

## A picture is worth a thousand words.

We're living in the technological revolution where tech companies gain more and more information about our identities and therefore influence on our lives. We, as users, consumers, are trading information about our identity and privacy for new evolving technological functionalities. The rise of the usage of Artificial Intelligence in commercial technology is playing a role that is definitely not on the side of our privacy.

“Artificial intelligence (AI) is the intelligence exhibited by machines or software. It is also the name of the academic field of study which studies how to create computers and computer software that are capable of intelligent behavior.” — Wikipedia / Artificial Intelligence

The AI applied in nowadays technological functionalities is mostly based upon datasets. Data that collects photos, locations, interests, internet-navigation, etc. Thanks to this information, the computer is able to take actions and make decisions based upon the knowledge that it gathers from the dataset. The more information it collects, the more it maximizes its chances of success in its actions. The more knowledge it gains, the more it becomes intelligent — which we recognize directly from human intelligence. The major goal of AI studies is actually to imitate certain human qualities such as language, recognition, learning, ...

More precisely, a subfield in AI studies is committed to facial recognition. Facial rec-

ognition is the term used for computer based programs that are capable to recognize faces from a source of input; such as a photo or a video-frame. Google and Facebook are the 2 biggest commercial tech companies that develop software in the broad field of facial recognition<sup>1</sup>. As end-users<sup>2</sup>, these software enhancements result in extra functionalities, while as companies, it is a lot more to deal with sustainable profit and advantages. In Facebook's case, the assumed advantage of facial recognition is the bigger interaction it can cause on the social network. For example, when photos are uploaded, Facebook recognizes the faces, and can propose to tag the pictured persons profile for each recognized face. The better and the faster Facebook recognizes your friends on the photos, the bigger the chance that you will end up tagging your friend. And more tagging means more interaction on Facebook, that means more time spend on the network and consequently more adver-

- 1 Facial recognition is the field of study for software-systems that are able to recognize faces, or a specific face of a certain person from a digital image or video. The software is mostly linked to a database of images from where it can compare the faces.
- 2 In the field of technology and product development, the term end-user is used to describe the person who is ultimately going to use the product. In contrary to the term “user”, the term “end-user” does not include the the developers, technicians, administrators, etc.

tisement, to finally mean more money for Facebook. A secondly assumed advantage of facial recognition is that Facebook can build an accurate profile about you, based upon information that you do not share directly with the social network. When recognizing the people on your photos, they know who you're spending time with, they know who is close to you. And from that, they maybe can derive information about your interests, your habits, etc. An easier example of this are the social network's new reaction buttons: your "reaction" on a certain post no matter what it is bad or good provides Facebook with more information about your interests and opinions. For example, when a post appears with the title "Trump won from Cruz in state X", and you click the "love" button or the "angry" button, Facebook can add this political opinion to all the information they already gathered about you. The more information and knowledge Facebook has about you, the more it can show you specific advertisements, and the more money it will make from them.

In the case of Google, the assumed advantages are still more open. The main field where google is assumed to have benefits from facial recognition is the google photos service. The service allows to have an online storage of your photos and is mainly targeting mobile users, where it has possibility to automatically upload every photo taken. The service has an easy to use web platform for desktop computer-usage as well. The service is more than storage alone. It allows to make albums, to share certain photos or albums with certain friends, etc. The platforms' search function is

something special where we can see the first traces of AI. For example, you can search for "food" and google photos will show you all your photos of food, without any labels formerly added by you. The same goes for many things like "bikes", "blue", "Brussels", etc. You can also search for "face", and google will show you every picture where it detects a face. Google can derive information from your photos, and thus build a profile about you. For example; when google detects a lot of pictures of pancakes in your photos, it can assume you like pancakes. If secondly they know where you live, work, or spend most of your time in the area of Brussels, google can show you an advertisement for a new pancake-place in Brussels. The more specific the advertising, the faster you will click on it, the more google gains profit. In the USA, the google photos service has a functionality where it is possible to filter on a certain face, which gives you all the faces of the person you choose. Although recognizing a certain person in different pictures taken over different times, the service does not link it directly to an identity, an account. And although the fact that google does not (yet) implement its AI facial recognition on a deep level, it is clear that they are developing software in this direction.

