AI, WHERE CAN WE FIND YOU?

Artificial Intelligence (AI) – you have probably come across this term when reading about technical devices.

We usually come across this term when a device or a software can perform tasks that seem particularly challenging to us and that we expect would require intelligence to solve.

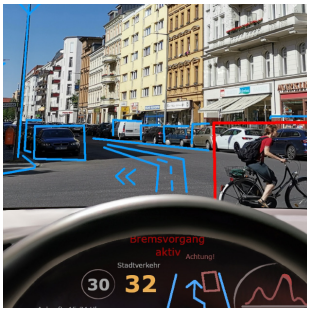
In fact, what we refer to as "AI" always consists of algorithms which make use of specific techniques (such as processing vast amounts of data) to generate the desired results. These devices neither have a brain nor can they think or feel independently.
Instead, they are specialised computer programs that we might sometimes perceive as quite clever, but actually they are just very good at calculating. That's why we always refer to them as AI systems.

AI systems do not have a brain!

Here you will find applications where AI algorithms are used as well as others of which you might suspect that an AI system is involved, but that actually work quite differently. We will briefly explain how they work.

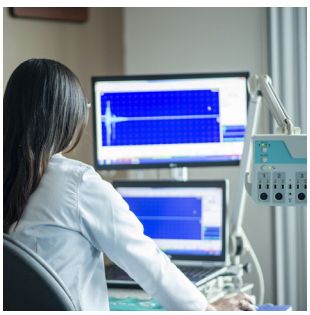
01 WANTED: AI

AUTONOMOUS VEHICLES



AI systems are used as **assistance systems** in many cars. These systems enhance driving safety or enable personalised profiles for each driver. For example, an AI system for facial recognition can identify a tired driver through sensor data. Images and data at different intervals are compared and a warning is issued when the driver shows certain patterns of being tired (e. g. closing the eyes very often). The assistance system utilises **efficient data analysis**. In the future, various vehicles are expected to communicate with each other and exchange information about locations, routes and hazards – this will make it possible for vehicles to become increasingly autonomous.

MEDICAL MONITORING



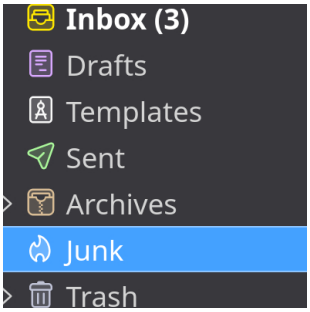
Doctors having more time for their patients because they are supported in the evaluation of medical data? This wish might come true. AI systems can assist in **disease diagnosis** using large datasets such as X-ray images. They compare many images with each other in a short time, recognise patterns and can provide assessments for disease recovery and surgical risks. AI systems can also **monitor and assess** treatment processes and the condition of patients and alarm when a life-threatening situation arises.

01 WANTED: AI

STREAMING PLATFORMS & MUSIC STREAMING

Streaming services like Spotify or Netflix remember your past behaviour within their respective streaming apps to predict your future behaviour and your music or movie preferences. For example, they store information about which TV series you've already watched, how often you've played a song and which songs you regularly skip. Based on these observations, the provider creates your **user profile**. AI algorithms compare this profile with the profiles of other users and suggest songs or videos that you might also like. These recommendations are then presented to you, such as in Spotify's Discover Weekly playlist or in a Netflix watchlist. This process is called **machine learning**.

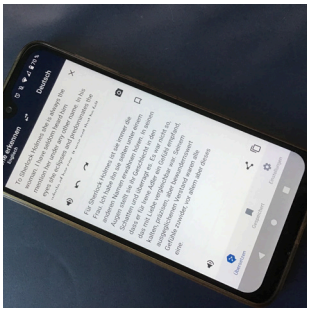
SPAM FILTER



An AI spam filter **compares** new emails to a vast collection of previously received emails. Such a large amount of data is also referred to as Big Data in the context of AI systems. **Indicators of spam e-mails** are things like many special characters or uppercase letters in the text or subject line. These characteristics are rated with points. If a new e-mail exceeds a certain point threshold, the AI system decides that the new e-mail contains enough characteristics of a typical spam e-mail and moves it to your spam folder.

