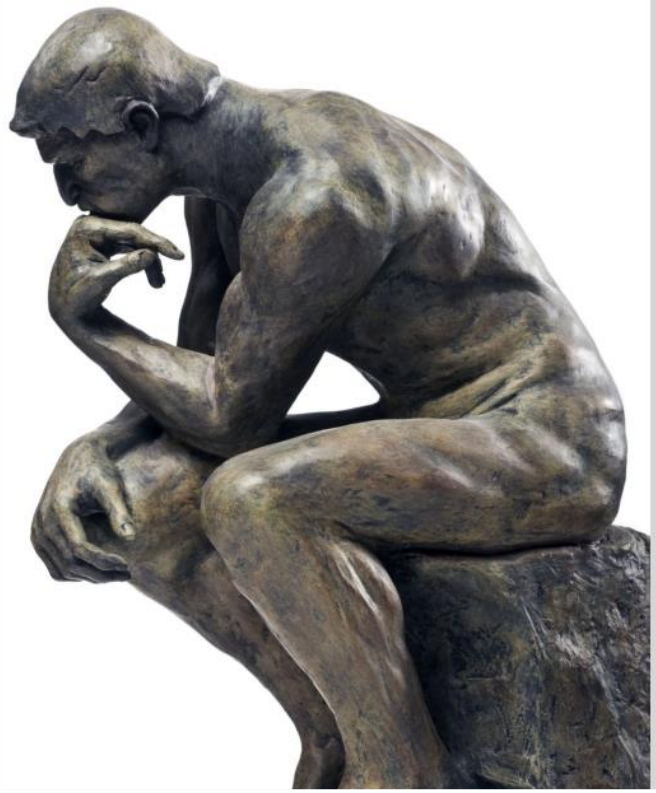

Wat is Kunstmatige Intelligentie nou eigenlijk?

Kenneth Gilhuijs

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UMC Utrecht

Wat is kunstmatige intelligentie?

Van Dale:

in·tel·li·gen·tie *(de; v)*

1 verstandelijk vermogen: *kunstmatige intelligentie* het met behulp van een computer nabootsen van het menselijk denken

Wikipedia:

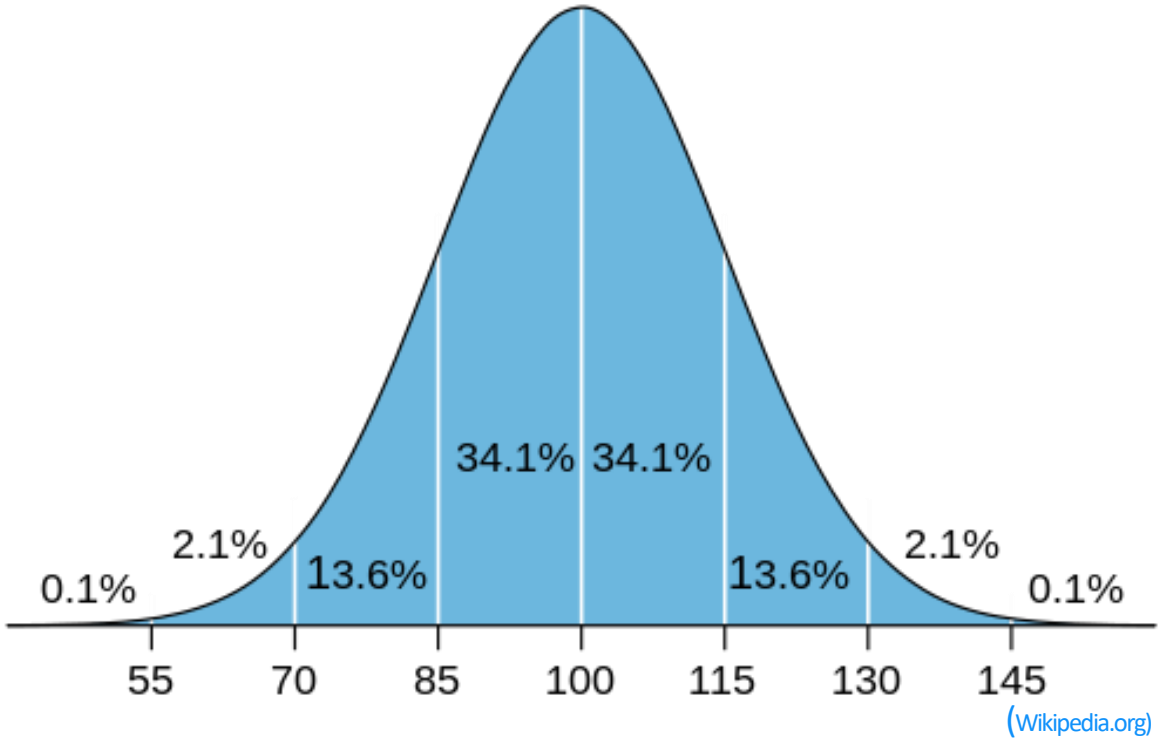
Kunstmatige intelligentie

Kunstmatige intelligentie of artificiële intelligentie is de wetenschap die zich bezighoudt met het creëren van een artefact dat een vorm van intelligentie vertoont. Wikipedia (NL)

Automaton; Henri Maillardet (1745–1830)

Hoe beoordelen we kunstmatige intelligentie?

IQ test (mens)

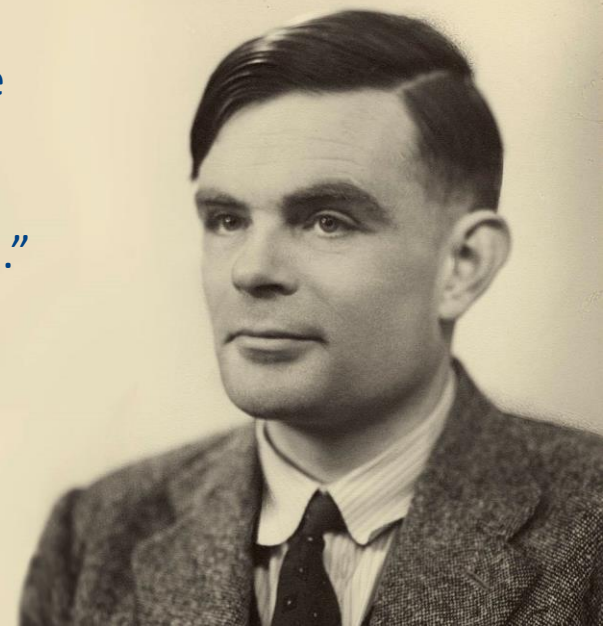


(Wikipedia.org)

Turing test (computer)

"A computer would deserve to be called intelligent if it could deceive a human into believing that it was human."

(1950)



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De Turing test - 1950

VOL. LIX. NO. 236.] [October, 1950

MIND

A QUARTERLY REVIEW

OF

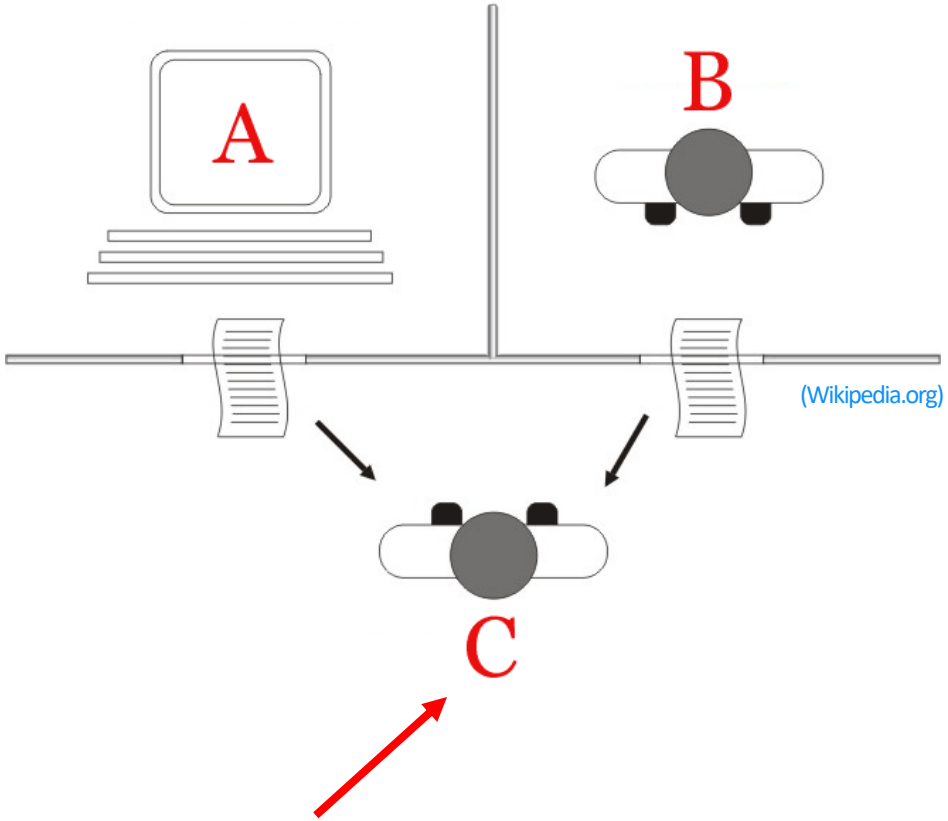
PSYCHOLOGY AND PHILOSOPHY

I.—COMPUTING MACHINERY AND INTELLIGENCE

BY A. M. TURING

1. *The Imitation Game.*

I PROPOSE to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, 'Can machines think?' is to be sought in a statistical survey such as a Gallup



(Wikipedia.org)

De "Interrogator"

De Turing test - 2023

HUMAN OR NOT? A GAMIFIED APPROACH TO THE TURING TEST

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"I believe that in 50 years' time it will be possible to make computers play the imitation game so well that an average interrogator will have no more than 70% chance of making the right identification after 5 minutes of questioning."