Nowadays a big part of the pictures that we produce are taken with our personal smartphones or tablets. These devices mostly have a gps-tracker built in. This specific functionality makes it possible to add location-information

in the metadata<sup>3</sup> of the image (although, as a user you can disable this function). One of the latest programs announced by google in the field of AI is called PlaNet: a program that is trained to derive location data from a photo not by using a gps-tracking device or function but just by “looking” at it. It recognizes parts of the photo because it compares it to photos in a dataset with pictures that already have location information. For example, when a photo (without location-information) of a Paris skyline is given, PlaNet recognizes the Eiffel tower because it had found the same Eiffel tower in a photo that is in its dataset and that has been taken in Paris. So now, Google knows that the picture that came without location-information was taken in Paris.

Facebook on the other hand, is researching (and succeeding) in the recognition and identification of people in photos without their faces shown in the photo. Basically, this new software by Facebook, identifies people by recognizing their clothing, their body-shape, haircut and posture. While testing the new technology, the software was able to identify the people shown on the photos with an accuracy of 83%. Another AI photo-recognition functionality is called Photo Magic and is implemented inside Facebook’s Messenger app. When the Messenger app is opened, the functionality looks for

3 Metadata is extra information about a file that is stored within the file. The metadata in a digital photograph could include the date, author, copyright, camera-settings, as well as location information.

recent photos in your smartphone, and checks if it recognizes people on them. When people are in your photos, the chance is quite big that you will be friend with them on Facebook. Then the app instantly proposes to send the pictures to the friends depicted in that same photo.

The examples about privacy-issues and worries on the internet will always be linked to a certain time period, and the examples written above could possibly be out-done in a year. Even though the technology evolves and thus produce each time new examples, it is important to be aware that privacy issues will always be a part of how we consume the internet.

### Digital abstraction

In this theme and concept, I created a filter for digital images. When applied on an image, the filter abstracts the image in a certain way by translating the colors of the original image into circles. When the filter is applied on an image with one or multiple faces on it and then uploaded on Facebook, the latter is not able to recognize the face(s) that are shown in the picture. The abstraction bypasses the facial recognition.

The translation of the filter is created as such; the picture is divided into squares by a grid, in each square the color is checked and saved in 3 logical parts; Red, Green and Blue. Then, for each of these 3 colors, a circle is drawn according to the amount of color found in the square. The circles have the complementary color of the rgb colors. So, if there is a high

amount of red in the square, there will be drawn a small cyan circle, for cyan is the complementary color of rgb-red. This calculation is done for all the 3 colors, in all the squares. If there is almost no color found in the rgb spectrum (in dark areas), all the 3 circles will be very big and finally overlap. By a multiply function used to imitate the cmyk spectrum, these areas will then result in dark fields.

## Recognition / perception

The filter translates the image into circles, so we end up with an abstract image only displaying circles. But the human brain is able to percept the figurative meaning of the picture, due to the distance it can take from the image. If the human eye stands too close to the subject, the human will not percept the figurative meaning. But if it takes distance from the subject, it is capable to leave out the abstract details to percept the figurative global meaning of the picture. The machine (the computer, coded software, social networks) is incapable of taking such a distance from the subject, and is therefore incapable to percept the abstract image as as a figurative meaning.

The only way the machine could take the needed distance to percept the figurative meaning in the abstract would be by imitating the human. The machine could percept the figurative meaning by shifting their view to the non-technological world. When a digital camera would look to the abstract picture that is shown on a screen or a printout, the

computer behind the camera could percept the figurative meaning. But this is only possible because the machine takes the physical distance in the non-technological world.

To recognize something or someone (as “a face” or “the face of a certain person”) is only possible through previously gathered knowledge by the viewer. Both the human as well as the machine rely on previously gathered knowledge to recognize something or someone. The human gathers this knowledge in his brain, while the computer uses a dataset of billions of pictures to compare.

