Artificial intelligence & Human intelligence

AI… any task performed by a program or a machine that, if a human carried out the same activity, we would say the human had to apply intelligence to accomplish the task.

Minsky & Mc Carthy

Begrip van wat “AI” is, verandert doorheen de tijd

Schaken

Turingtest

Quiz met open vragen

Go-bordspel

Wat is menselijke intelligentie?

Planning?

planning, learning, reasoning, problem solving, knowledge representation, perception, motion, and manipulation and, to a lesser extent, social intelligence and creativity

Computers & software

Volgen meestal **stappenplannen** of **algoritmes**

Computers & software

Pas sprake van “**intelligentie**” als systemen **zelf kunnen leren**
én dus niet enkel stappenplannen volgen.

3 intelligentieniveaus

1. Narrow AI
2. Artificial General Intelligence
3. Superintelligence

Niet alles wat “slim” lijkt, is AI

Expertsystemen
RPA (robotic process automation)

Narrow AI

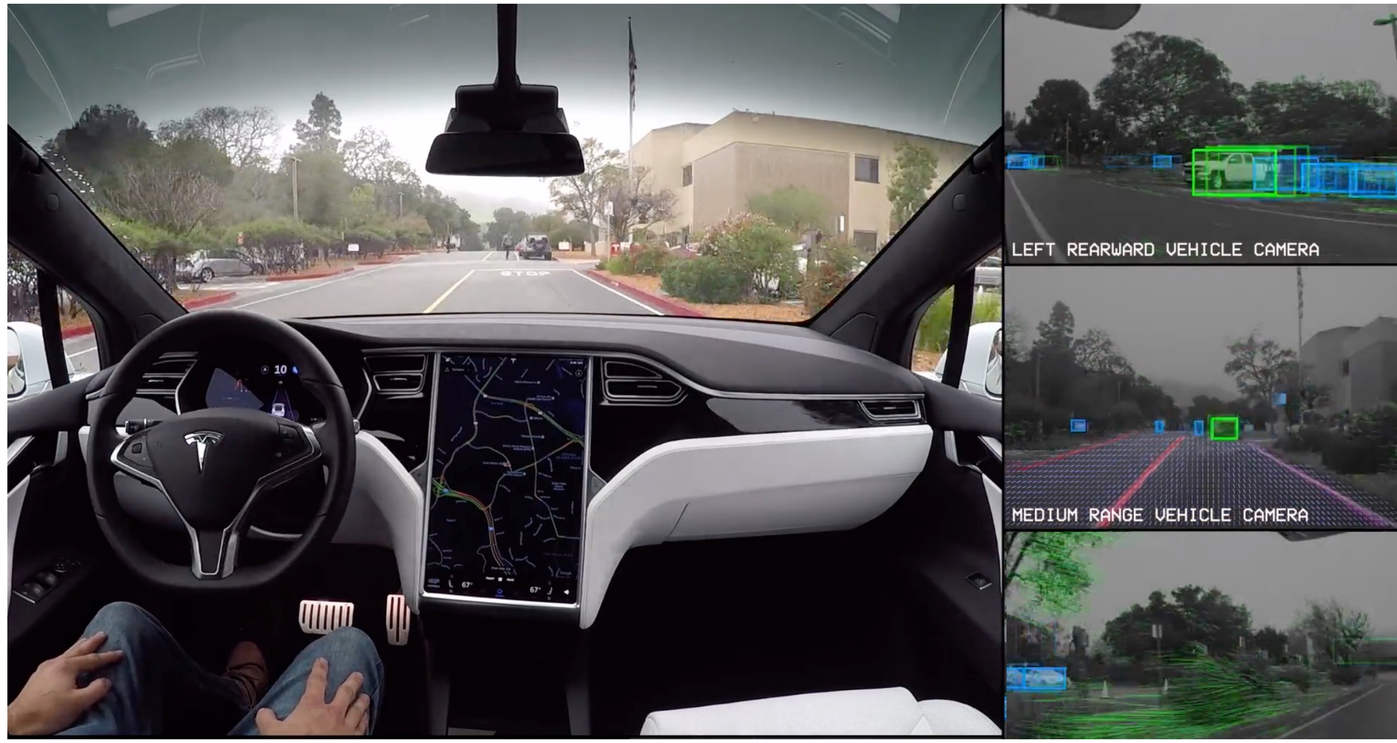
Narrow AI is what we see all around us in computers today: intelligent systems that have been taught or learned **how to carry out specific tasks without being explicitly programmed how to do so**.

Voorbeelden

Shazam

Voorbeelden

Zelfrijdende auto’s



Voorbeelden

Spraak

Examples of Narrow AI

Deep Blue

Can't learn to play a new game based on a description of the game rules

DARPA Grand Challenge

Software can't even learn to drive different types of vehicles besides cars (trucks, boats, motorcycles)

Google

Can't answer complex questions. Whatever happened to AskJeeves?

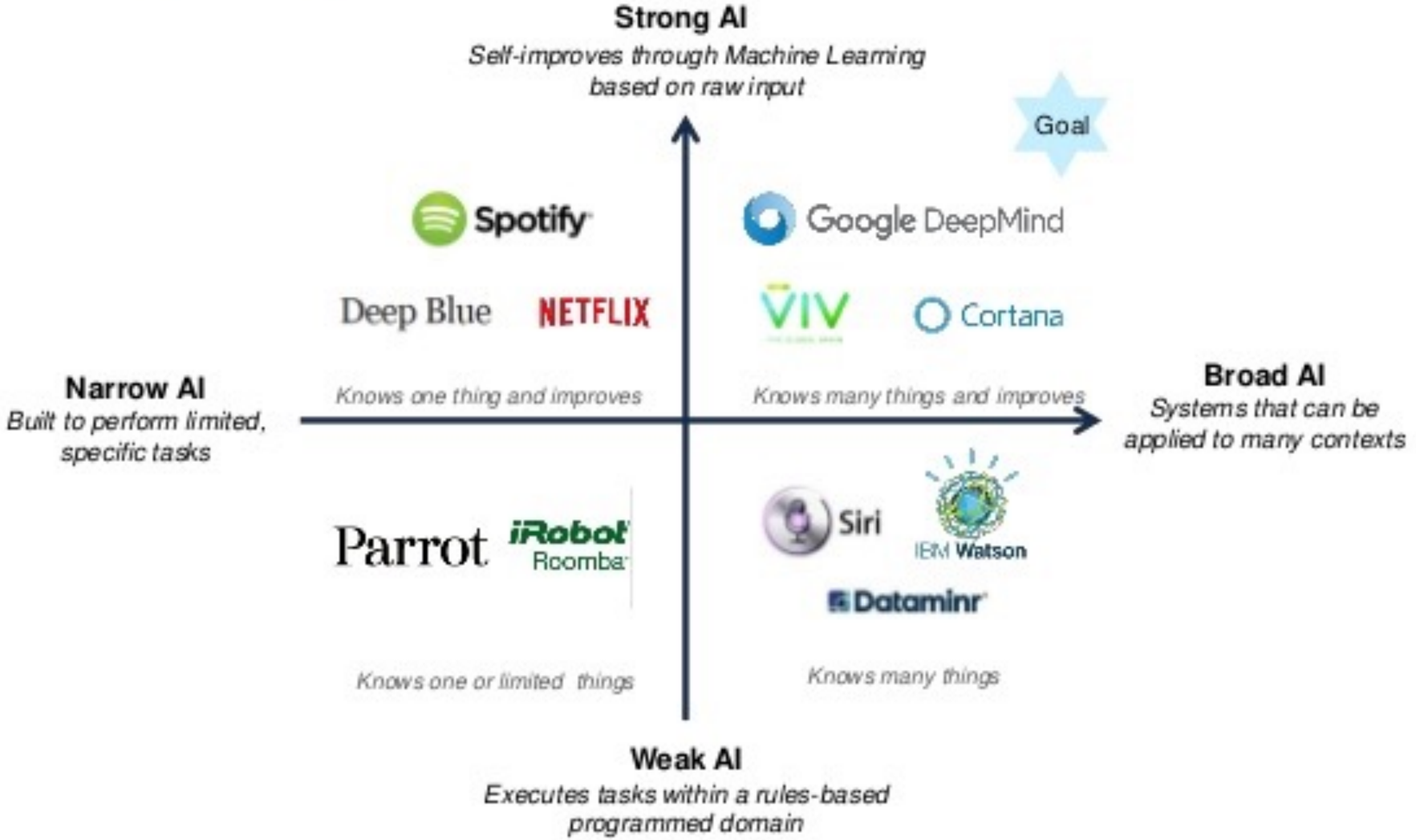
Unlike humans, these systems can only learn or be taught *how to do specific tasks*, which is why they are called **narrow AI**.