01 WANTED: AI

TRANSLATION SOFTWARE



Modern online translators, such as Google Translate and DeepL, use AI systems to translate texts into another language. To do this successfully, previously translated texts are used: **By comparing the original text and the respective translation, the AI system learns what belongs together.** Context is also taken into account. For example, the English word "odd" has a different meaning in the context of mathematics than in other contexts, where it can mean "strange". And in other languages there might be two different words for this, e. g. in German: "ungerade" and "eigenartig". Once the AI system has correctly analysed the connections between the languages, it can also translate new texts.

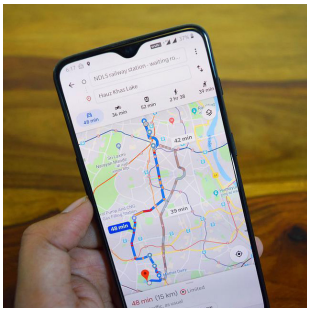
ROBOTIC VACUUM CLEANERS

If your parents' robotic vacuum cleaner efficiently avoids obstacles and can even create an accurate map of where it has already cleaned and where it has not, then it contains an AI system. This AI system utilises small cameras and sensors to **detect objects** and, based on previous experiences, finds a path around the object. Additionally, it can calculate an **efficient route** through the entire apartment.

But beware! Not every robotic vacuum uses AI algorithms. Some simply move randomly and turn around when they encounter an obstacle. This is not intelligent and usually doesn't clean thoroughly!

01 WANTED: AI

NAVIGATION SYSTEMS

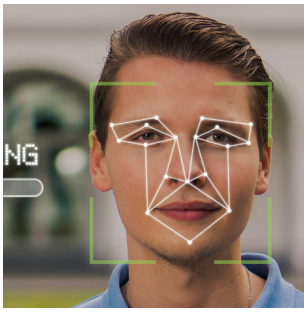


Navigation systems like Google Maps use AI systems to suggest the **fastest navigation route** for you. The algorithms can calculate the quickest route in a matter of seconds, taking into account the traffic conditions. To determine these conditions, the AI system analyses **location data** from mobile phones on the possible routes. If a mobile phone is moving slower than usual, it may indicate a traffic jam, for example. Additionally, other factors like construction sites or road types (highway, country road, etc.) are captured and factored into the calculation, providing you with a fairly accurate estimate of your arrival time.

DIGITAL ASSISTANTS

Amazon‘s Alexa, Apple‘s Siri, or Samsung‘s Bixby: Digital assistants are now offered by many companies. They recognise your voice and perform the desired tasks. To make **voice recognition** work and for the assistant to know what to do, AI systems are used. These systems first receive audio data collected from users worldwide, along with their meanings. They analyse this data to determine the exact **meaning of a sound snippet**. Once they have identified patterns for this, they are ready for your voice and can even differentiate and correctly understand "not" and "no" even when you are muttering or speaking sloppily.

FACIAL RECOGNITION



Facial recognition algorithms attempt to capture **key facial features** that uniquely identify a person. These features include, for example, the shape, position and size of the mouth, nose and eyes. The AI system learns to recognise these features through a large number of **example images of faces**. The algorithm recognises that the "mouth" pattern, for instance, is characterised by a specific set of pixels in certain colours and a particular position in the image. Once the AI system has been trained in this way, it can analyse new images to identify the most important points and then compare them, for example, with photos in a police database. If it finds a face that exhibits the same or very similar features, the suspect is identified.

SOCIAL MEDIA

Social media apps also use AI systems to **predict your future behaviour** based on your past actions within the app. They record which posts you like or view for an extended period, how much time you spend on the app and which posts you view without interacting with them. This information is used to create a user profile. The profil information are than used to provide you with **targeted advertisements** and new posts that may interest you. The goal is to provide you with a positive user experience so that you use the app more frequently and for longer periods – the app aims to make you addicted to it!

