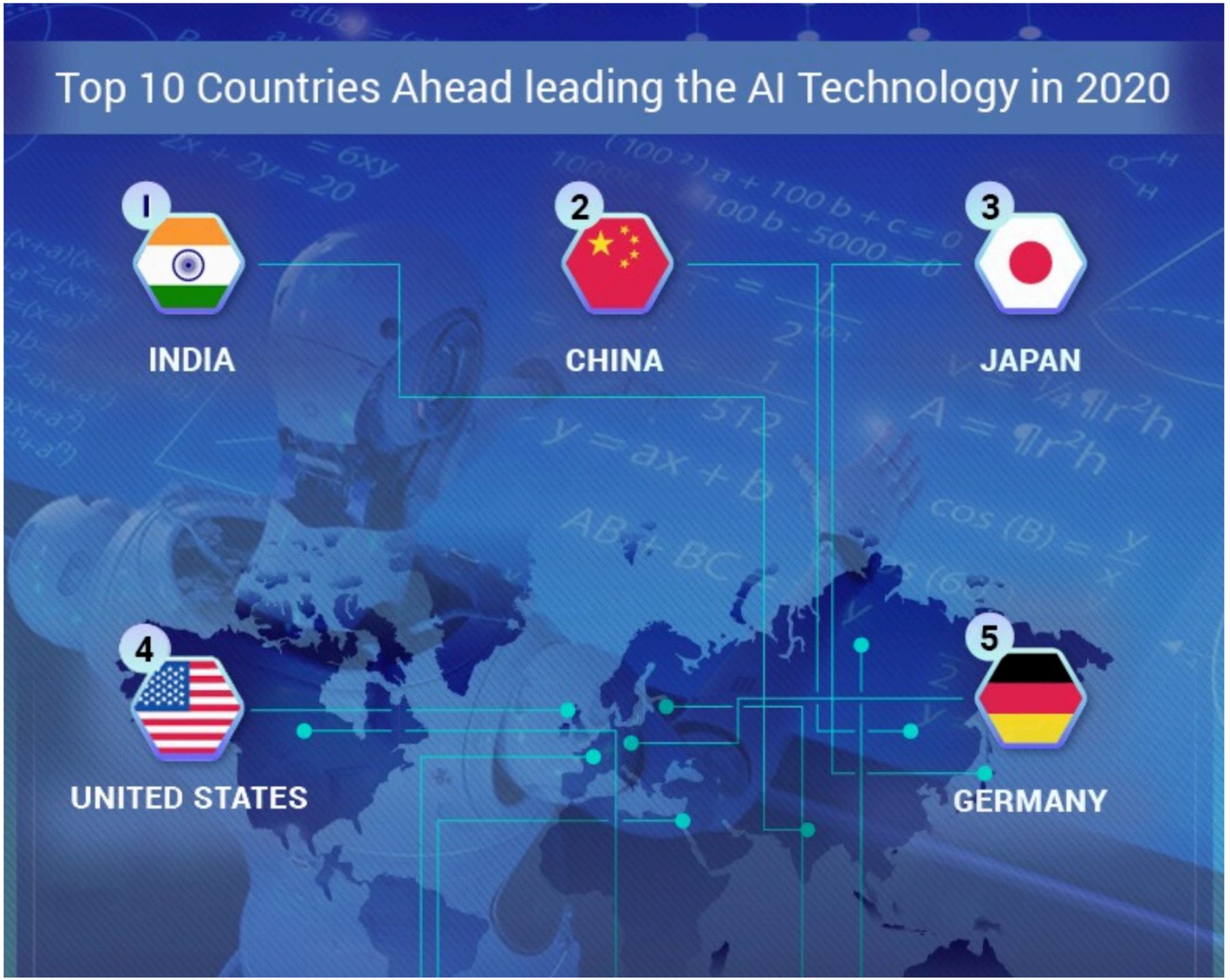
1. How do digital data work? How do you digitize data?
2. Most data is unstructured.
3. Difference between structured and unstructured data.
4. Data in tables with relations: databases.
5. Data revolution.
6. Collecting data: with and without human intervention
7. Processing data: algorithms
8. Machine learning: automatic learning from data. Automate "head labor".
9. Machine learning algorithms and learning techniques.
10. Computers, machine learning and language.
11. Practical examples: TF-IDF, RECOMMENDATION ENGINES
12. Computers, machine learning and image recognition
13. Problems with AI: AI and bias