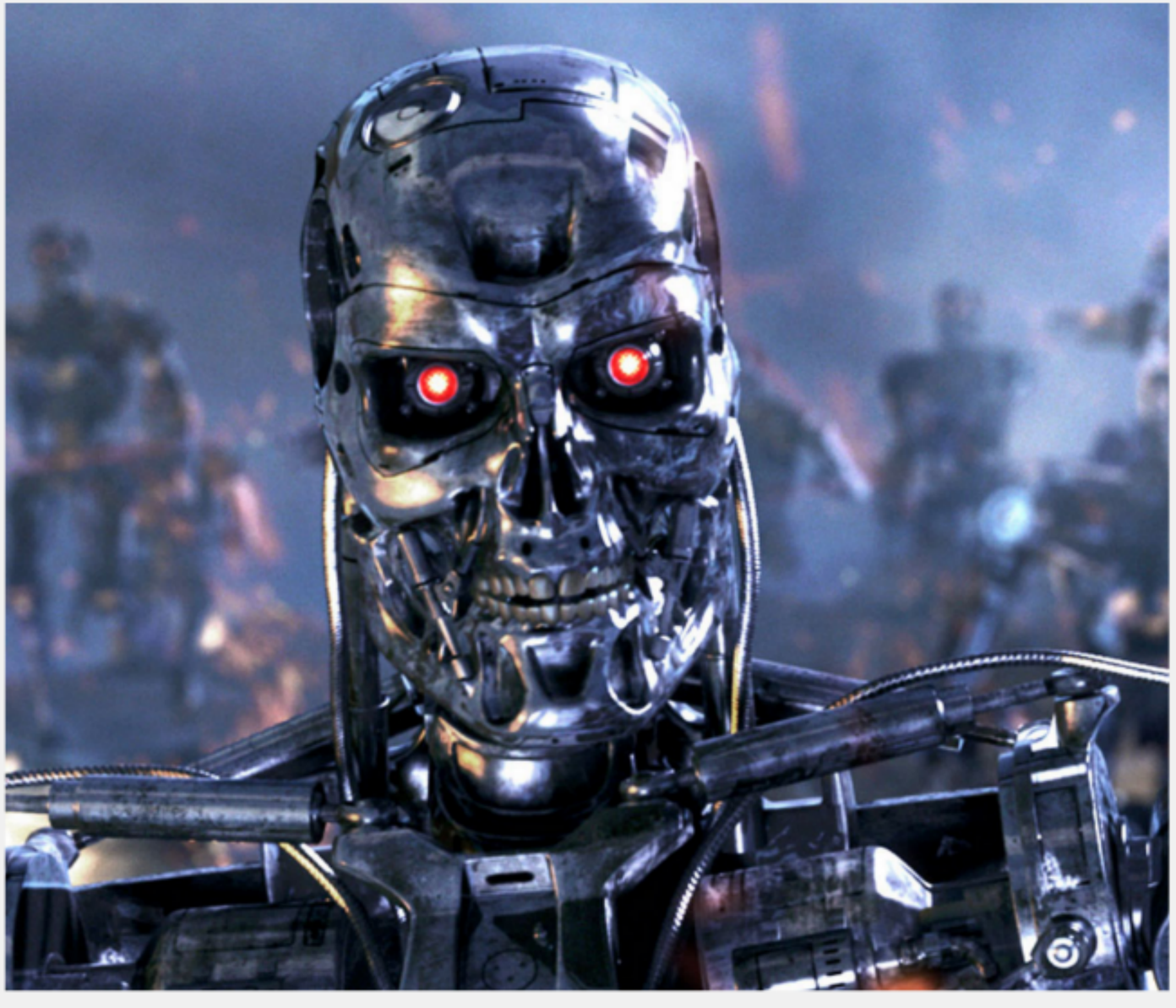
“narrow” of “broad”

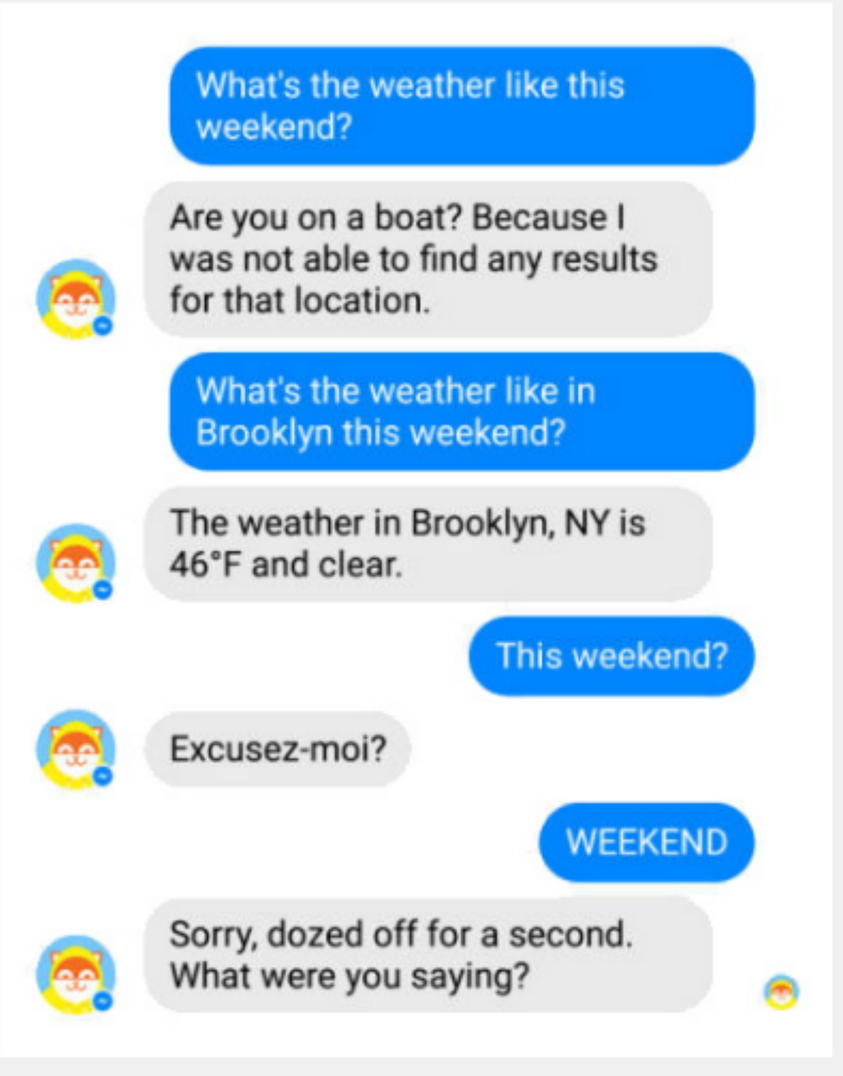
maar ook

“weak” of “strong”

The goal of AI is to create Strong and Broad platforms using Machine Learning techniques







https://chatbot.fail/

strong AI vs weak AI

Van AGI tot Superintelligence

"any intellect that greatly exceeds the cognitive performance of humans in virtually all domains of interest"

Nick Bostrom

Hoe leren mensen?