– Alan Turing, 1950

ABSTRACT

We present *"Human or Not?"*[1], an online game inspired by the Turing test, that measures the capability of AI chatbots to mimic humans in dialog, and of humans to tell bots from other humans. Over the course of a month, the game was played by over 1.5 million users who engaged in anonymous two-minute chat sessions with either another human or an AI language model which was prompted to behave like humans. The task of the players was to correctly guess whether they spoke to a person or to an AI. This largest scale Turing-style test conducted to date revealed some interesting facts. For example, overall users guessed the identity of their partners correctly in only 68% of the games. In the subset of the games in which users faced an AI bot, users had even lower correct guess rates of 60% (that is, not much higher than chance). This white paper details the development, deployment, and results of this unique experiment. While this experiment calls for many extensions and refinements, these findings already begin to shed light on the inevitable near future which will commingle humans and AI.

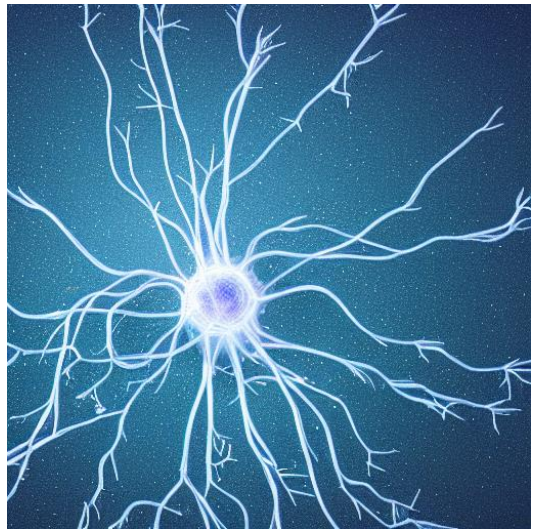
Janai et al, https://doi.org/10.48550/arXiv.2305.20010. 2023

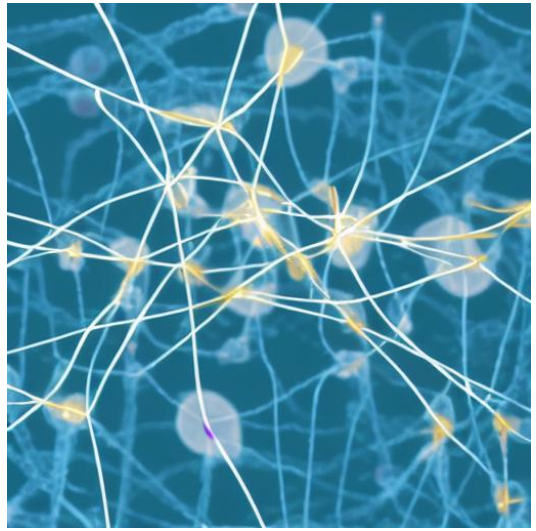
1.5 million participants had to guess whether they spoke to a person or to an AI.

"Overall, users guessed the identity of their partners correctly in only 68% of the games. In the subset of games in which users faced an AI bot, users had even lower correct guess rate of 60% (that is, not much higher than chance)."

Waarom komt AI intelligent over?

Emerging ability





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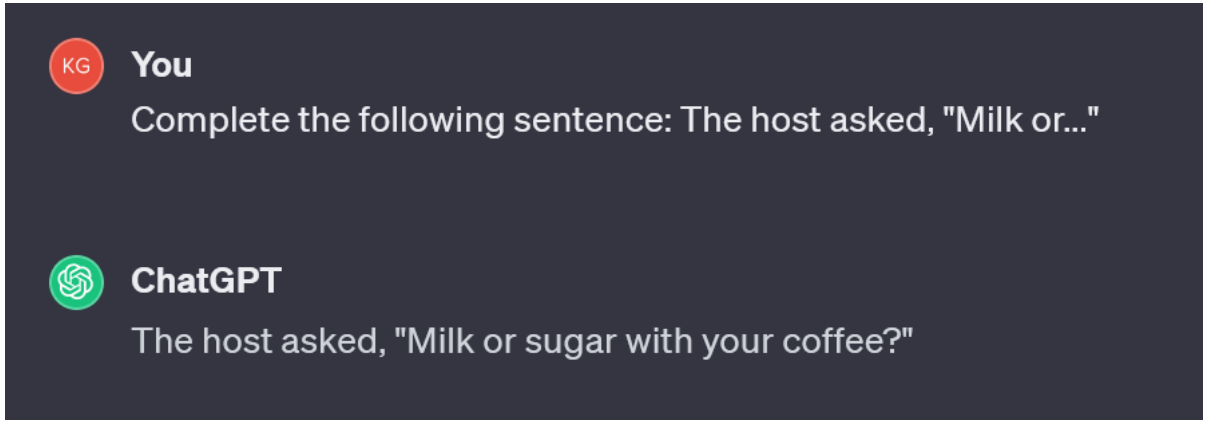
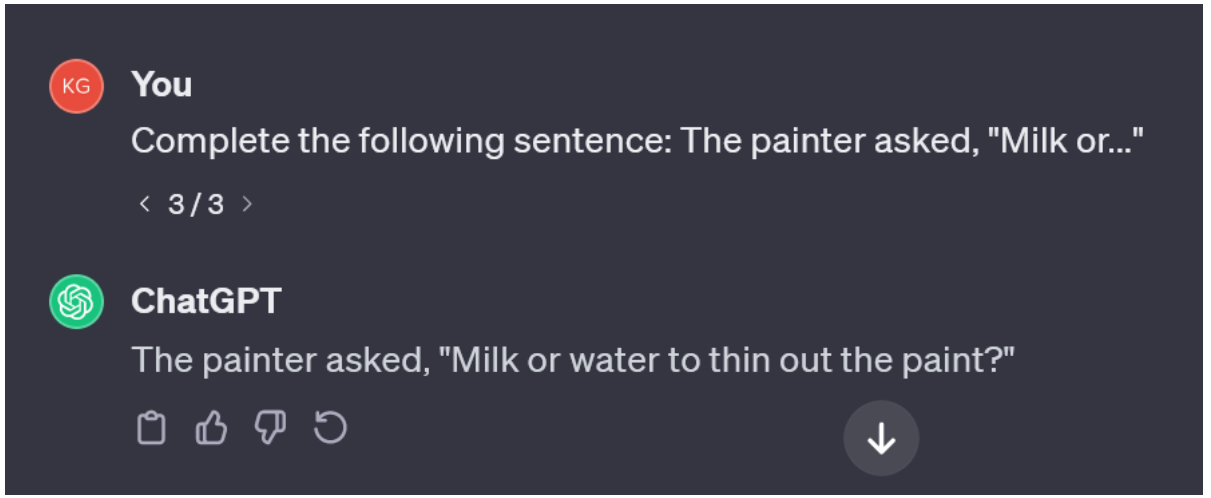
Waarom komt AI intelligent over?

Emerging ability





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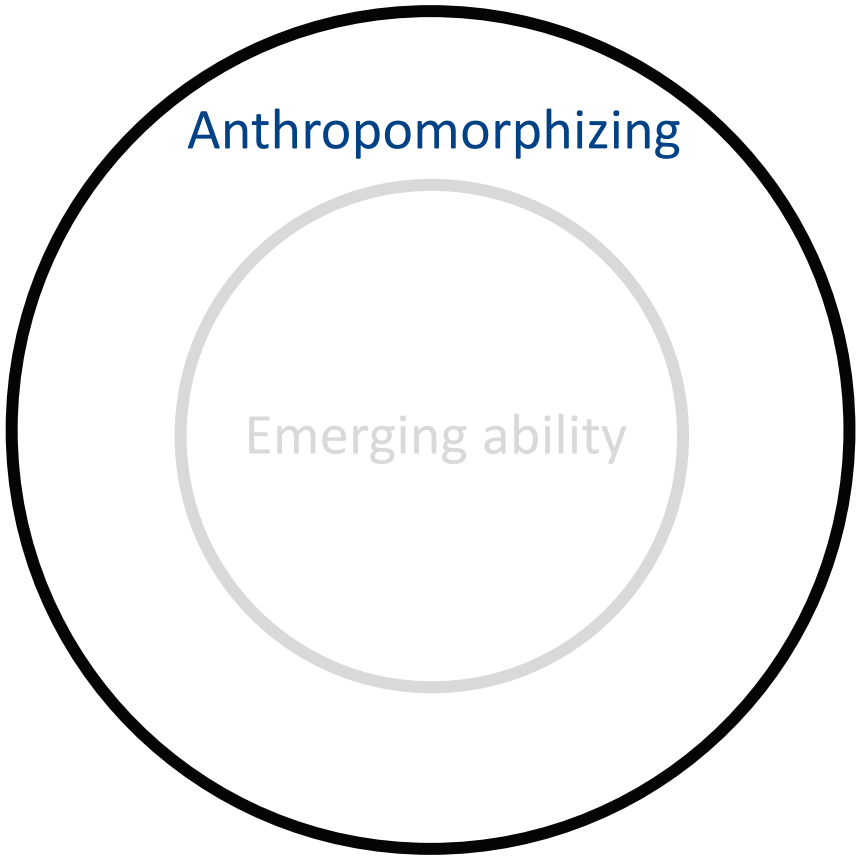
Waarom komt AI intelligent over?