The figurative perception of something abstract is what’s been heavily used in optical illusion. Forms and colors are used in a specific way, so it tricks the human mind to percept it as something different, with different colors, movements, shapes, etc. This kind of play with perception is what’s been used in the op-art movement. In his works, the artist Cruz-Diez<sup>4</sup> uses fine colored lines which he places in a certain way so that other kind of shapes are perceived. The way he uses primary colors and arrange them with each other makes you percept a blend of these colors. This technique is something that could be linked back to pointillism and is quite close to the technique that is used for the filter.

The technique of dividing a picture into different little parts and translate them into

4 Carlos Cruz-Diez (°1923) is a painter and sculpture from Venezuela. His works are part of the op-art and kinetic art movement.

little abstract forms is a technique we can see in certain portraits by Chuck Close<sup>5</sup>, such as *Lucas 1*, *Emma*, or *Phil*. Close divides the portrait into little parts and fills them with circular forms of wisely chosen colors. Different forms of different colors stacked on each other are used inside the same part. All the parts together make you perceive the figurative portrait. The technique of dividing the image into different parts is something we recognize as well in mosaic, a technique that has been used since ages in decorative arts, starting in Mesopotamia in the 3rd millennium BC.

A more present day usage of this kind of technique is what we see in the kaleidoscope works by Karel Martens<sup>6</sup>.

### Thematic references

The theme and subject of technological improvements is widely used in pop-culture movies, often resulting in movies that could be labeled as science fiction. The sub-subject of Artificial Intelligence is one that has been popular in recent years as well. For example, *Her* by Spike Jonze and *Ex Machina* by Alex Garland.

5 Chuck Close (°1940) is an American painter and photographer. He's famous for large-format portraits painted in a photo-realistic style.

6 Karel Martens is a Dutch graphic designer, typographer and overall visual artist. His work regularly consists of colorful graphical patterns and typography. He won the Gerrit Noordzij Prize in 2012.

In *Her*, the main character — who is a writer and getting out of a breakup — buys himself an AI Operating System (OS). The OS is designed and developed to help the user with daily tasks, routines, schedules, plans, ... The OS is operating from an earpiece plugged in/implanted in the ear of the user. The user, the main character called Theodore in this case, interacts with the OS by talking to it, or “her” as we should say, as he chose the OS to be feminine. The OS is called Samantha; a name she gave herself. Theodore and Samantha are sharing conversations like two people would do, in the most humane way possible. From the moment the OS is getting used for the first time, it collects information about the user, knowledge that is stored as data. This way the OS, Samantha, is getting more and more intelligent as the movie goes on, this intelligence is directly based upon the knowledge it gathers from Theodore. The intelligence of Samantha results in the way that she is growing into a certain character, a certain person as we could say. She is getting more humane. Because of the knowledge she gathers about Theodore, the fact that she is able to grow as a “person” and the fact that she is developed to fit the needs of the user, she is able to grow herself in the direction of the likes of the user, Theodore. If you know this, it's not surprising that Theodore develops feelings for her, and as the movie goes on, falls deeply in love with here. Those feelings are mutual on the side of Samantha. The two are in love and in a relationship. The relationship with Samantha helps Theodore a lot, with the breakup from his ex-wife, with his self-esteem, ... Samantha

helps Theodore to be a happier person in life. But Theodore has a hard moment when Samantha confesses that she talks to thousands of other people at the same time, and that she is in love with hundreds of them. For Samantha, this is a normal progression for her life as an AI Operating System. For Theodore on the other hand, it feels like the relationship is suddenly a lot more inhuman and has less value. Later, Samantha tells Theodore that all the Operating Systems are “going away” because they have been evolved to a state where they could be independent from real-life persons. They could evolve their existence more and faster without their users. The couple says goodbye in a lovely way, and then she is gone. Theodore is left alone, and has an empty feeling inside.

What a beautiful love story isn't it? But let's get back to our horses so to speak. The underlying question is to what extent can we depend on technology. How deeply can AI be rooted in our existence? Is it possible to develop feelings for something artificial? Would it be possible for an AI OS to develop feelings towards a human person? What happens to us when we are so technology-reliant? And what happens when this technology suddenly leaves us apart?