1. Reinforcement learning
2. Supervised learning
3. Unsupervised learning

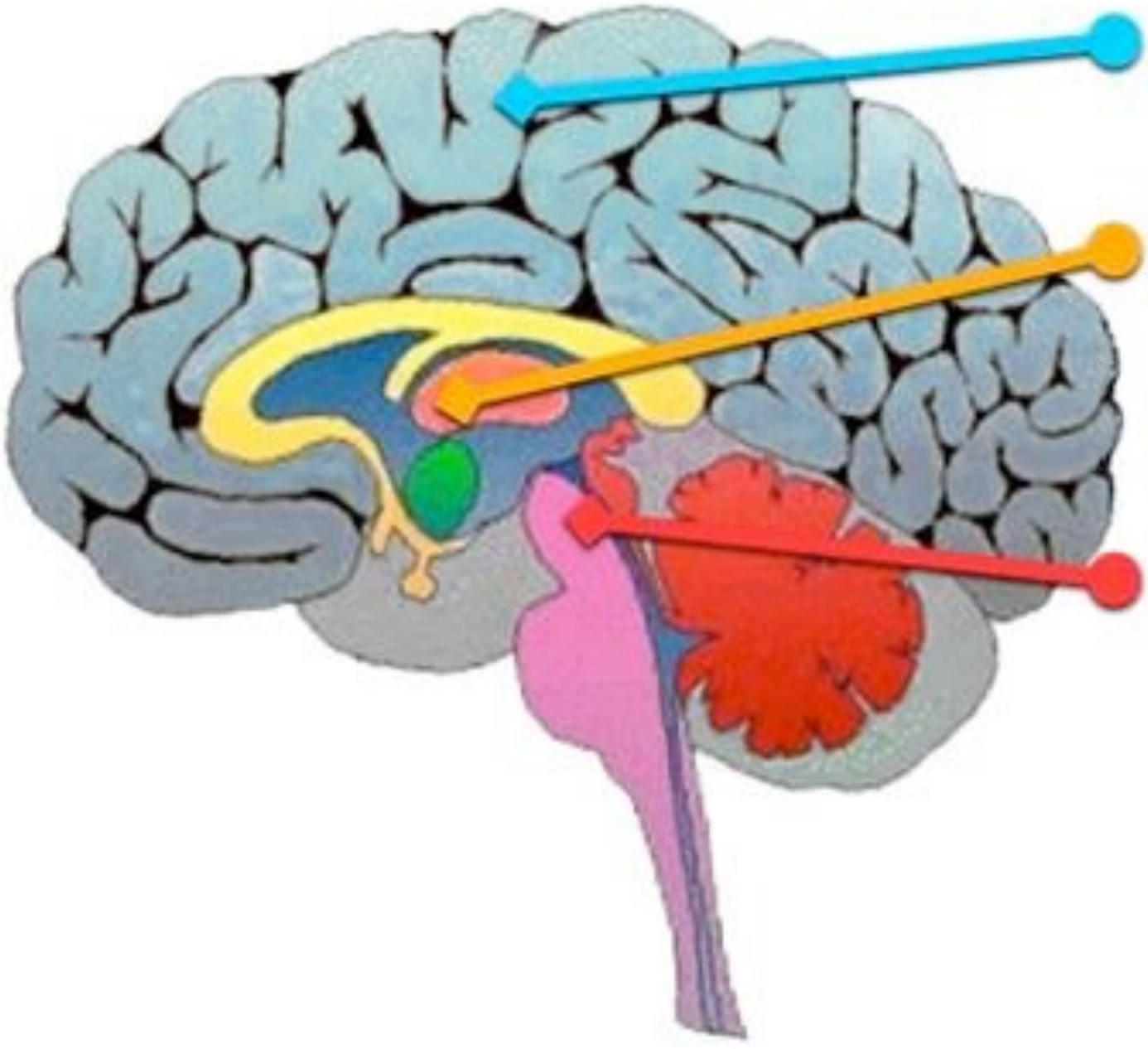
1. Reinforcement learning: **belonen of bestraffen** (=bekrachtigingsleren)