Putin says the nation that leads in AI ‘will be the ruler of the world’

The Russian president warned that artificial intelligence offers ‘colossal opportunities’ as well as dangers


Top 10 Countries Ahead leading the AI Technology in 2020
1
INDIA
2
CHINA
3
JAPAN
4
UNITED STATES
5
GERMANY

INDEX RANKINGS

South Korea take the top spot in the index, with strong scores in every policy area, followed by Germany and Singapore.

1st South Korea

2nd Germany

3rd Singapore



Automation Index

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

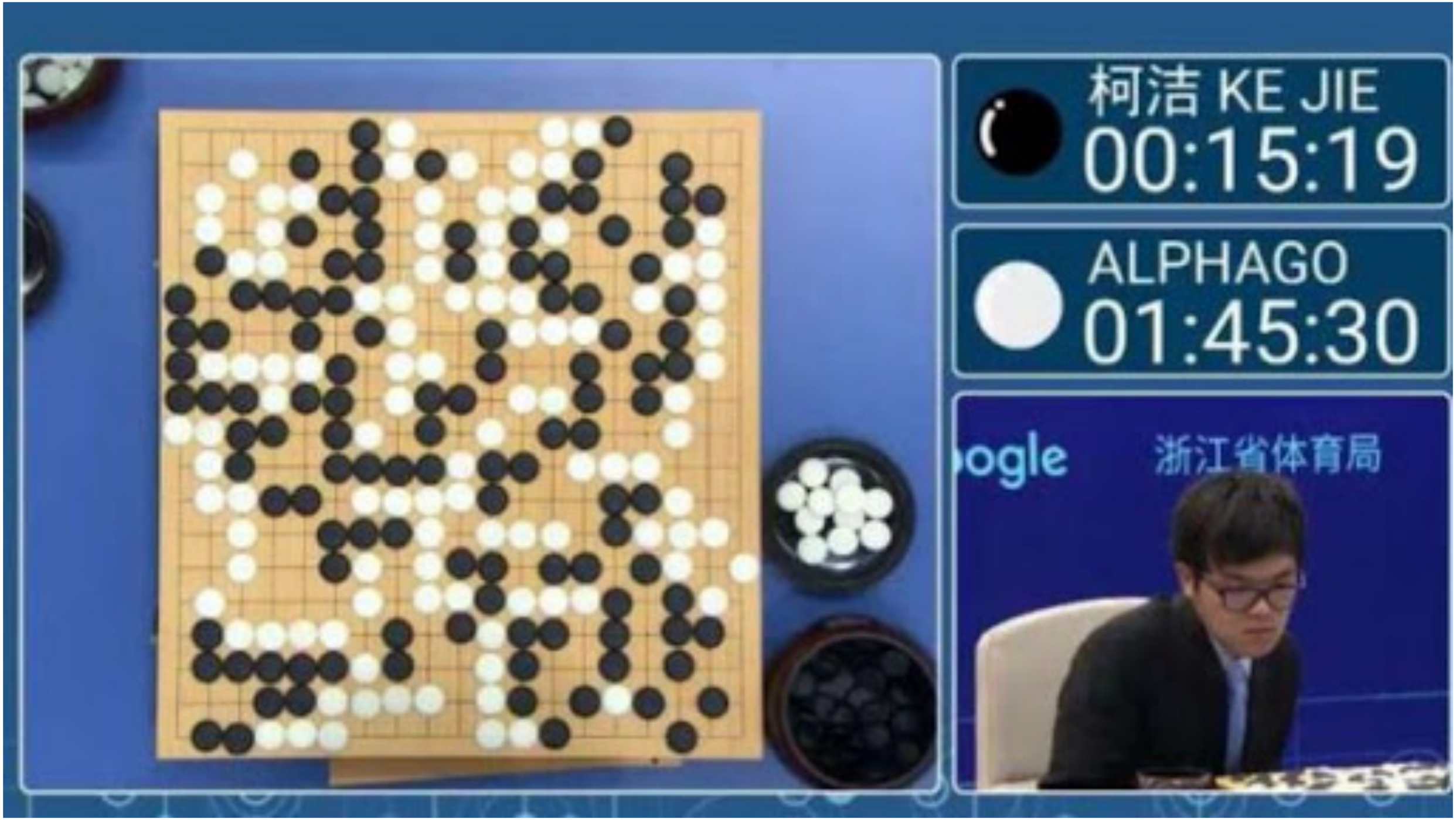
Understanding what "AI" is, changes over time