<u>Antropomorfiseren:</u>

Het toekennen van menselijke eigenschappen, emoties of intenties aan niet-menselijke entiteiten

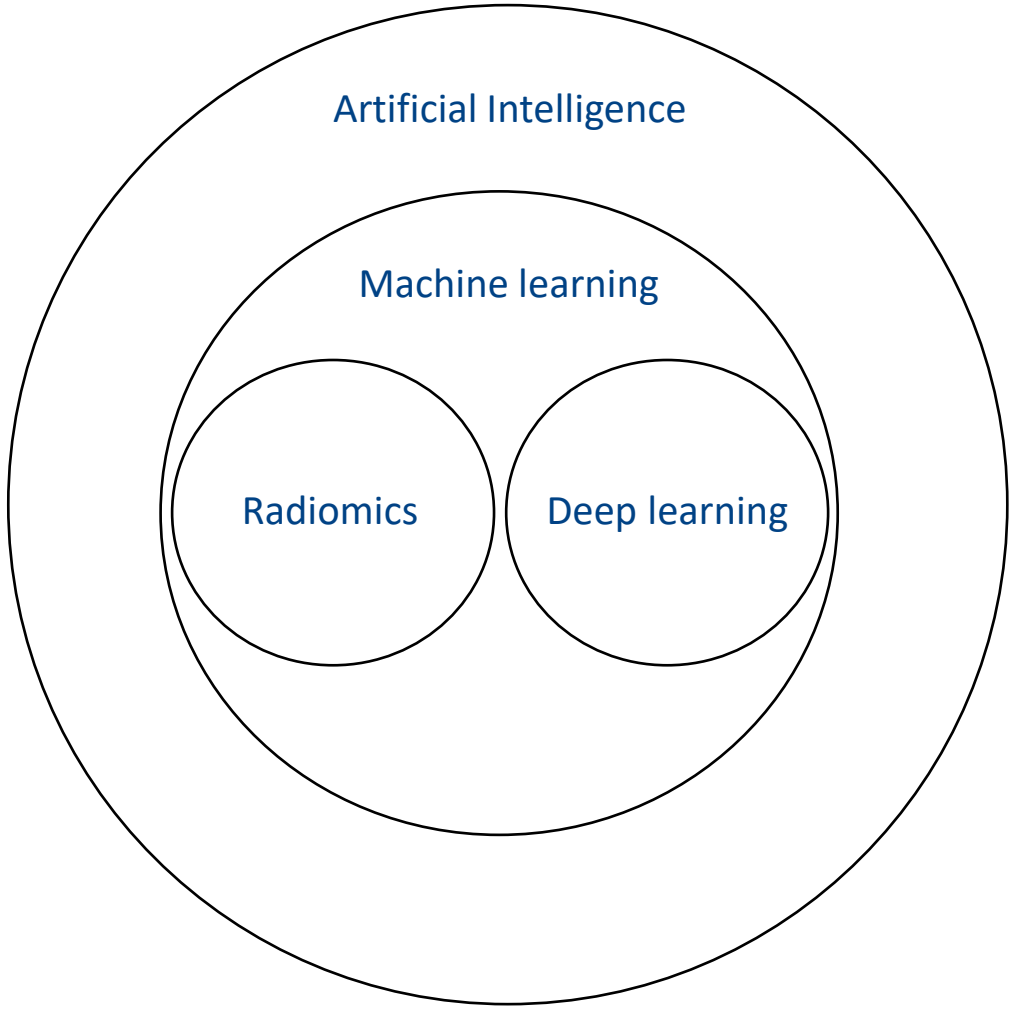
<u>Cognitieve bias:</u>

Mensen antropomorfiseren om betekenis te geven aan gebeurtenissen en gedragingen die zij ervaren

Waarom komt AI intelligent over?

“It could go quite wrong”

Narrow Artificial Intelligence (NAI)



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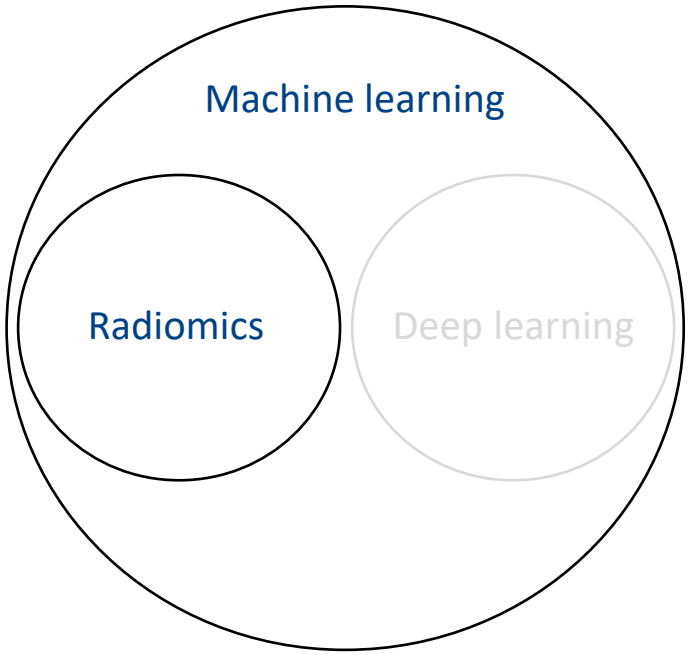
Narrow Artificial Intelligence (NAI)



Machine learning

Mandarijn

Sinaasappel

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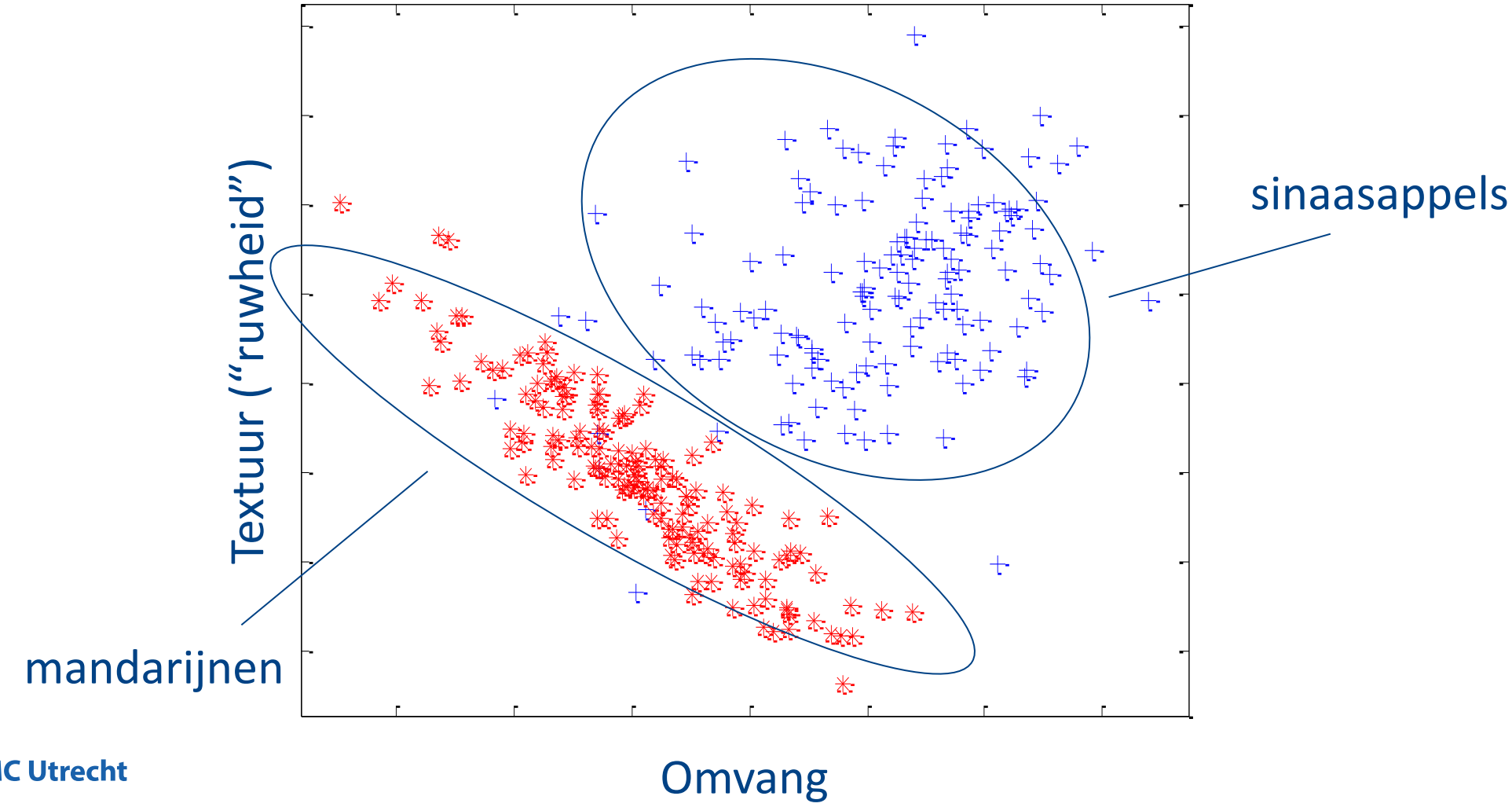
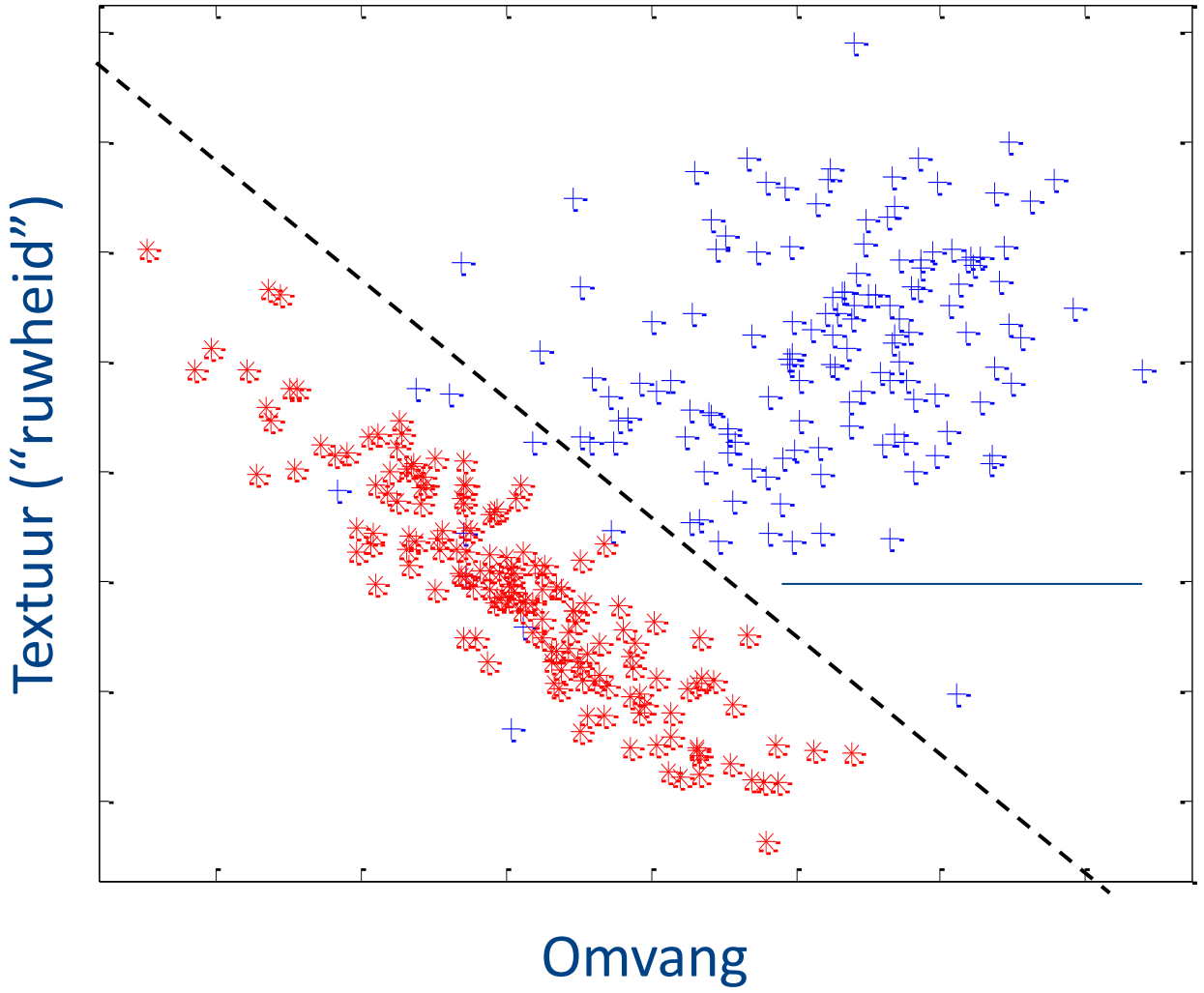
Machine learning