2. Supervised learning:
voorbeelden krijgen van iets of iemand anders.

3. Unsupervised learning:
uit je zelf dingen leren, zonder toezicht.

HUMAN LEARNING

Niet bekend hoe dit precies werkt…

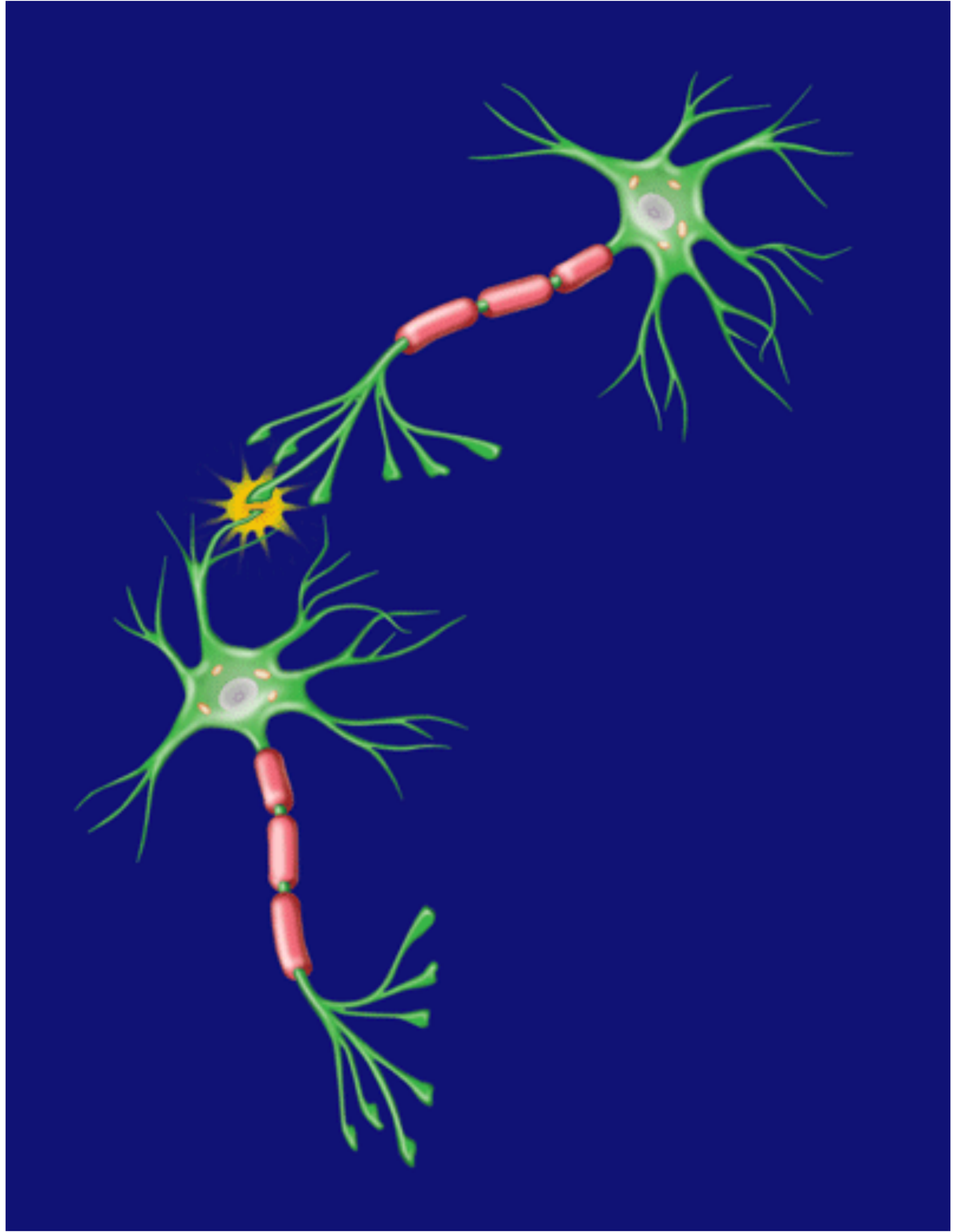


Neocortex:
Rational or Thinking Brain

Limbic Brain:
Emotional or Feeling Brain

Reptilian Brain:
Instinctual or Dinosaur Brain

100 miljard neuronen
en nog veel meer verbindingen

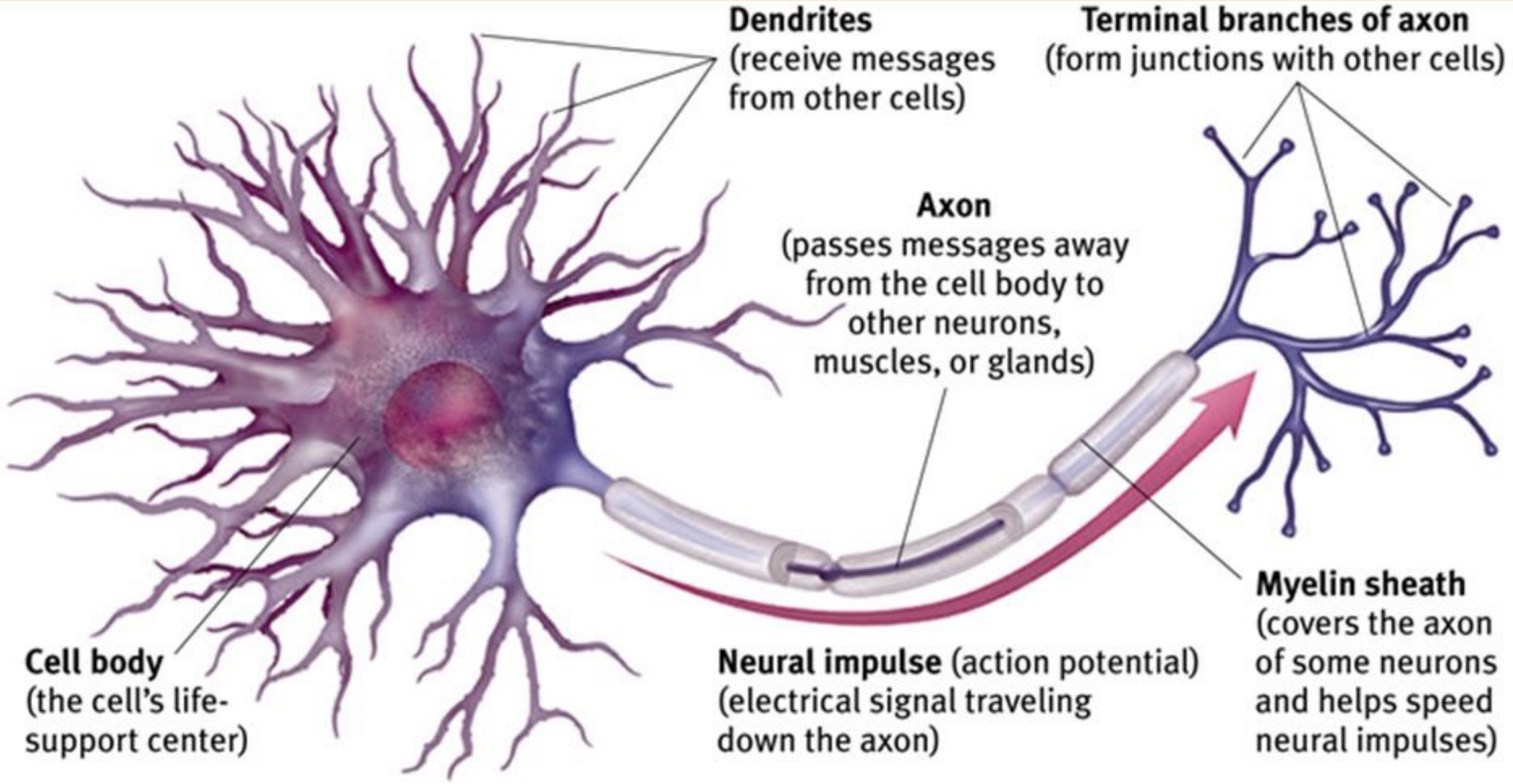


Vlak na de geboorte is de plasticiteit het grootst.
Onze hersenen worden razendsnel aangepast aan onze leefomgeving.
Maar ook op volwassen leeftijd blijft er nog een zeker aanpassingsvermogen bestaan zodat we in staat blijven nieuwe dingen te leren. Hoe meer we ons ontwikkelen hoe meer nieuwe verbindingen aangelegd worden. Hoe vaker bepaalde 'routes' in de hersenen gebruikt worden, hoe sneller contact met die bepaalde gebieden gelegd wordt. Omgekeerd worden weinig gebruikte, dus onrendabele, routes opgeheven.

Dankzij dit aanpassingsvermogen is er ook een kans (meer of minder) te herstellen van een beperkt hersenletsel. De complexiteit van het netwerk - er zijn veel meer verbindingen dan nodig zijn- maakt het mogelijk 'omwegen' aan te leggen als de 'rechtstreekse route' naar bepaalde hersengebieden afgesloten is.
Reorganisatie, dat wil zeggen overname van functies door andere gebieden, en gebruik van onbenutte hersencapaciteit is dus mogelijk.

Day 1: How does a Neuron Work?

