Getting Creative - AI and Arts

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Good afternoon!

The title of my talk is: Getting Creative - AI and Arts.

Why?

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 assistance systems that are playing an ever greater role in road traffic, in hospitals and in many other areas of application. Art is also affected by this, because the computer-assisted and AI-supported implementation of someone's own creative ideas and thoughts and experimentation with new things have led to innovative results, some of which I would like to present to you today.

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This presentation will hopefully be controversial, because not all of you will 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, creativity is allowed and explicitly desired even with such means like Deep Learning. Perhaps there is an acceptable compromise in between and perhaps one should see the intensity of technical support from a gradual point of view: 0% to 100%: 0% means: only the artist. 100% means: only the machine. Maybe we should start labelling art "Made by Human" or (even then cheaper in price) "Made by Machine". Such a decision would also be interesting with regard to ethics.

While van Gogh, Picasso, Shakespeare, Mozart, Beethoven and many more created their works partly or perhaps even predominantly at night or in connection with extraordinary emotional states such as infatuation or suffering, modern systems actually offer the possibility of producing output (is it art?) 24 hours a day.

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In the following minutes I will exemplarily present some artists and their, partly new, working ideas. Form your own opinion and decide for yourself what this art for you means! Is art as such

subject to a change that can or must be accepted or is it a direction of its own that no longer has anything in common with the traditional concept of art? In this sense, would you visit a theatre piece where Johanna von Orléans is a QT robot? Or Hamlet an embodied chatbot? To be or not to be...

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Does ‘machine art’ promote creativity and is a collaboration with an AI machine still art? Is a painting ‘à la van Gogh’ or a ‘piece of music by JS Bach’ still innovative/novel? What are the answers to legal questions regarding ML-based reproduction? Is this kind of engineering another form of plagiarism?

I would be interested in your opinion and hereby encourage you to write to me after all.

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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.

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".

In one of his exhibitions, the "Painting Fool" scanned a newspaper article (in the Guardian) on the war in Afghanistan, extracted keywords, and then created images connected with them. The "Painting Fool" then put these images together to make a composite image reflecting the "content and mood" of the newspaper article.

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In the abstract of the journal paper by *Springer->Computers and Creativity* titled "The Painting Fool: Stories from Building an Automated Painter", the Painting Fool is described as a software that BEGIN QUOTE "we hope will one day be taken seriously as a creative artist in its own right. This aim is being pursued as an AI project, with the hope that the technical difficulties overcome along the way will lead to new and improved generic AI techniques. It is also being pursued as a sociological project, where the effect of software, which might be deemed as creative is tested in the art world and the wider public." END QUOTE

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And later: "by studying both the technical difficulties and sociological issues involved in engineering software for creative purposes, we hope to help usher in a new era where computers routinely act as our creative collaborators, as well as independent and creative artists, musicians, writers, designers, engineers and scientists, and contribute in meaningful and interesting ways to human culture."
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Before I continue with some project examples, I would like to emphasize that many artists say that they use AI-technology. But, in fact, it is Machine Learning in almost any case, and, more precisely, Deep Learning-architectures as the ones you see in the slide. Typical architecture are GANs (= generative adversarial networks), Convolutional Networks, Auto-Encoder, and so on.

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This is the result of a project I did together with my former students (Jiaqin, Jingjing, Mei, Ze) in the course "Machine Learning" in Winter Term 2019/20. It was about "Deep Learning in the Arts". We concerned own photographs taken from the university. Based on our photographs, we used Tensorflow, a software suite with Deep Learning techniques in it (such as Auto-Encoder), to create new photographs in artistic styles (van Gogh and others). These were combined into our 2020 calendar (->SHOW). More precisely, we used existing digitised artists' masterpieces, trained them with Auto-Encoders and applied the developed ML model to new images. The project was a great experience to all of us! But even the question remained whether the results could be seen as new? I mean, we have taken existing artwork and applied it to an existing photography. That would be the same as changing a mathematical formula, e.g., by adding an additional constant value.