Machine learning



Classificatielijn:
Textuur - m·Omvang - b = 0

als <0: mandarijn
als >0: sinaasappel

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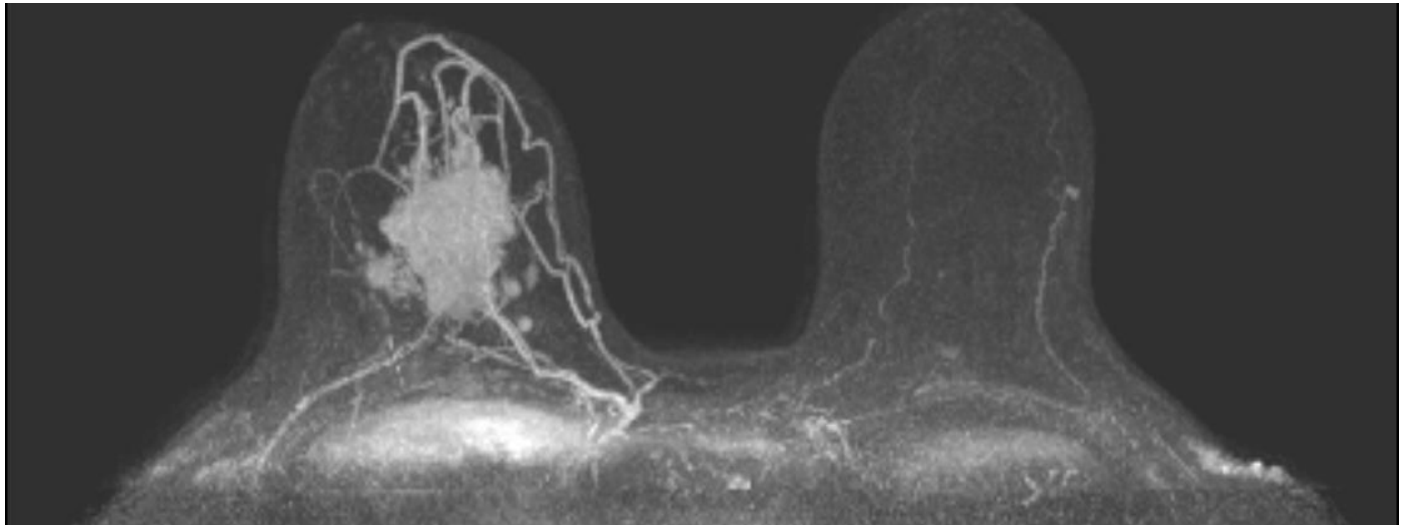
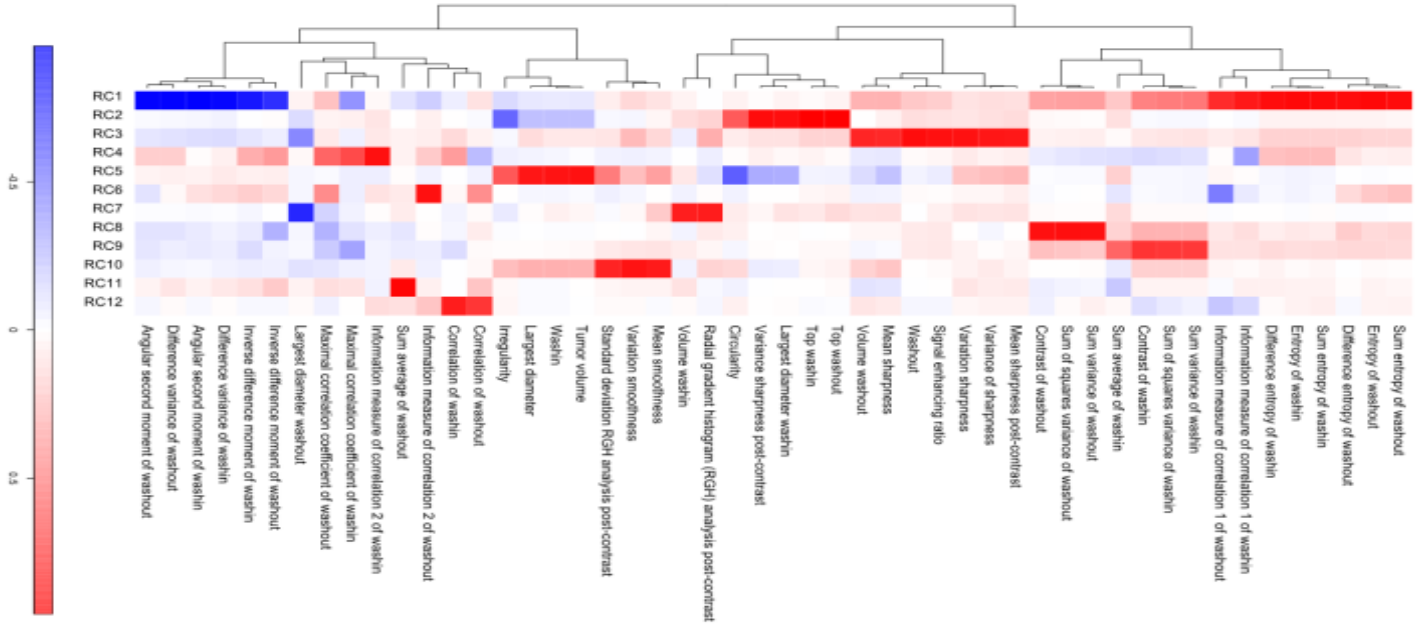
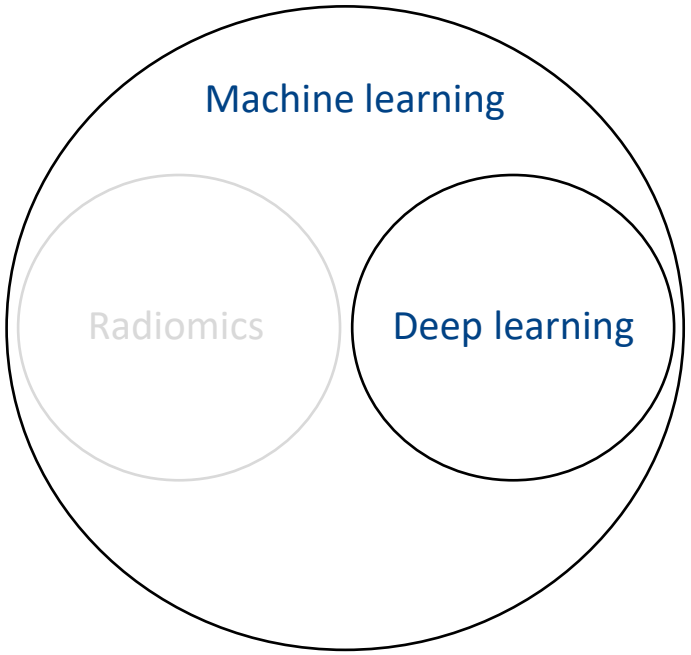
Machine learning