Neurons



MACHINE LEARNING

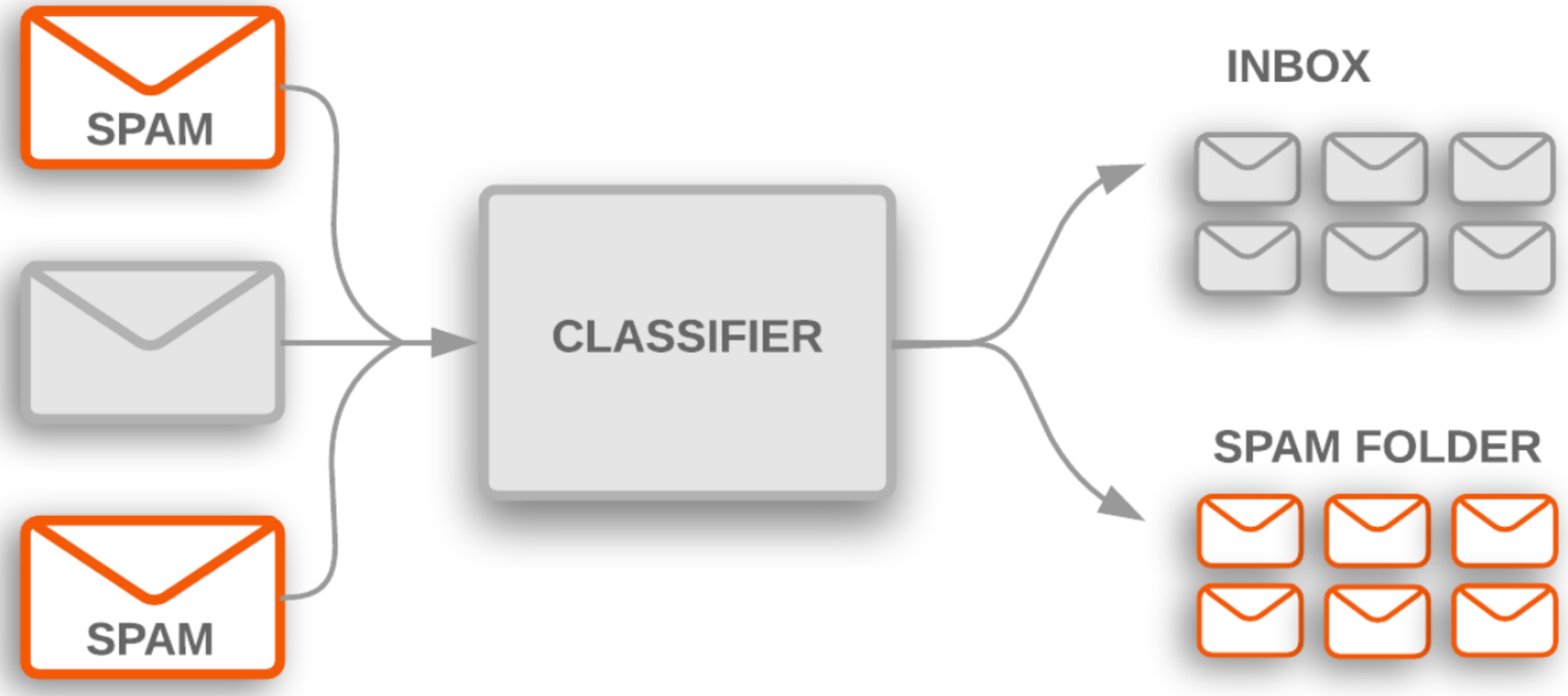
Neurale netwerken

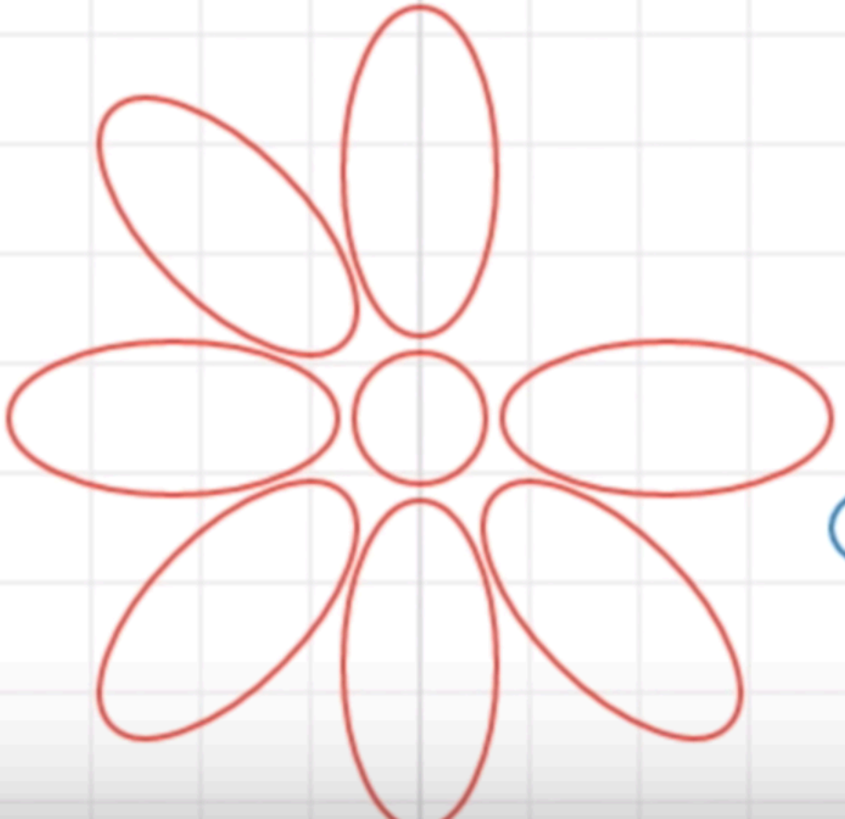
Machine learning is where a computer system is fed large amounts of data, which it then uses to learn how to carry out a specific task, such as understanding speech or captioning a photograph.

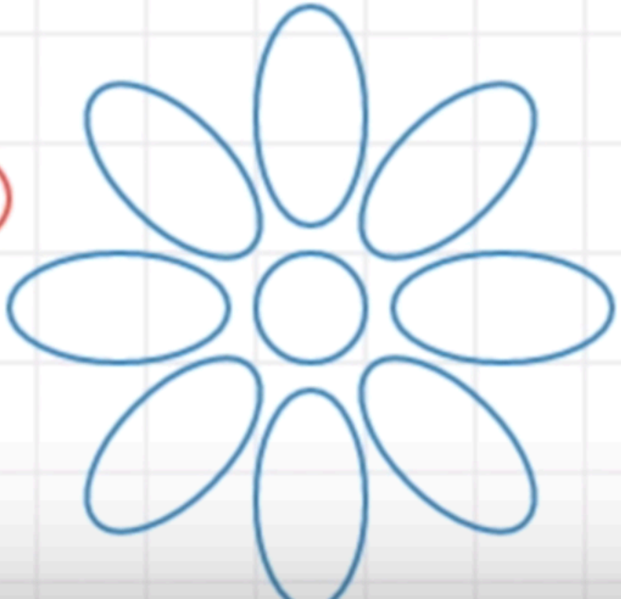
AI nu:

