. The titles available in the comic app are adaptations of successful graphic novels, for example: Sherlock and the Vampires of London.

The interrogation is an interactive drama, the user is thrown into a room with a dangerous killer and must convince him to spare his next victims. Working with fictional characters, the user must figure out what the killer wants and help stop the murders. The user must act quickly and be able to save each of the victims.

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Created in February 2016, AIVA is specialized in "Classical and Symphonic music composition". It became the world’s first virtual composer to be recognized by a music society SACEM.

By reading a large collection of existing works of classical music (written by human composers such as Bach, Beethoven, Mozart, and others) AIVA is capable of detecting regularities in music and on this base composing on its own. AIVA uses Deep learning and Reinforcement learning.

Since January 2019, the company offers the "Music Engine", which is capable of generating short (up to 3 minutes) compositions in various styles like Rock, Pop, Jazz, Classic, et cetera. The slide shows a preview of the score Opus Number 3 for piano solo titled "A little chamber music".

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The following 3 slides show several conferences and events, in which we continue to pursue the theme of "AI & Art".

- AIFA 2021 – Artificial Intelligence and the Future of Arts
- BNAIC 2021: AI in Action, Joint International Scientific Conferences in AI, organized by UL and BeNeLux Association for Artificial Intelligence

In AIFA and in BNAIC, participants explored the increasing interactions between AI and Arts and addressed a wide range of topics such as the role of AI as a tool for creating art in the visual and performing arts, what kind of AI technology is used and deployed, or how AI as technology can become a material component of an artwork.

There were and are also various interviews in collaboration with Esch 2022 and today with BattleRoyal, as well as a participation in a panel discussion invited by the EU National Institutes of Culture about a “future living with AI”. Since no one can predict the future of society coexisting with machines, it should be clear that our future will be much more predictable if we decide responsibly today what kind of future we want.

The conference “Humanities & the Rise of AI” is a conference organized by the Faculty of Humanities in cooperation with the Department of Computer Science and with The British University in Dubai and the United Arab Emirates University. The conference will take place next year in Dubai at the beginning of February as part of the World Expo and at the invitation of the Luxembourg Ministry.

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The AI & Art Pavilion

This picture shows the result of a project I did together with my former students Jiaqin, Jingjing, Mei and Ze in the course "Machine Learning" in the winter semester 2019/20. It involved our own photos that we had taken in the university. Based on these photos, we used Tensorflow, a software with deep learning techniques (e.g., auto-encoder), to create new photos in an artistic style (van Gogh and others). These were combined in our 2020 calendar. This project has decisively stimulated our contribution "AI PhotoBooth".

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On this slide, you can see a snapshot of how we set up the Photobooth and then tested it: step into our Photobooth after all! Our QT robot, called Cutie, will approach you (in English) and first ask for permission to take your picture. Look into the camera, but do not be afraid, your picture will not be stored, it will only be used in the processing. Then please choose an art style. Wait. After a few seconds your picture is ready and you can look at it. If you want to have the finished picture sent to you, simply enter your email address. Again, we do not store this, so do not worry. The picture will be sent to your email address within one day.

Cutie has an implemented intelligence that allows it to learn specific characteristics of any art style, such as that of an artist. This art style can then be applied as if 'mixing' a new image with the learned art style. The result is a new image that suggests as if it has been 'painted' by the chosen artist themselves.

Cutie uses a machine learning technique known as Generative Adversarial Networks (GANs). These GANs are based on the idea of simulating the concept of neural processing of signals (as is the case with humans and other living things). However, like many other machine learning techniques, GANs are ultimately a mathematical approach that enables the robot to recognise and memorise the characteristic features of a style. The learning process is carried out by the machine autonomously and without the intervention of the scientist.

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So, let's get together! Visit us and enjoy the projects. Ask us if you need more explanation! We will help you!

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Thank you very much for listening!