Chess

Turing test

Quiz with open questions

Go board game


柯洁 KE JIE
00:15:19
ALPHAGO
01:45:30
浙江省体育局

What is “human intelligence”?

Planning?

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

Computers & software

Usually follow **step-by-step plans** or **algorithms**

Computers & software

Only talk of “intelligence” when systems can **learn themselves**
and therefore do not just follow step-by-step plans.

3 levels of intelligence

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

Not everything that seems “smart” is AI

Expert systems
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**.

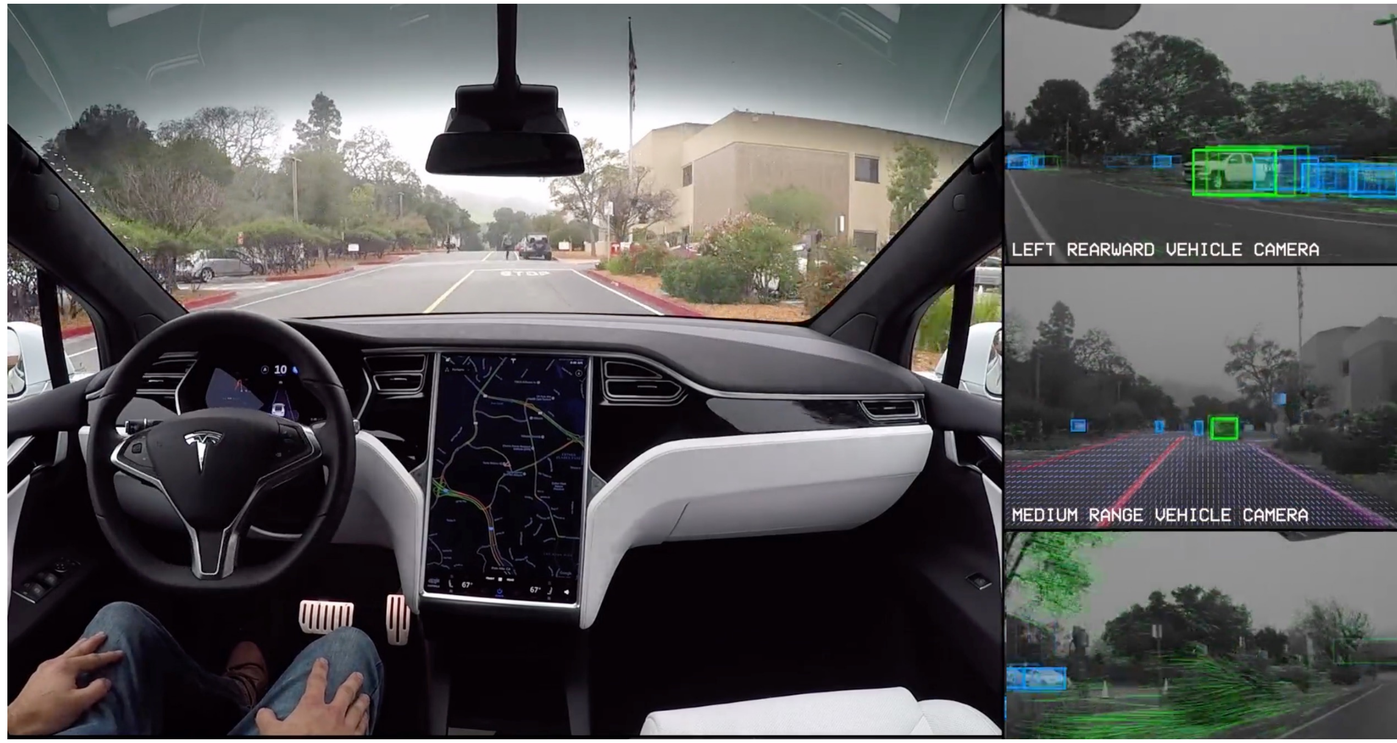
Examples

Shazam



Examples

Self-driving cars



Examples

Speech



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?

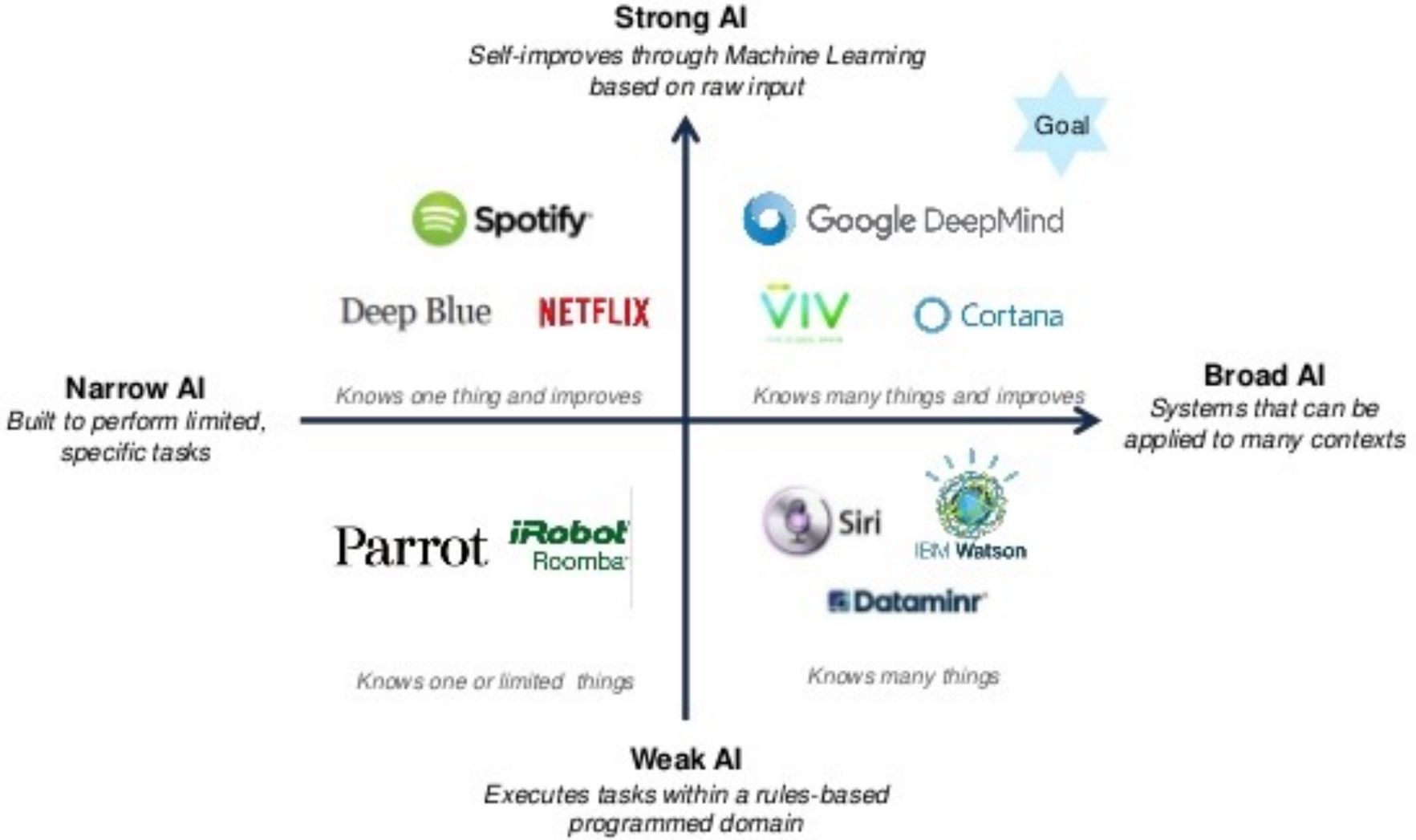
Unlike humans, these systems can only learn or be taught *how to do specific tasks*, which is why they are called **narrow AI**.

