



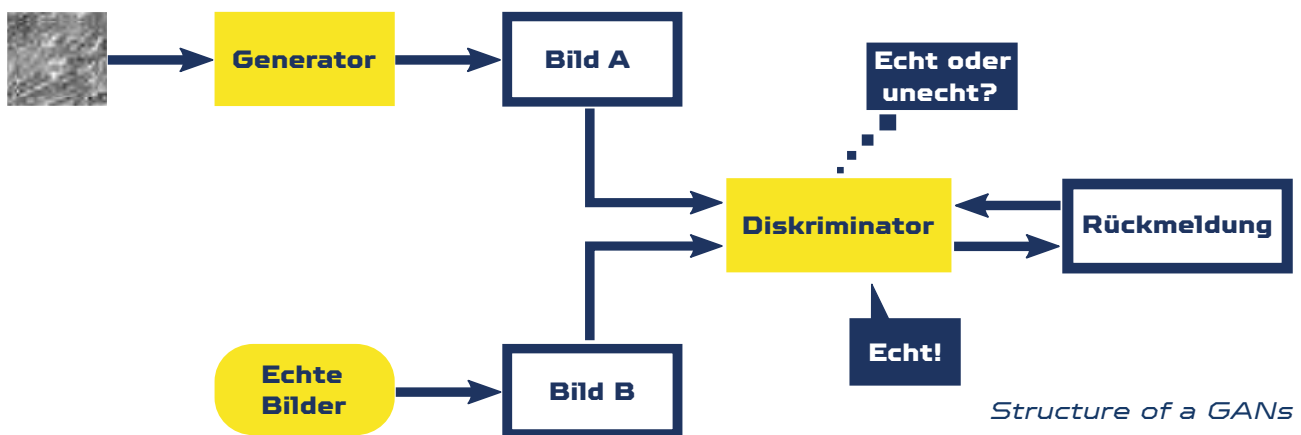
WHO WAS CREATIVE?

How can a computer generate deceptively real image?

This can be done using so-called GANs [generative adversarial networks].

A GAN consists of two artificial neural networks. These are algorithms that are modeled after the human brain. Just like you, artificial neural networks can learn through feedback. And that is what the GAN utilizes.

One artificial neural network **generates** an artificial image. That is why it is called the **generator**. At the beginning, it only receives a description of the image.



Another artificial neural network has to **evaluate the image** like a teacher. For this purpose, it is presented with both real images and images from the generator and must decide which image is real and which one is artificially generated. Since it only gives a *thumbs up* or *thumbs down* for the generator's image, the second network is also called the **discriminator**.



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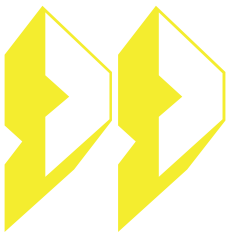
At first, it is easy because the generator doesn't yet know what a real image looks like. It only learns what it's doing wrong from the **feedback of the discriminator**.

This is similar to learning to draw a face as a child. At first, it was just scribbled, then it became a dot-dot-comma-line face, and later on eyes, nose, and mouth. The better the generator draws, the harder it is for the second network to evaluate, and the more likely it is to confuse an artificial image with a real one.



**Dot, dot, comma,
dash...**

This makes our generator happy, because of course it wants to receive a good rating! **So, the generator learns from the discriminator's evaluation what it needs to do to make its images look as real as possible.**



To help the discriminator to improve as well, it also receives feedback on its decisions. Therefore, the two artificial neural networks are **competitors**, each trying to outperform the other.

You might have noticed that nobody is monitoring the learning process. That is why it is also called **Unsupervised Learning**.



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How can you distinguish a real image from an artificially generated one??

Examine the image for discrepancies!
Take a closer look at the glasses in the portrait.

Right! The right and left temples of the glasses cannot possibly belong to the same pair. They are not identical!

Especially with **symmetry**, such as with earrings, glasses, or beards, the AI system struggles. But even **teeth** sometimes look unrealistic or asymmetrical.



Hey dude! It's really unreal!

In addition, depicting **hair** is very difficult. Particularly the hairline and individual strands are a real challenge for the AI system.

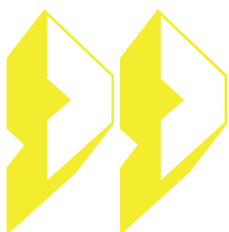


Looks delicious, such an unreal schnitzel!

Moreover, the AI system has only learned to generate a portrait, food, animals, or certain objects. As a result, you may notice **inconsistencies with the environment** or other objects in the image.

Take a closer look at the image with the schnitzel:

There is cutlery in the front right. However, unlike the schnitzel, it does not look real: the fork is blurred and the knife is incomplete.