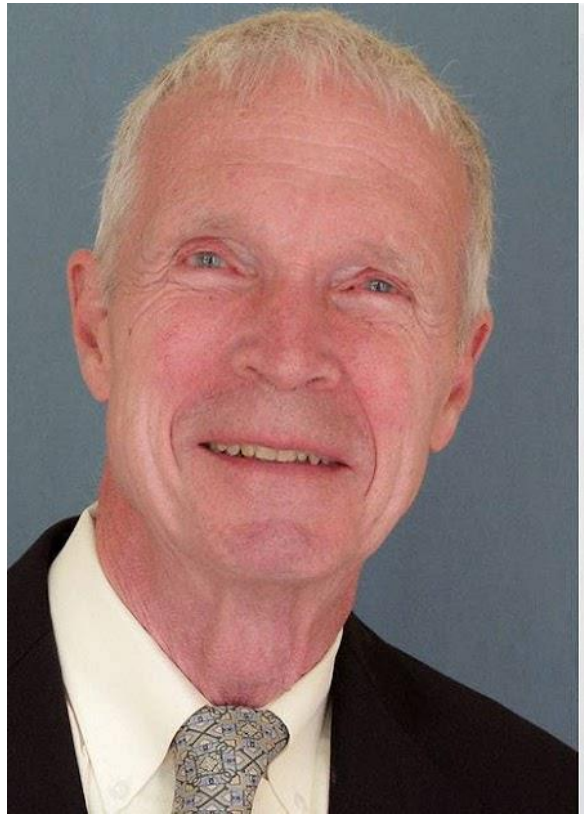
Machine learning met een groot aantal (50 – 1000) vooraf gekozen beeldkenmerken

Narrow Artificial Intelligence (NAI)



Nobel Prize in Physics 2024

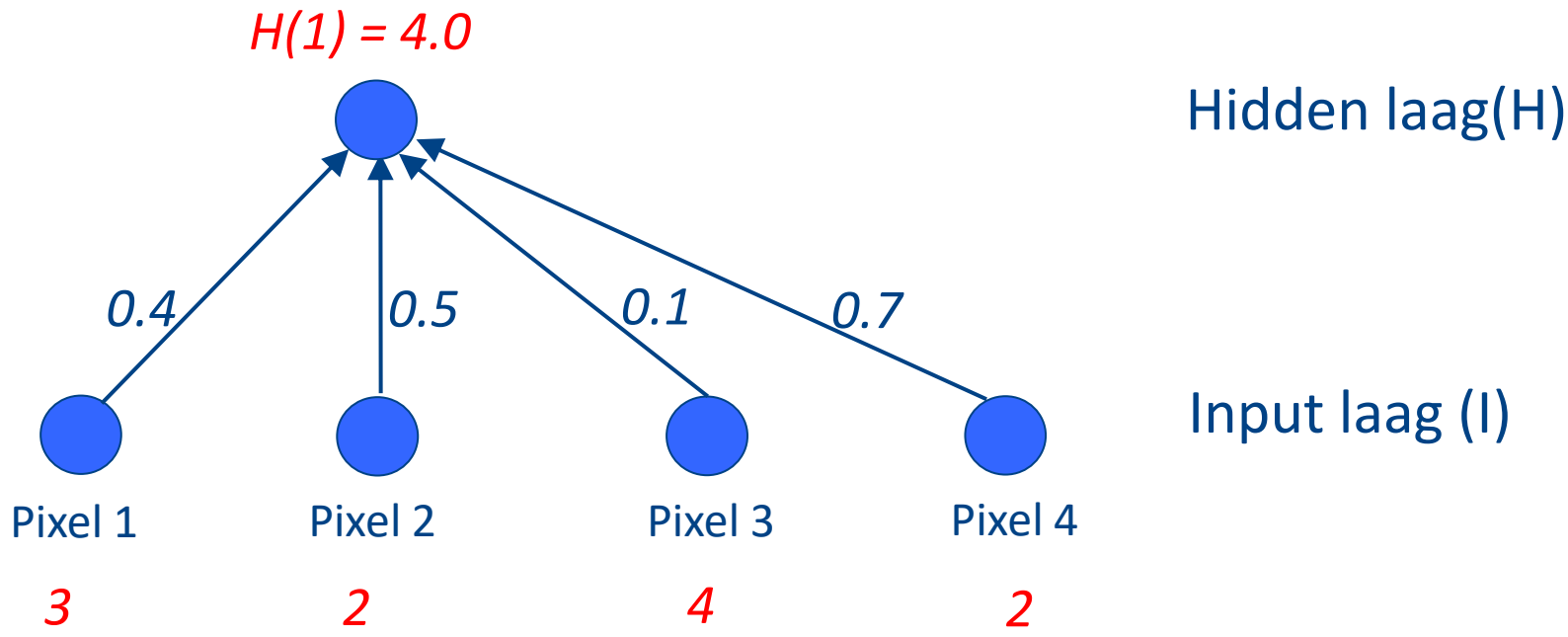
“for foundational discoveries and inventions that enable machine learning with artificial neural networks”



John Hopfield

Geoffrey Hinton

Neuraal Netwerk



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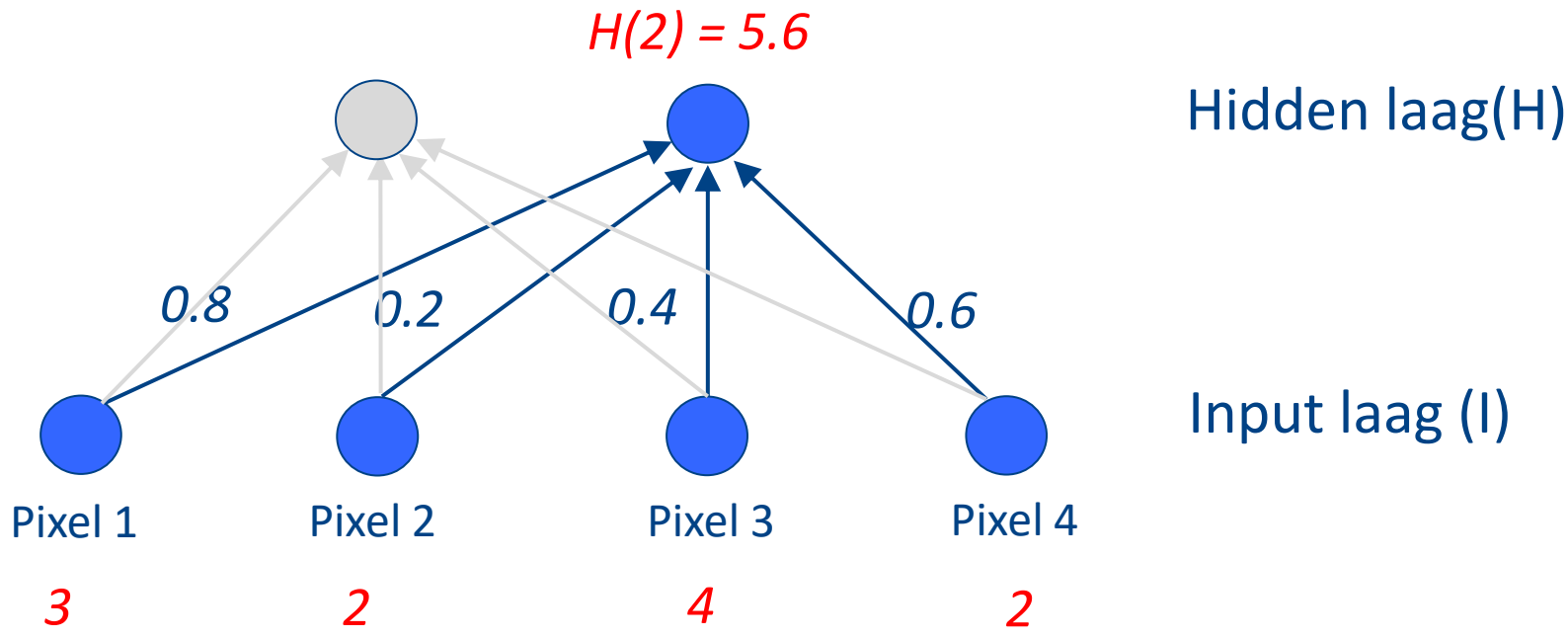
want H(1) = 3x0.4 + 2x0.5 + 4x0.1 + 2x0.7 = 4.0

Neuraal Netwerk



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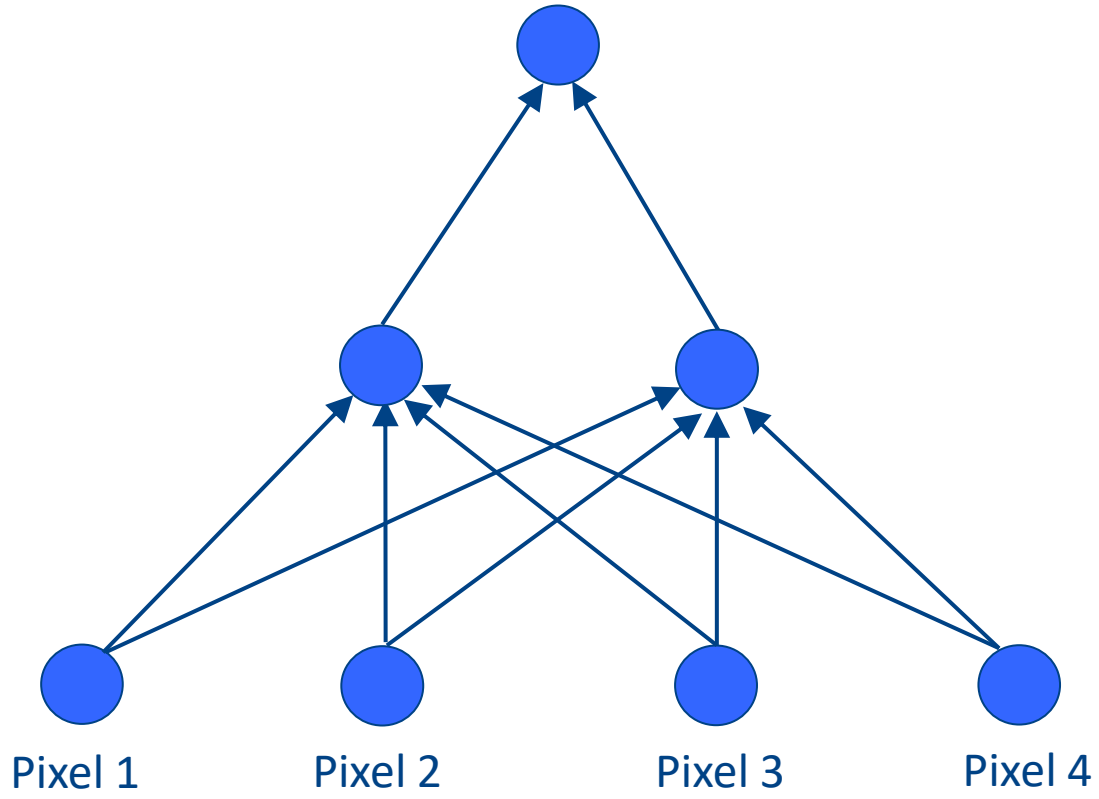
Neuraal Netwerk