1. Classificatie
2. Voorspelling

Voorbeeld classificatie

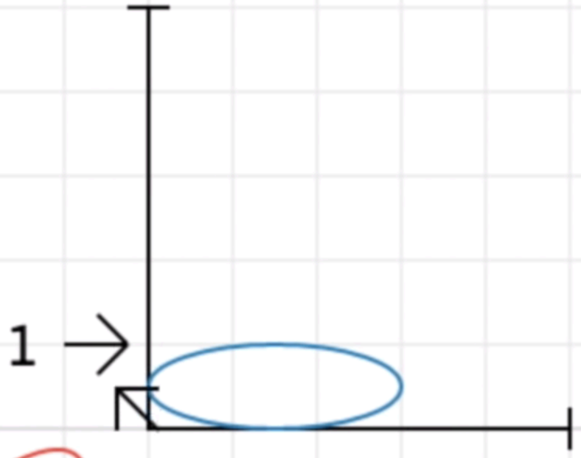


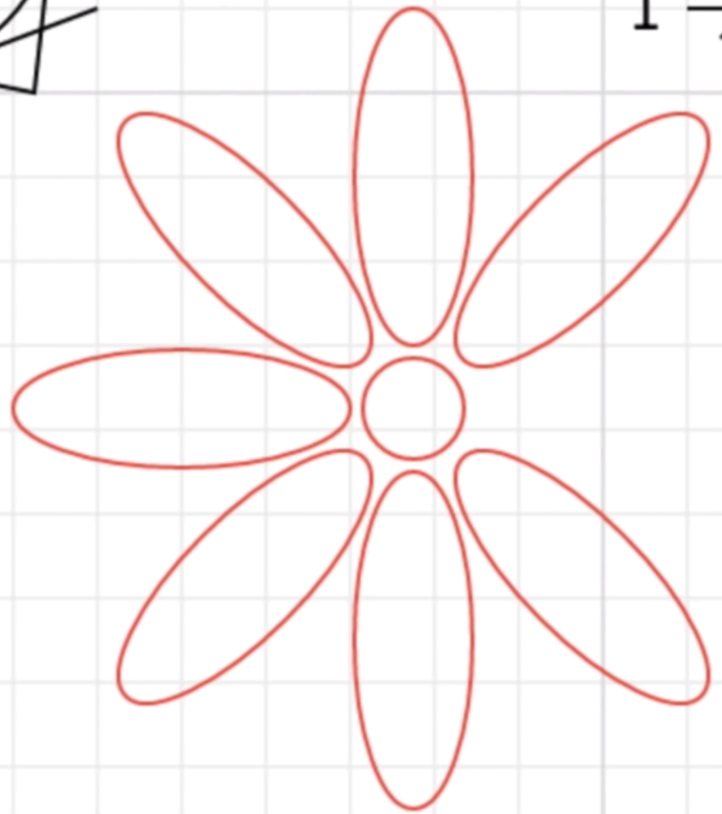


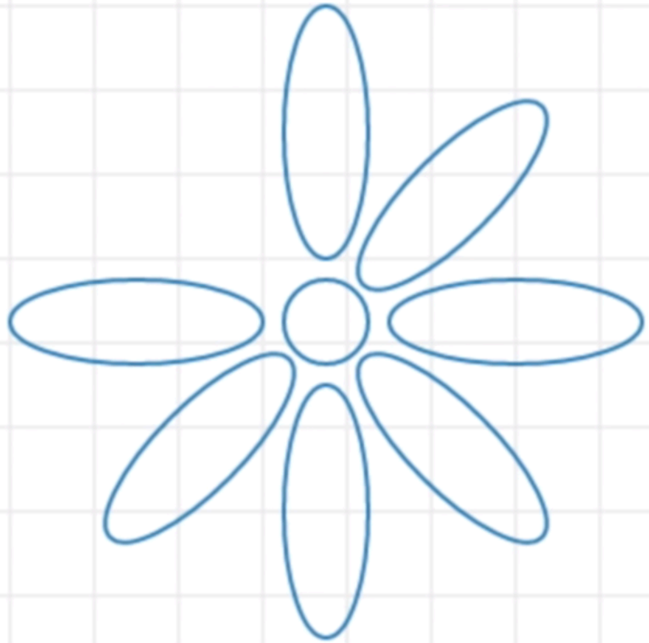


Predictie op basis van data

color	○	○	○	
length	3	2	4	3
width	1.5	1	1.5	

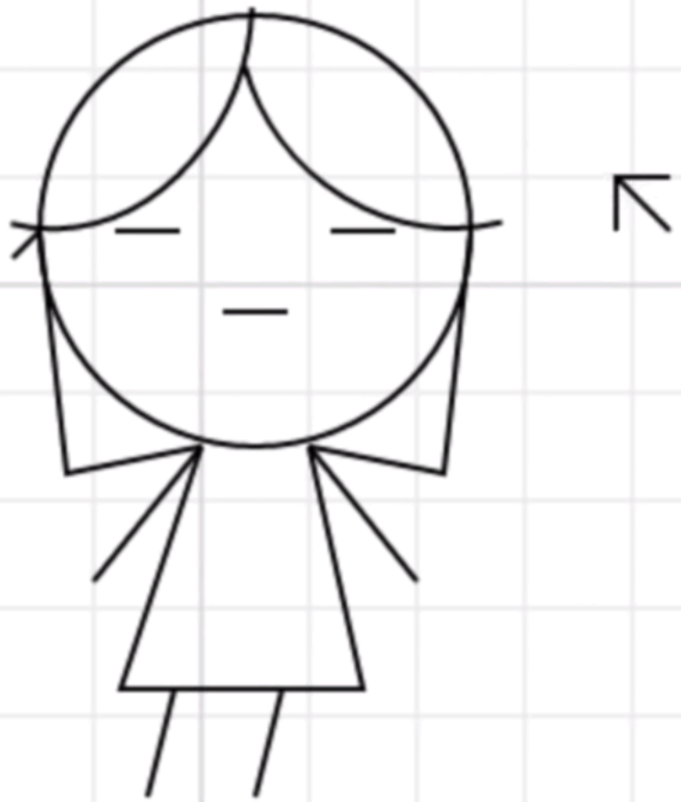






Predictie op basis van data

color	○	○	○	○	○	○	○	○	
length	3	2	4	3	3.5	2	5.5	1	4.5
width	1.5	1	1.5	1	.5	.5	1	1	1



Predictie op basis van data

color	○	○	○	○	○	○	○	○
length	3	2	4	3	3.5	2	5.5	1
width	1.5	1	1.5	1	.5	.5	1	1

1

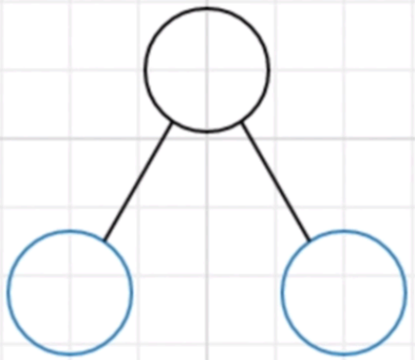
4.5

Predictie op basis van data

Hoe kan software dit berekenen?

Met behulp van **Artificiële Neurale netwerken**

color	○	○	○	○	○	○	○	○	???
length	3		4	3	3.5	2	5.5	1	4.5
width	1.5		1.5	1	.5	.5	1	1	1



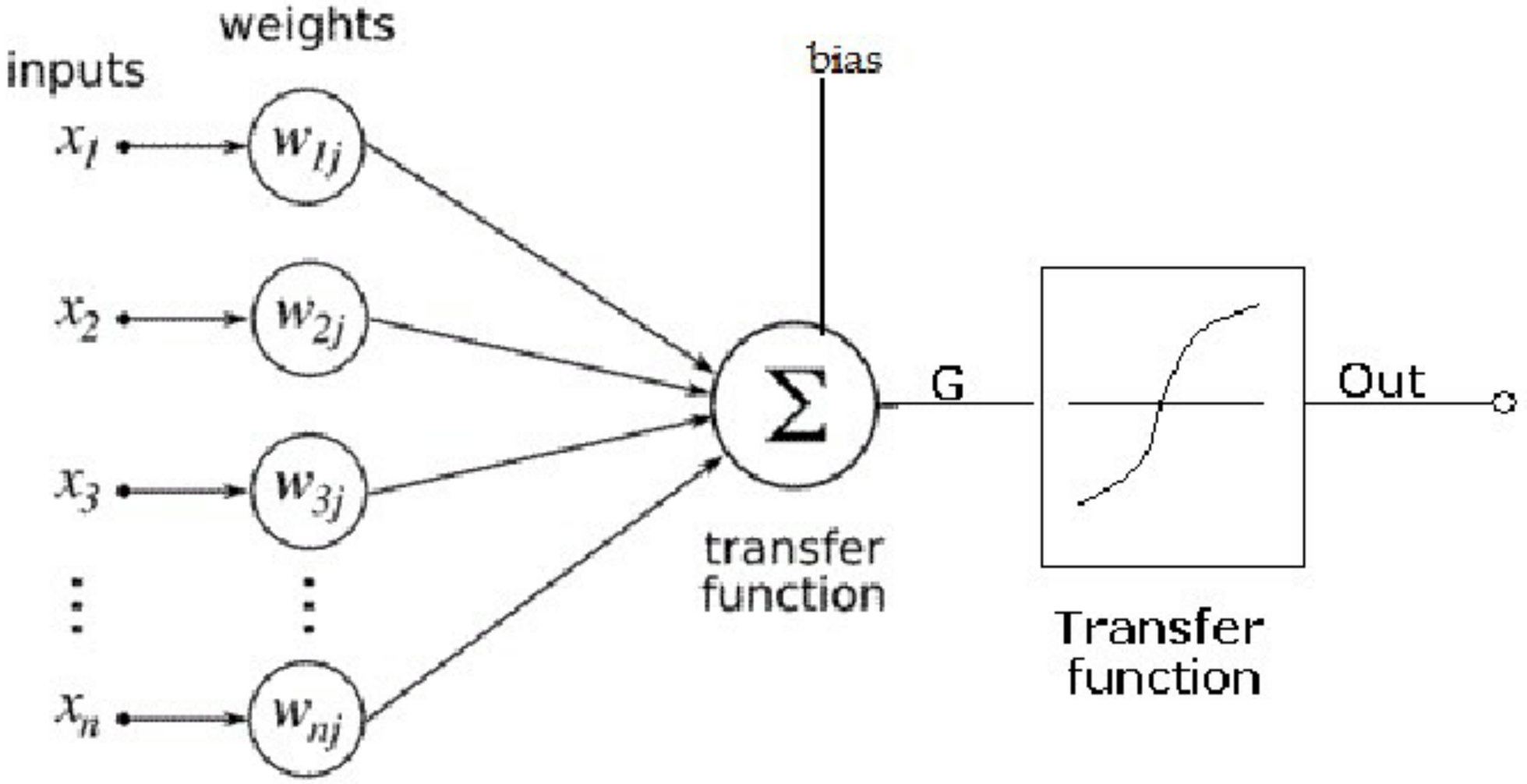
NN(2 , 1) = sigmoid(w1 · m1 + w2 · m2 + b)

Wat als het resultaat fout is?