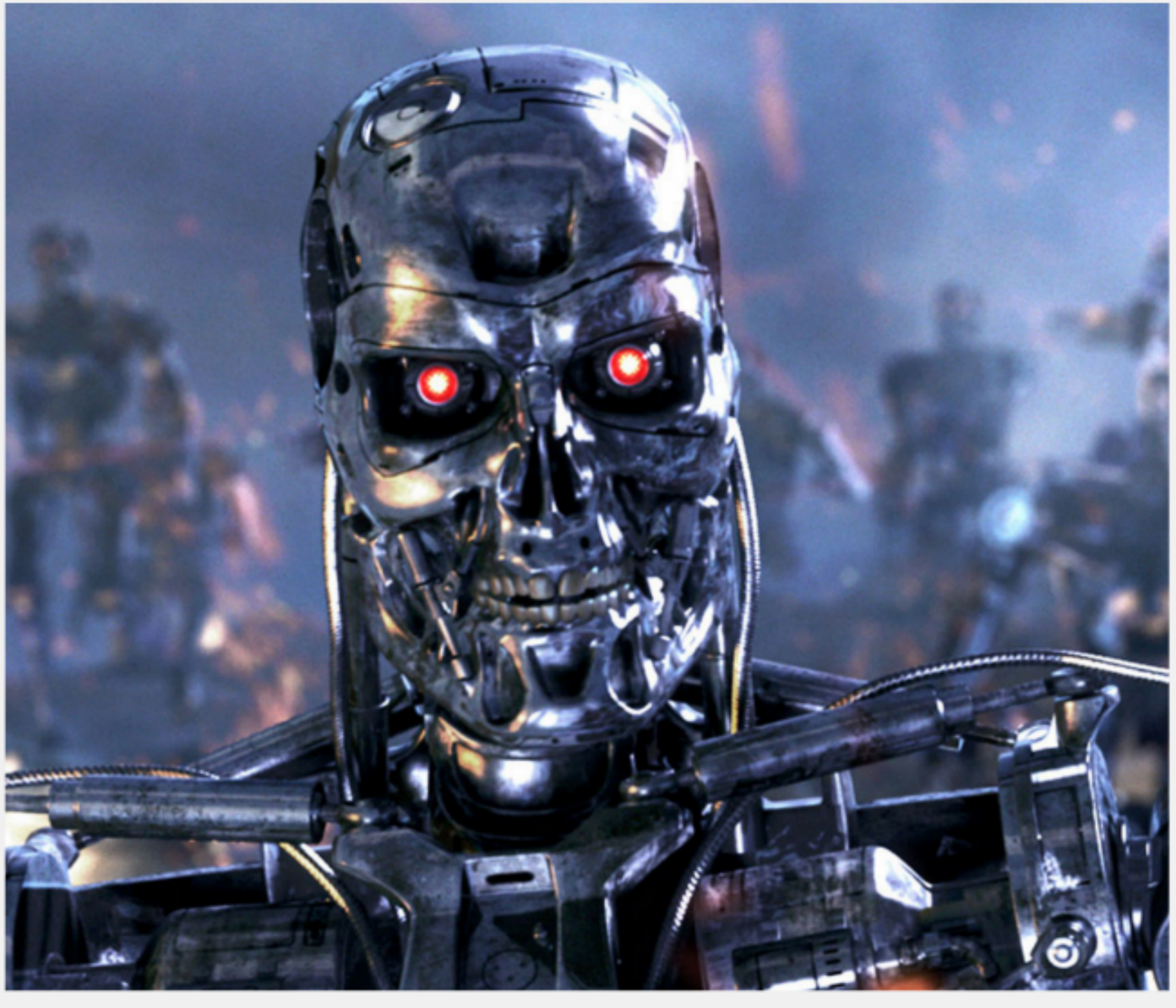
“narrow” or “broad”