01 WANTED: AI

POWER MANAGEMENT

It is hard to believe, but it is true! Even our power supply is now controlled by AI systems. For example, since solar installations independently feed electricity into the grid, electricity is no longer exclusively generated in power plants and distributed through substations. Instead, electricity is now produced in many individual locations (for instance, solar panels on roofs, wind turbines), stored locally and distributed from there. This makes the **distribution of electricity more complex** as it still needs to be delivered to where it is needed. Therefore, AI systems gather and analyse supply data from all over Germany and determine **optimal solutions** to distribute the generated electricity as efficiently as possible to where it is urgently needed.

ELECTRONIC APPLIANCES

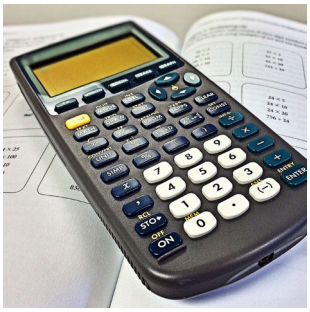
Whether it's a toaster, refrigerator or food processor, all of these household devices operate through simple electronics and some mechanics or physical principles. They are **not computers**. This also applies to record players and digital thermometers. Just because a device consumes electricity or has a digital display does not mean it is an AI system. And even though we may sometimes not under-stand its behaviour – for example, when the toast suddenly burns even though we haven't changed any settings – it is **not intelligent**.

01 WANTED: AI

MOBILE PHONE VS. SMARTPHONE

Old mobile phones are different from smartphones: Those phones were pure communication devices, while your smartphone is a small computer. You can see this in the range of functions as well. In the past, you could make calls, send short text messages and maybe play very simple games on your phone, that's it. Nowadays, we have countless apps, are constantly surfing the internet and the device's **functionality** is almost infinitely expandable. And, of course, you can install applications that use AI algorithms!

"NORMAL" ALGORITHMS IN USE



Many electronic devices today contain small computers and the device can respond to our inputs. However, the device doesn't learn its behaviour on its own with the help of large amounts of data like AI algorithms do. Instead, a software developer **programs what inputs are available and how the device should react and behave**. This way you get the same output for the same input every time. Calculators, digital alarm clocks, ATMs and printers operate this way (except when there's a paper jam). For e-scooters and motorised wheelchairs, motors are controlled based on inputs, but even this is done using regular algorithms.

When do we need AI systems? We actually need them whenever we can't describe all the inputs a system might receive. For example, we can't store all the faces in the world for a facial recognition system, especially not with different facial expressions or in varying lighting conditions. This is where AI systems come in because they can learn the patterns that are important for recognising a face. However, since the inputs are so diverse and uncertain, the AI system can only make educated guesses in its outputs. Consequently, it sometimes makes mistakes and does not always provide the same answer for the same input.

SOURCES

"AI systems do not have a brain!"

Drawing created by Michaela Müller-Unterweger

The photos used in the info boxes correspond to the representations on the picture cards, sources are listed below.

SOURCES PICTURE CARDS

autonomous vehicle

https://commons.wikimedia.org/wiki/File:Autonomous-driving-Barcelona.jpg

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translation software

Picture taken by Annabel Lindner, App: DeepL

medical monitoring

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power management

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robotic vacuum cleaner

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navigation system

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streaming platform

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music streaming

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digital assistant

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social media

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facial recognition

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spam filter

Picture creaded by Annabel Lindner

calculator

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SOURCES PICTURE CARDS

printer

https://pixabay.com/de/photos/b%c3%bcro-drucker-kopierer-arbeitspl%c3%a4tze-5169618/, picture modified

food processor

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record player

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digital alarm clock

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ATM

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refridgerator

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toaster

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mobile phone

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motorised wheelchair

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e-scooter

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digital thermometer

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