Now, why not play another round of **Artist Unknown** and try to use this knowledge to scrutinize the pictures and expose any fakes?



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SOURCES

Graphik "Aufbau von GANs"

erstellt von Annabel Lindner

Foto "Echt unecht, der Herr!"

erzeugt mit <https://thispersondoesnotexist.com/>

Foto "Sieht lecker aus, so ein unechtes Schnitzel!"

erzeugt mit Dall·E (<https://labs.openai.com>)

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AI-Artefacts

Facial portraits

all generated using <https://thispersondoesnotexist.com>

Photos of food, animals, objects

alle erzeugt mit Dall·E (<https://labs.openai.com>)

AI art videos

https://aiccreated.art/art_gallery#

AI System playing Super Mario-Video

<https://www.youtube.com/c/MinecraftSethBling>

3D-Chaos-Videos

<https://www.youtube.com/c/DoodleChaos>

AI System composes Bach

<https://www.youtube.com/watch?v=QibM7-5hA6o>

<https://www.youtube.com/watch?v=X72YHyaTIUE>

AI System AIVA (Songs: I am AI, Plutonium, Guiding Light, Digital Spring, Cyberpunk, The Golden Age), LICENSED by AIVA

<https://www.aiva.ai/>

<https://www.youtube.com/playlist?list=PLv7BOfa4CxsHAMHQj0ScPXSbgBILg1RPo>

Human products and artworks

Super Mario-Video

<https://www.youtube.com/c/KingBoo97>

No Copyright nature shots Videos

<https://www.youtube.com/c/audiolibrary-channel>

Animation video

<https://www.youtube.com/watch?v=ujr30VgKK8Q>



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Menschliche Erzeugnisse & Kunstwerke

Video Big Buck Bunny

<https://www.youtube.com/watch?v=aqz-KE-bpKQ>, in Ausschnitten

No Copyright Songs

<https://instrumentalfx.co/download-top-15-best-no-copyright-songs-ncs-2017/>

<https://www.youtube.com/watch?v=XwmpmLVG7h0>

Portrait Photos

<https://www.sarahkastner.de/templates/yootheme/cache/Honey-Foto-90fae6d2.jpeg>

<https://fotografie.at/galerie/image/479030-m%C3%A4nnerportrait-hans-aus-indien/>

https://upload.wikimedia.org/wikipedia/commons/e/ee/Peter-siegele_2017_portraitfoto.jpg

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https://upload.wikimedia.org/wikipedia/commons/4/44/Portraitfoto_von_J%C3%B6rn_Ipsen.jpg

<https://www.das-portrait.com/wp-content/uploads/2022/04/fotostudio-das-portrait-frankfurt-portraitfoto-slide-1.jpg>

<https://image.jimcdn.com/app/cms/image/transf/dimension=1024x2048:format=jpg/path/s2047a22fa41leadc/image/i4bcb8a8185144d96/version/1483175995/image.jpg>

<https://pixnio.com/free-images/2017/02/25/2017-02-25-07-04-03.jpg>

<https://www.publicdomainpictures.net/pictures/240000/nahled/woman-blue-eyes-portrait.jpg>

<https://pixnio.com/free-images/2017/03/22/2017-03-22-12-07-37.jpg>

<https://pixnio.com/de/menschen/frauen/frau-glamour-portrait-madchen-frau-menschen-gesicht-schon-attraktiv>

<https://pixnio.com/de/menschen/frauen/frau-mode-portrait-glamour-auge-huebsches-maedchen-gesicht-attraktive>

<https://pixnio.com/de/menschen/frauen/portrait-huebsche-frau-maedchen-fotomodell-person>

<https://pixnio.com/de/menschen/kinder/schon-jung-blond-madchen-portrait-gesicht-handvoll-nusse>

<https://pixnio.com/de/menschen/frauen/schoen-maedchen-portrait-laecheln>

<https://pixnio.com/de/menschen/manner/portrait-alteren-afrikanischen-mann-aus-der-nahe-gesicht>

https://upload.wikimedia.org/wikipedia/commons/a/a0/Official_portrait_of_Scott_Mann_MP_crop_3.jpg



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https://upload.wikimedia.org/wikipedia/commons/e/e9/Official_portrait_of_Scott_Mann_crop_2.jpg

https://upload.wikimedia.org/wikipedia/commons/9/9c/Official_portrait_of_Lord_Mann_crop_2.jpg

Nahrungsmittel

<https://webneel.com/daily/1-food-hyper-realistic-painting-tom-martin>

<http://wallpapersdsc.net/wp-content/uploads/2016/09/Junk-Food-Pictures.jpg>

pxhere.com/de/ [Creative Commons]