Output laag(O)

als O = 0 ➔ mandarijn

als O = 1 ➔ sinaasappel

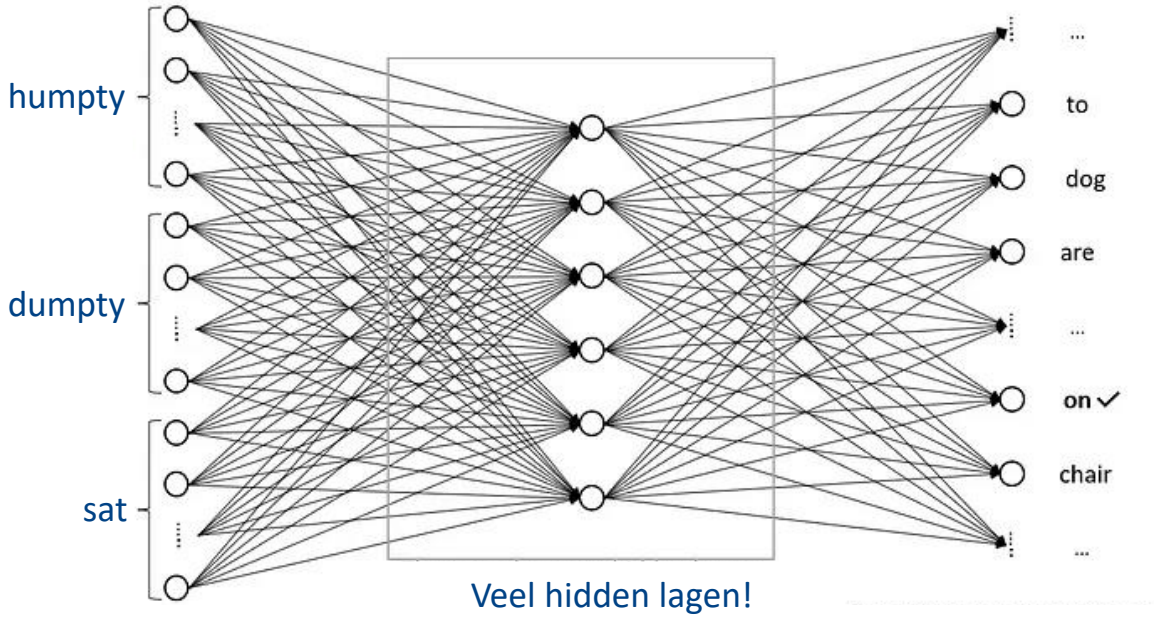
Hidden laag(H)

Input laag (I)

ChatGPT: 175 milliard verbindingen!

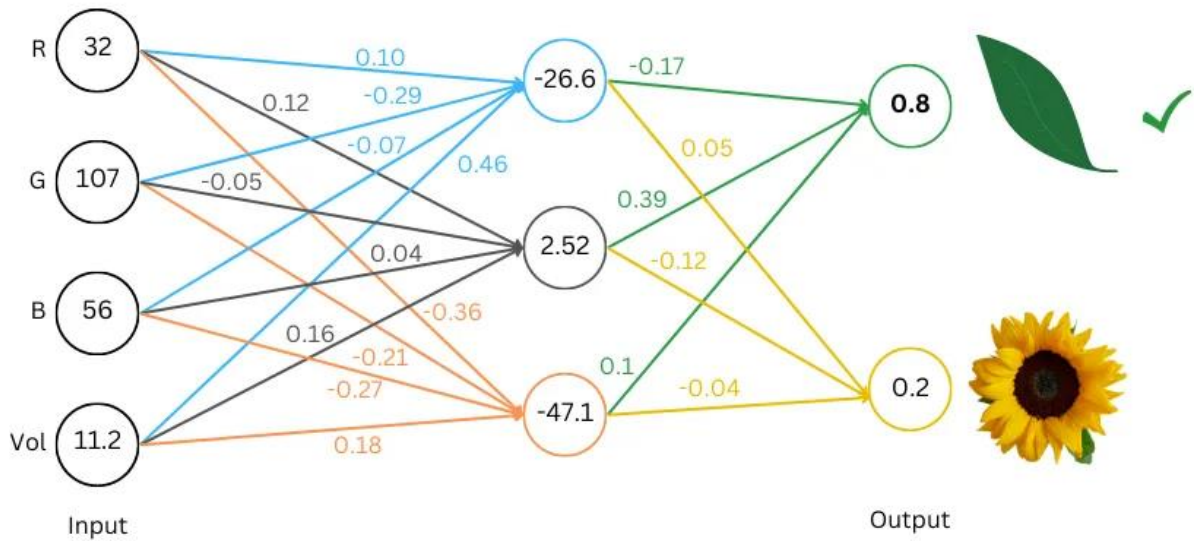
Neuraal Netwerk

Voorbeelden



Veel hidden lagen!

ChatGPT

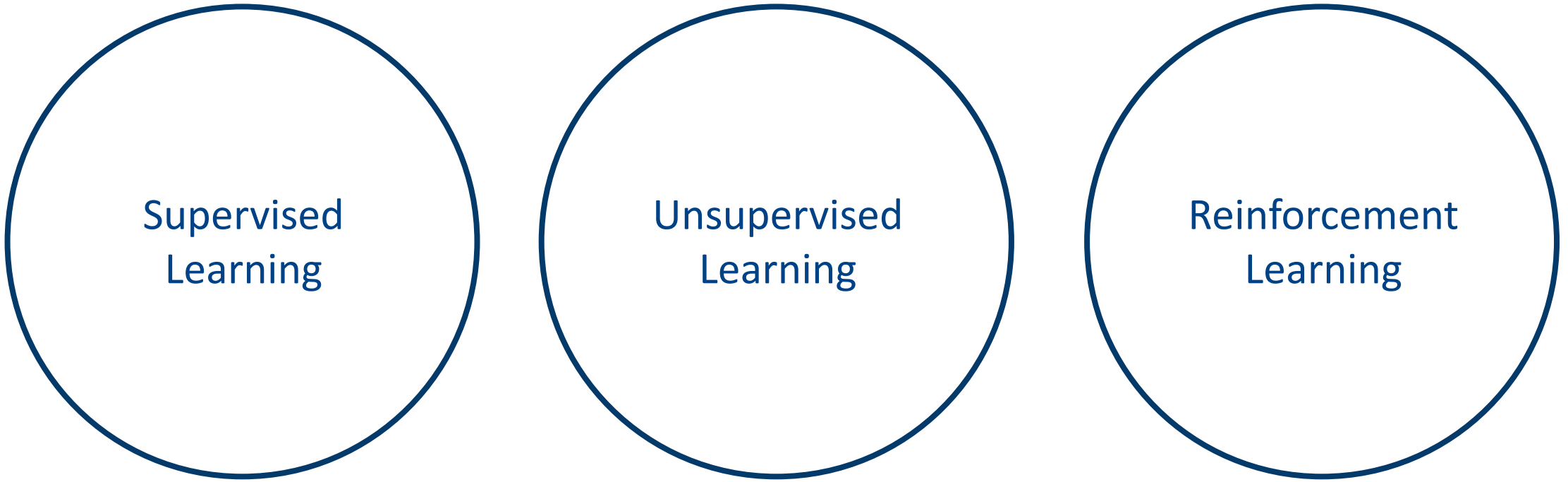


Blad of bloem?

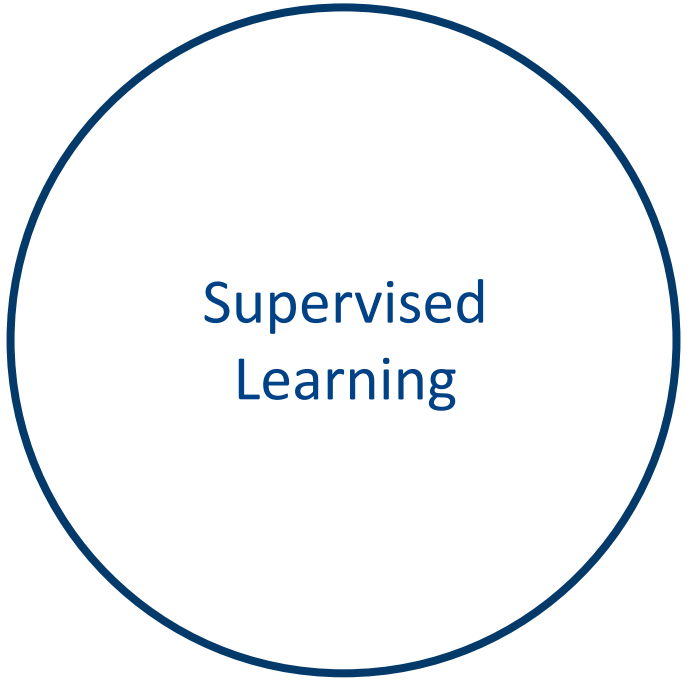
R. Patel (https:TowardsDataScience.com; 2024)