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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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Holly Herndon : “The laptop is the most intimate instrument”

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". Three years later, she explored what had become her more critical and now she is putting AI-technology against AI-technology by using a digital engineering to expose its own limitations, while mining its capacities as a musical collaborator.

Her goal is not to replace the human element, but to enhance it. For her music album titled "Proto", she gave birth to an AI "baby", a synthetic polyphonic singer she named "Spawn", housed in a device resembling a portable TV {-> see the full interview at the address given on the slide}...

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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.

Steenbrugge explains "his basic workflow" as follows:

1. I first collect a dataset of images, which will define the visual style and theme that the AI algorithm has to learn.
2. I then train the AI model to mimic and replicate this visual style. This is done using large amounts of .computational power and may take several days.
3. I choose the audio and process it through a customised feature extraction pipeline.
4. I let the AI create new, entirely unique visuals with the audio features as input.
5. I then start the final feedback loop, where I manually curate, rearrange and synthesise these visual elements into the final work.

The point is that AI does not fully create the work, and neither does he. It is very much a collaboration as he points out in MusicTech.

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.

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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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I would like to refer to parts of a newspaper article titled "What Happens When Machines Learn to Write" from "The New Yorker" magazine. Here, Programming is put on the same level as writing a poem.

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There are more resonances between programming and poetry than we might think. Computer science is an art form of words and punctuation, thoughtfully placed and goal-oriented, even if not necessarily deployed to evoke surprise or longing.

Laid out on a page, every program uses indentations, stanzas, and a distinctive visual hierarchy to convey meaning. In the best cases, a close reading (= attentive reading) of code will be rewarded with a sense of awe for the way, ideas have been captured in words.

Programming has its own sense of minimalist aesthetics, born of the imperative to create software that does not take up much space and does not take long to execute. Coders seek to express their intentions in the fewest number of commands. One poet's "road not taken" is one programmer's "if-then-else" statement. Generations of coders have taken their first steps by finding different ways to say "Hello, World." Arguably, one could say the same for poets.

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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!"

Mary Flanagan’s reaction raises another question: Given the power of new techniques in AI, why not think more broadly about the kinds of art one can make using it? She argues that one could think of "machine-generated" as a kind of literary GMO's (genetically modified organisms)

{remark: GMO's are genetically modified organisms whose genome has been engineered in the laboratory in order to favour the expression of desired physiological traits or the generation of desired biological products.}

or we could think of it as an entirely new, and worthy, category of art. As we interact more and more with machines, both knowingly and unknowingly, our own expectations around both work and art will change, and labels will start to dissolve.

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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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At the end, please let me some commercial products that are currently on the market:

Storytelling: 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 AI Painter is close to what you have seen at page 5 of the slides (calendar) and what we also show with our project PHOTOBOOTH at the AI & Art Pavilion / Esch 2022.

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Some final words in conclusion

The situation for artists has changed an artist's life due to an ongoing automation - as the graph shows. According to this, there are about 35% of jobs "jobs-at-risk" in 2019. That is scary, but on the other hand, I think that AI, precisely the application of machine learning, also adds value to art. If a label a la "Made by Humans" were to come, then original human works will continue to be honoured. I am quite sure about that.

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Some of you probably know that we already had a lot of AI hype at the end of the nineties and around the turn of the millennium, but this then disappeared due to the emerging disinterest of the industry. In contrast to those days, however, developments in the field of machine learning have continued and many achievements in terms of hardware and software have become apparent. Therefore, I think that the current developments are and will remain sustainable.

On the other hand, a colleague told me yesterday that AI is taking us back to slavery and that the use of AI techniques is a step back to the exploitation of humans. I do not agree on that. While there are important arguments for and against AI - it is a double-edged sword like many other things - I see AI technology - despite everything - as an opportunity.

For the arts, too.

Thank you very much listening!