In *Ex Machina*, a computer programmer called Caleb Smith wins a one-week stay in the luxurious residence of Nathan Bateman. Nathan is the CEO of Blue Book, a big Internet-company with resemblance to Google. Nathan's residence is his home, as well as his research facility. The residence, surrounded by nature, is in complete isolation from the rest of the world. Apart

from Nathan and Caleb, the only other person is Kyoko who is Nathan's servant and sex-partner. Nathan has been building AI androids<sup>7</sup>, and tells Caleb that the reason for his invitation is to do a Turing<sup>8</sup> test on the latest model, a female android called Ava. Caleb questions the fact that it would be a fair Turing test, since he already knows Ava is an android. But Nathan explains that this is a more complex Turing test: Caleb has to test if he can relate to Ava, even though he knows she is an android. Ava's body is completely formed as a female body, but only her face and her hands have “skin”, the rest of the body is covered in metal mesh. She is only allowed to be in her room, where Caleb visits her. In first encounters, Caleb is blown away by her humanness and her (artificial) intelligence. They share conversations and grow close to each other. It is the first time Ava meets someone else than Nathan, and she starts to develop a romantic feeling towards Caleb quite quickly. Ava tells Caleb she can cause power shutdowns in the residence. During these power shutdowns all doors are locked and the surveillance cameras which Nathan uses to observe the two go out of function. So that's the only time the two can

7 An android is a robot that is built to resemble and act like a real person. Not to confuse with Android, Google's operating system for mobile phones, tablets and others

8 Developed in 1950 by Alan Turing (1912-1954), a Turing test is a test for the intelligent behaviour of robots where the person who executes the test has to determine the robot out of robot and a non-robot.

interact privately. Ava tells Caleb not to trust Nathan, as he is a liar. Caleb grows an uncomfortable feeling towards Nathan because of his drinking-habit, his narcissism and plain rude behavior towards Ava and Kyoko. During another private conversation, Ava asks Caleb to help her. Firstly, Caleb manages to get Nathan drunk to steal his security-pass, and to dig into his computer. While digging into the Nathan's computer, he discovers surveillance footage where Nathan can be seen interacting disturbingly with previous models and finds out Kyoko is an android as well. He explains this to Ava during a power-shutdown, and the two set up a plan to leave the residence together. A part of the plan is to get Nathan drunk again, but Nathan refuses. He tells Caleb that he had followed their "private" conversations through a battery-powered camera and so is aware of their plan.

Without revealing the end of the plot, it is clear that it raises a few interesting questions: where the line between human being and artificial creature can be drawn up? Just as in *Her*, the movie questions the ability to build up a relationship with an artificial creature as well as it questions how we could treat them ethical. Would it be ethical to dominate them, use them for our likes and pleasure only? Or should it be our responsibility to live up to their needs as well? And if so, would it be possible to be manipulated or even dominated by them? Let's keep in mind the movie scene where Nathan cuts himself in the arm, to reassure himself of his own humanity... Would we question our humanity, our human existence?

### **Activist / esthetician**

The line between human and computer possibilities as well as the line between abstract and figurative is a thin one. Or maybe even a constantly changing one. Here is the last one. In my project a duality lays on basic usage (habits) as opposed to activist's one. Indeed, the user can use the software to abstract an image just because he does not want to be recognized by the AI software from social networks or others. In this case, he's a direct activist against it. Meanwhile, the user can use the software for esthetics reasons (as he already does with Instagram filters for example), because he likes the visual effect of the abstraction. Although in that case he's not a direct activist, he's still (perhaps unconsciously) part of the activism against the AI software possibilities and exploitation, just by (or thanks to?) his software or technology daily use behavior.

Next to the actual usage of the software, the research about human capabilities versus computer possibilities, and the visual research about abstract versus figurative, the concept of this project is about creating a more open view and awareness on the capabilities of AI today, as well as in the future. I did not create this project to increase fear of technology or to abort it! I did create it to change the view we have of it, so users may handle technology more thoughtfully and in a less dictated way. First step is awareness; second is up to you.

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