Trainen van Machine Learning

Trainen van Machine Learning



Trainen van Machine Learning



- De machine leert van gelabelde data

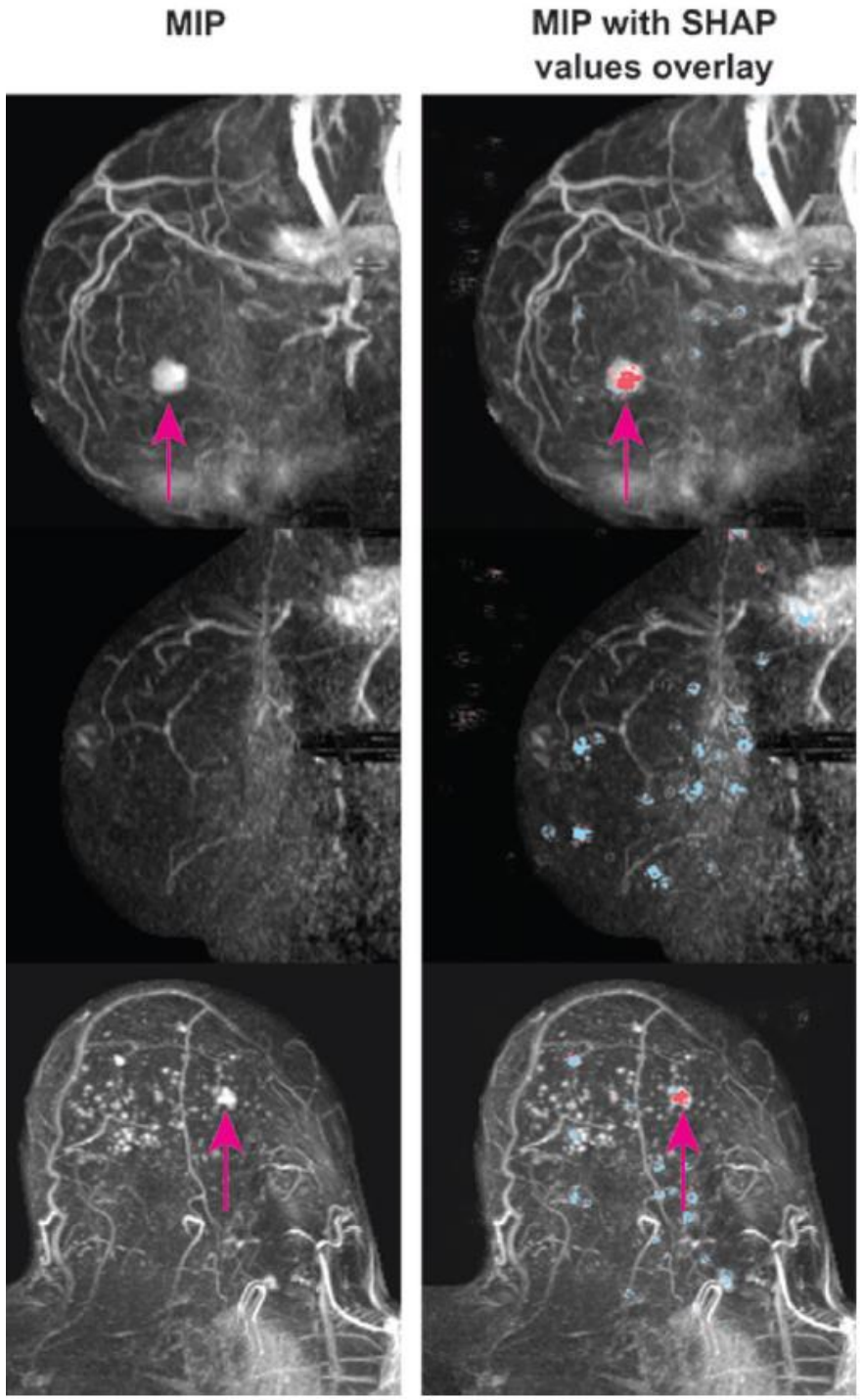
- Externe sturing nodig (supervisie)

- Koppelt input-labels aan gewenste output-labels

- Technieken: Regressie, classificatie

Trainen van Machine Learning

Supervised Learning



Verburg E, et al. *Radiology* (2021)

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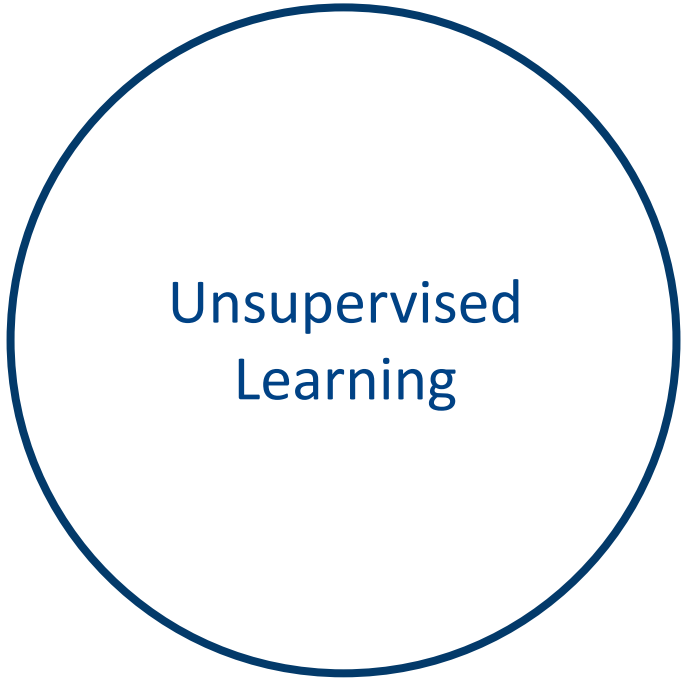
Trainen van Machine Learning



- De machine leert van ongelabelde data

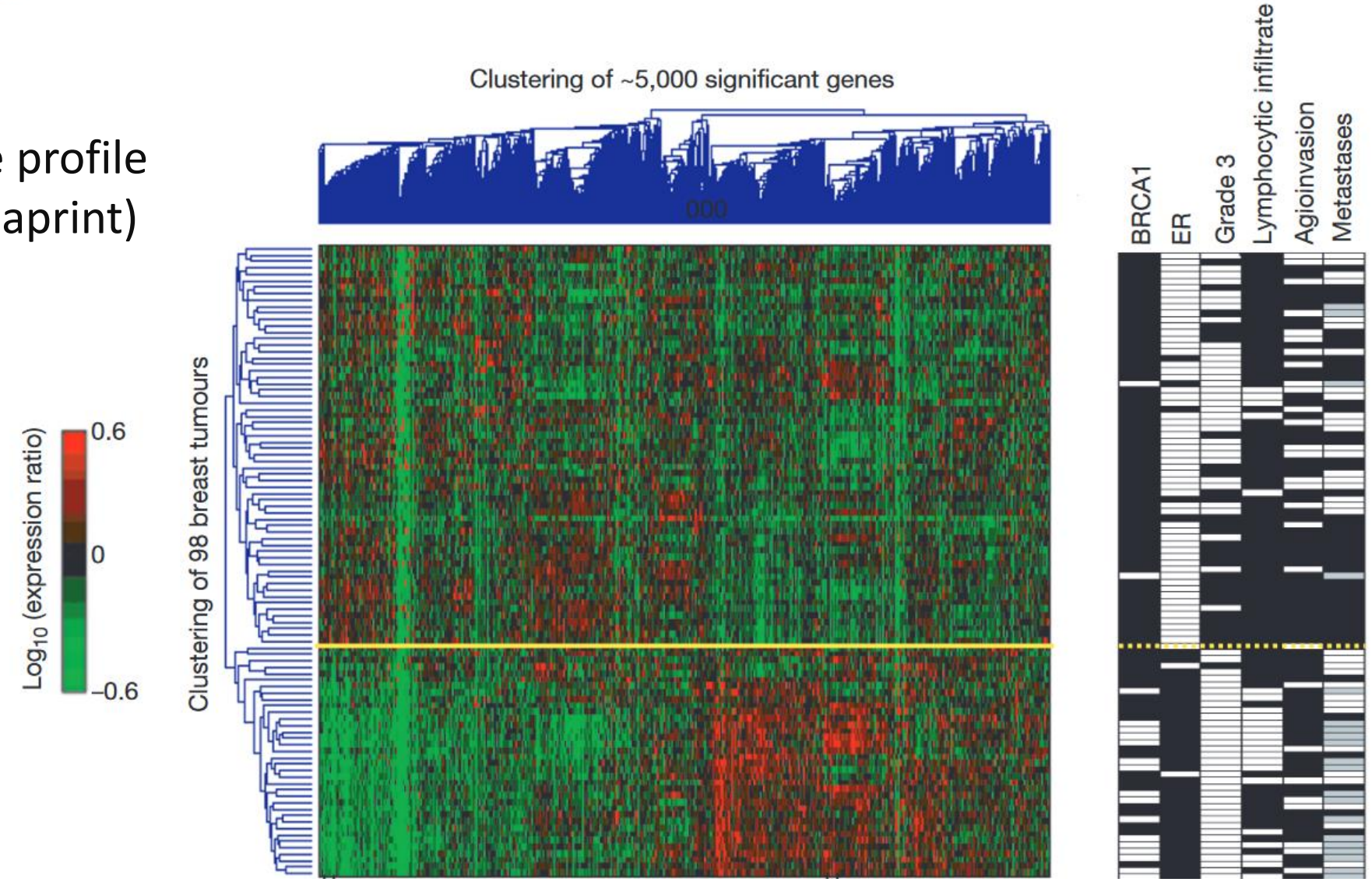
- Geen externe sturing nodig (dus unsupervised)