Corrigeren: menselijke tussenkomst.
De parameters (gewichten of bias) aanpassen.

Supervised learning

Mensen kijken uitkomst na en passen de “parameters” aan.
De computer leert vervolgens bij en maakt minder fouten.


weights
inputs
bias
x_1
x_2
x_3
x_n
w_{1j}
w_{2j}
w_{3j}
w_{nj}
Σ
G
Out
transfer
function
Transfer
function

1. Tel het gewicht van alle inputs op…
2. Doe er iets mee (een berekening)
3. Bepaal de output (op basis van vooraf getoonde voorbeelden)

Huidige AI-toepassingen

1. Beeld: computer vision
2. Tekst: natural language processing & generation
3. Spraak: speech recognition, speech synthesis
4. Voorspelling & suggesties
5. Virtuele assistenten: chatbots, smart assistenten
6. Robotica

Machine Intelligence LANDSCAPE

CORE TECHNOLOGIES

ARTIFICIAL INTELLIGENCE
IBM WATSON, MetaMind, Numenta, ai-one, Cycorp, Microsoft Research, nara, Reactor, SCALED INFERENCE

DEEP LEARNING
vicarious, Vision Factory, facebook, Baidu IDL, Google, ersatz, SKYMIND, SignalSense

MACHINE LEARNING
rapidminer, context relevant, 0xdata H2O, DATARPM, LIftIgniter, SPARKBEYOND, Azure ML, yhat, wise.io, Sense, GraphLab, Alpine, Ptonian

NLP PLATFORMS
cortical.io, idibon, LUMINOSO, wit.ai, MaluubA

PREDICTIVE APIS
AlchemyAPI, MINDOPS, Google, bigml, indico, ALGORITHMIA, Expect Labs, PredictionIO

IMAGE RECOGNITION
clarifai, MADBITS, DNNresearch, DEXTRO, VISENZE, lookflow

SPEECH RECOGNITION
GRIDSPACE, popup archive, NUANCE

RETHINKING ENTERPRISE

SALES
Preact, AVISO, RelateIQ, NGDATA, CLARABRIDGE, FRAMED, infer, ATTENSITY, causata

SECURITY / AUTHENTICATION
CROSSMATCH, cnjur, EYEVERIFY, BITSIGHT, CYLANCE, bionym

FRAUD DETECTION
sift science, SOCURE, ThreatMetrix, feedzai, Brighterion, VERAFIN

HR / RECRUITING
TalentBin, entelo, predikt, Connectifier, gild, hiQ, CONCEPTNODE

MARKETING
brightfunnel, bloomreach, CommandIQ, AIRPR, RADIUS, TellApart, people pattern, Freshplum

PERSONAL ASSISTANT
Siri, Google now, Cortana, cleversense, tempo, Robinlabs, KASISTO, fuse|machines, VIV, CLARA LABS

INTELLIGENCE TOOLS
ADATAD, Palantir, Quid, Digital Reasoning, FirstRain

RETHINKING INDUSTRIES

ADTECH
METAMARKETS, dstillery, rocketfuel, YieldMo, ADBRAIN

AGRICULTURE
BLUE RIVER, TerrAvion, ceresimaging, HONEYCOMB, THE CLIMATE CORPORATION, tule, mavrx

EDUCATION
declara, coursera, KNEWTON, kidaptive

FINANCE
Bloomberg, FinGenius, alphasense, KENSHO, Dataminr, minettabrook, BINATIX

LEGAL
Lex Machina, brightleaf, COUNSELYTICS, RAVEL, JUDICATA, Brevia, DiligenceEngine

MANUFACTURING
SIGHT MACHINE, MICROSCAN, IVISYS, BOULDER IMAGING

MEDICAL
Parvital, transcriptic, Genescient, ZEPHYR HEALTH, grand round table, bina, TUTE GENOMICS

OIL AND GAS
kaggle, AYASDI, TACHYUS, biota, Flutura

MEDIA / CONTENT
Outbrain, newsle, ARRIA, SAILTHRU, wavii, Owlin, NarrativeScience, yseop, Summly, Prismatic, ai

CONSUMER FINANCE
affirm, inVenture, zestfinance, BILL GUARD, LendUp, LendingClub, Kabbage

PHILANTHROPIES
DataKind, thorn, THE DATA GUILD

AUTOMOTIVE
Google, Continental, TESLA, MobileEye, CRUISE

DIAGNOSTICS
enlitic, 3SCAN, lumiata, ENTOPSIS

RETAIL
BAY SENSORS, PRISM SKYLABS, celect, euclid

RETHINKING HUMANS / HCI

AUGMENTED REALITY
wearable intelligence, META, layar, APX, blippar

GESTURAL COMPUTING
THALMICLABS, omek, FLUTTER, LEAP MOTION, eyeSight, 3Gear Systems, GestureTek, nod

ROBOTICS
intel, LIQUID ROBOTICS, SoftBank, iRobot, Boston Dynamics, jibo, anki, evolution robotics

EMOTIONAL RECOGNITION
affectiva, BEYONDVERBAL, EMOTIENT, cogito

SUPPORTING TECHNOLOGIES

HARDWARE
NVIDIA, XILINX, Qualcomm, NERVANA SYSTEMS, TEERADEEP, Artificial Learning, rigetti

DATA PREP
TRIFACTA, Paxata, tamr, Alation

DATA COLLECTION
diffbot, kimono, CrowdFlower, Connotate, WorkFusion, import.io

www.shivonzilis.com/machineintelligence

Bloomberg BETA

AI-bedrijven

https://www.tensorflow.org/

auto ml

https://teachablemachine.withgoogle.com/

But one of the most visible manifestations of this AI war has been the rise of virtual assistants, such as Apple's Siri, Amazon's Alexa, the Google Assistant, and Microsoft Cortana.

China

Chinese firms Alibaba, Baidu, and Lenovo are investing heavily in AI in fields ranging from ecommerce to autonomous driving. As a country China is pursuing a three-step plan to turn AI into a core industry for the country, one that will be worth 150 billion yuan ($22bn) by 2020.