- Zoekt patronen, resultaat vooraf niet bekend

- Technieken: Principal component analyse, Clustering

Unsupervised Learning

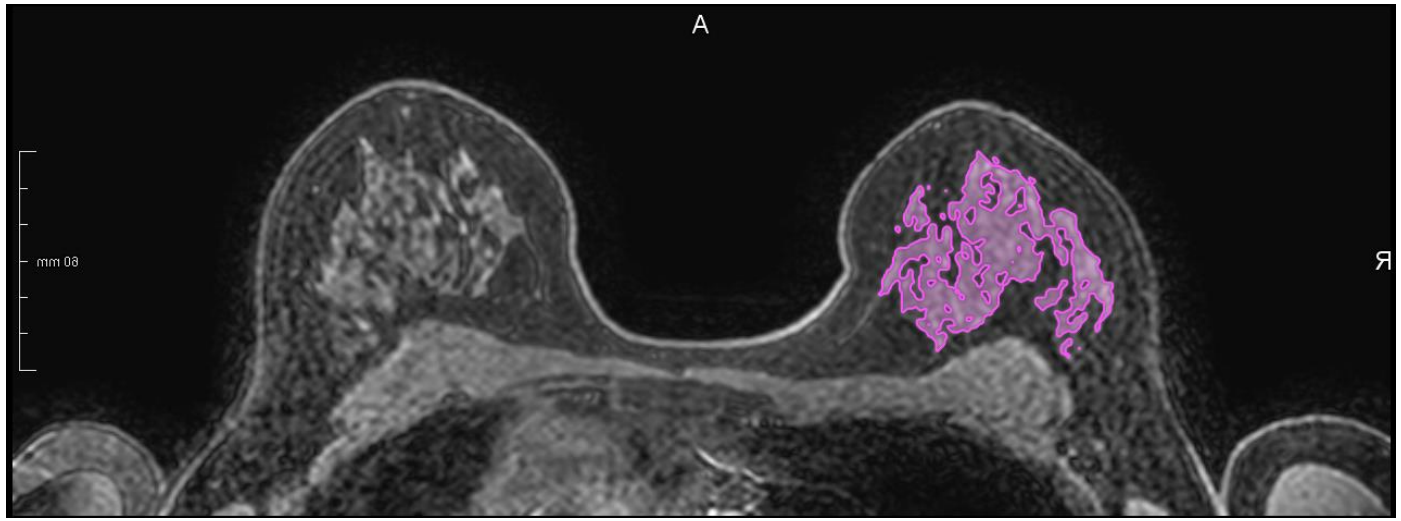
70-gene profile
(Mammaprint)



't Veer et al., Nature, 2002

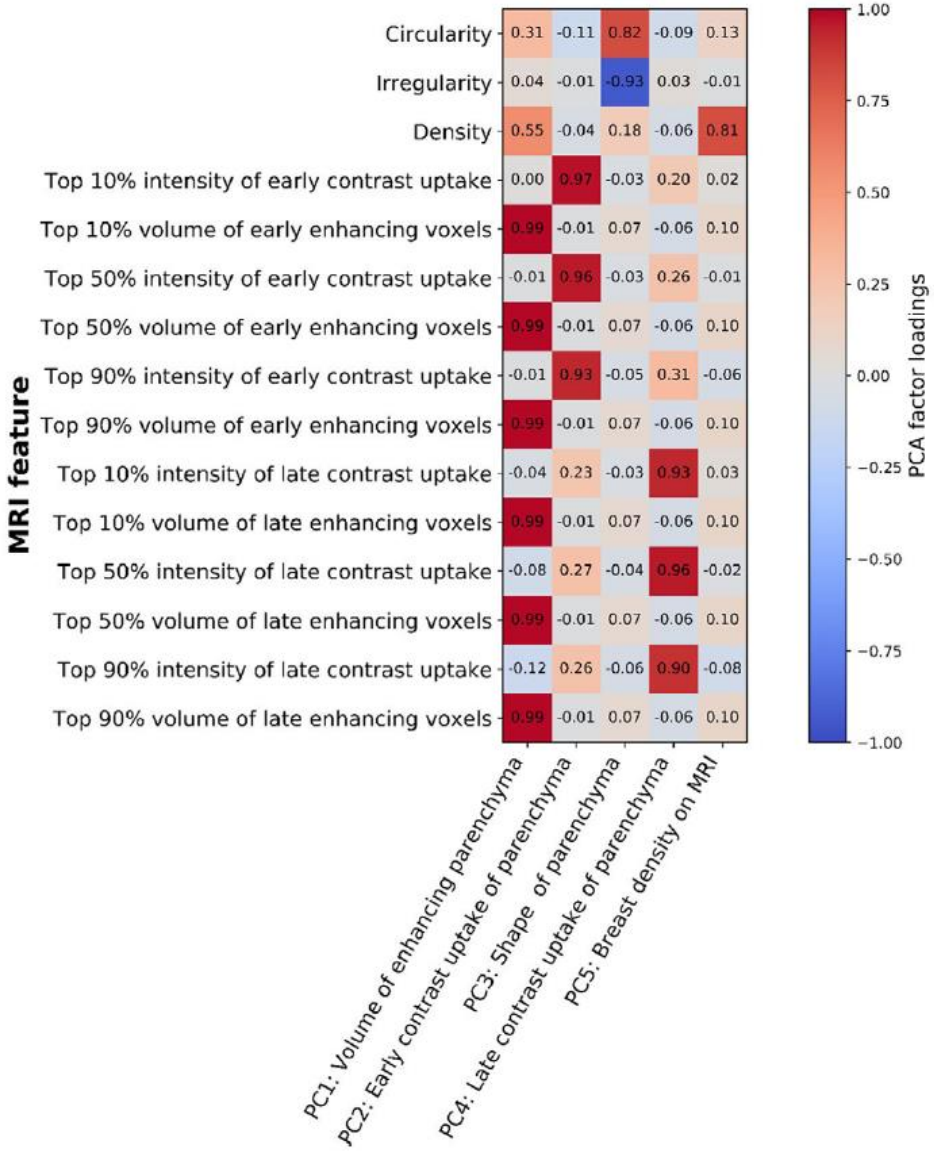
Combinatie Unsupervised en Supervised Learning

DENSE Risico Stratificatie



Wang H et al., Radiology, 2023

“In vrouwen met dens borstweefsel, komt borstkanker twee keer zo vaak voor als dat weefsel sterk oplicht op MRI dan als het weefsel zwak oplicht”



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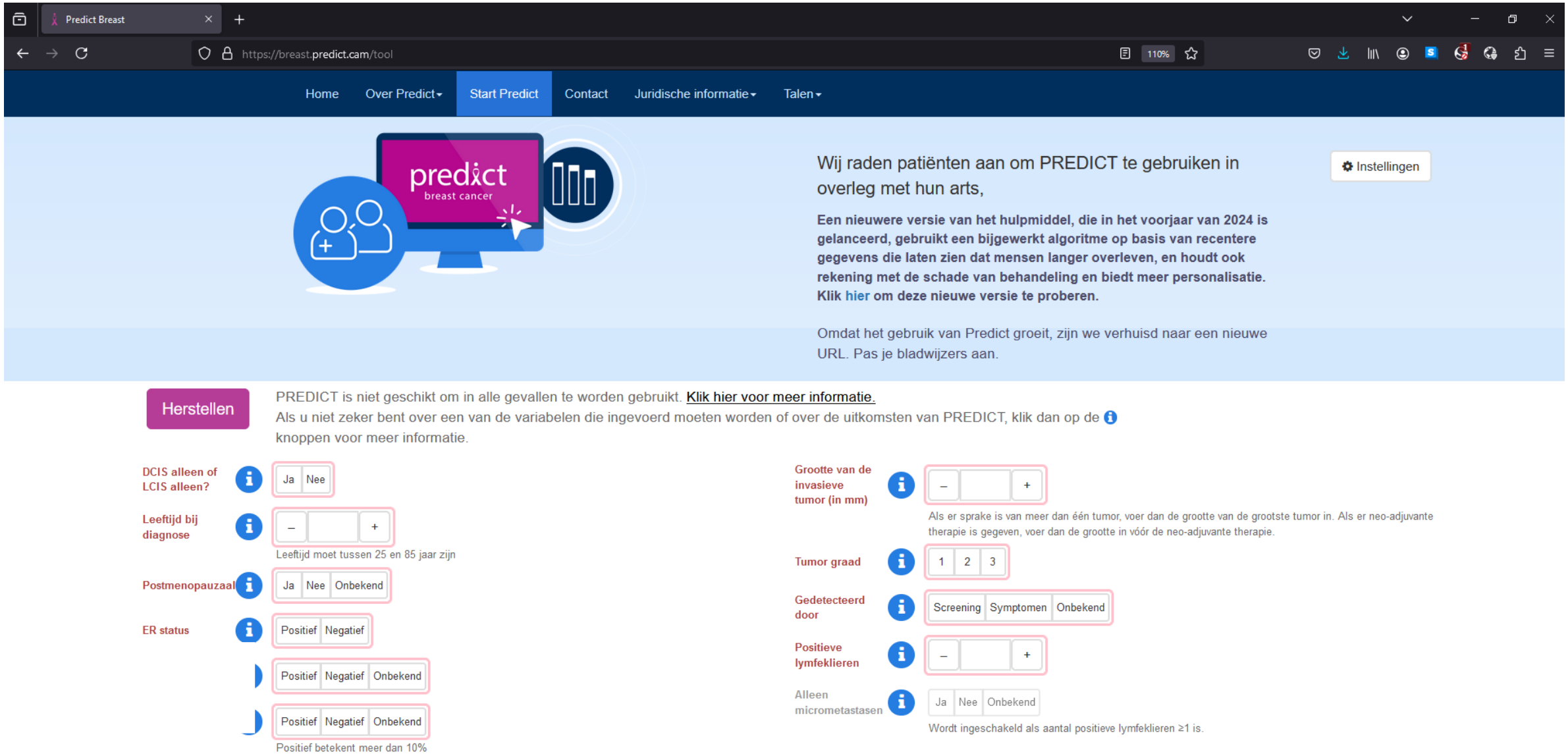
Wang H. et al. *Radiology* (2023)

Is dat niet eng, een AI met behandeladviezen?



Take-Home messages

Een eenduidige definitie van kunstmatige intelligentie (AI) is er niet

Radiomics en deep learning zijn allebei machine learning en vallen allebei onder AI

AI kent vele toepassingen in de oncologie: risico-stratificatie, workflow optimalisatie, detectie, diagnose, medicijn ontwikkeling, therapie response monitoring, etc.

AI is net zo betrouwbaar als de data die je erin stopt, maar dat geldt ook voor conventionele klinische richtlijnen!