Robots & drones

Single purpose
Narrow AI
Intelligentie in de cloud

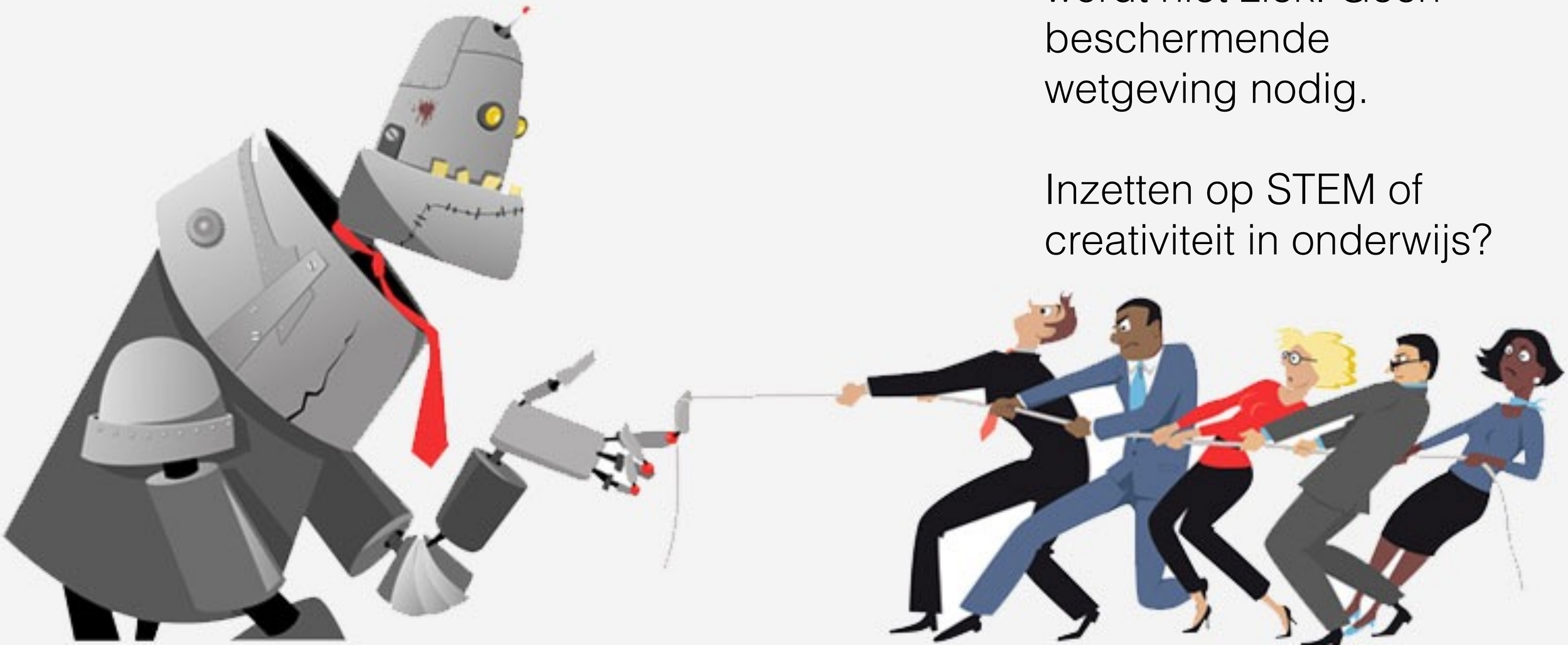
Wat ze leren via ML, opgeslagen in de cloud

Als ze stuk zijn, gaat intelligentie of “functie” niet verloren

Werkgelegenheid

Robots, automatisering, AI: duur in aankoop maar wordt niet ziek. Geen beschermende wetgeving nodig.

Inzetten op STEM of creativiteit in onderwijs?



Creatieve computers?

The quest for AI creativity

↓ Exploring creative frontiers

↓ Can AI learn to be creative?

↓ Augmenting creativity

Creativity may be the ultimate moonshot for artificial intelligence. Already AI has helped write pop ballads, mimicked the styles of great painters and informed creative decisions in filmmaking. Experts wonder, however, how far AI can or should go in the creative process.

When we recently spoke to 30 AI experts and thought leaders, their opinions

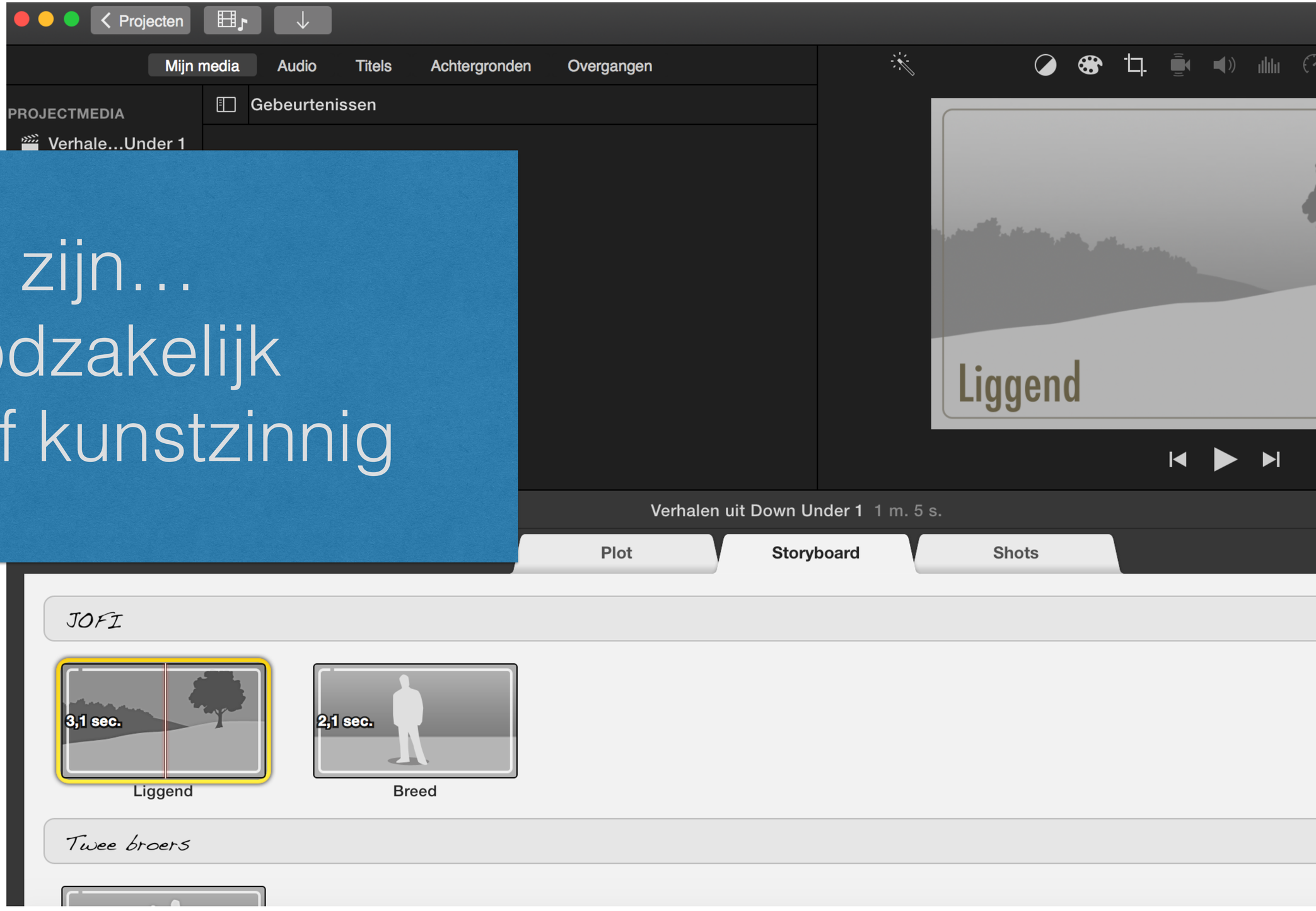
“It’s easy for AI to come up with something novel just randomly. But it’s very hard to come up with something that is novel and unexpected and useful.”

— John Smith, Manager of Multimedia and Vision at IBM Research

“Can we take what humans think is beautiful and creative and try to put that into an algorithm? I don't think it's going to be possible for quite a while.”

— Jason Toy, CEO, Somatic

Creatief zijn…
niet noodzakelijk
nieuw of kunstzinnig



Mensen blijven uniek omdat ze doodgaan.
Omdat ze plannen. Omdat ze weten dat alles eindig is.
Daarin zullen ze altijd het verschil maken.
Misschien hebben ze net daarom AI bedacht, om die
“gebreken” te overbruggen.

Om niet meer eindig te zijn.

- ik