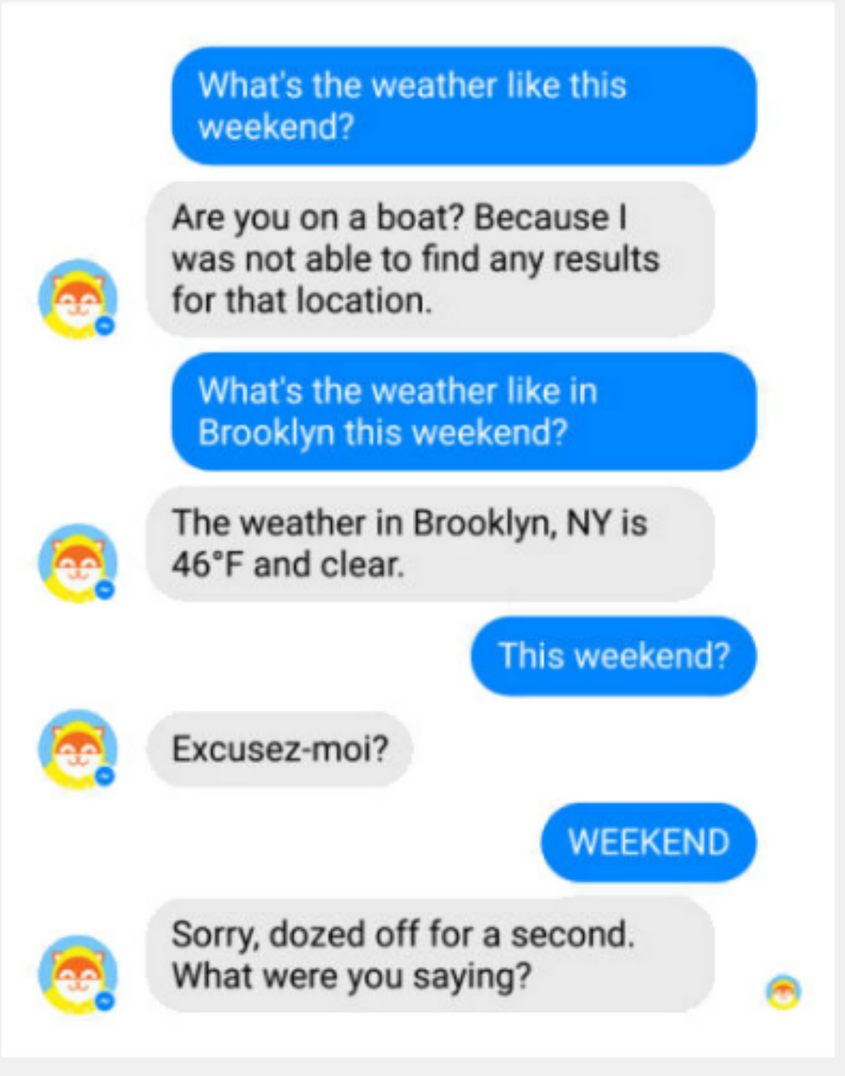
But also

“weak” or “strong”

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







https://chatbot.fail/

strong AI vs weak AI

From AGI to Superintelligence

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

Nick Bostrom

How do people learn?

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

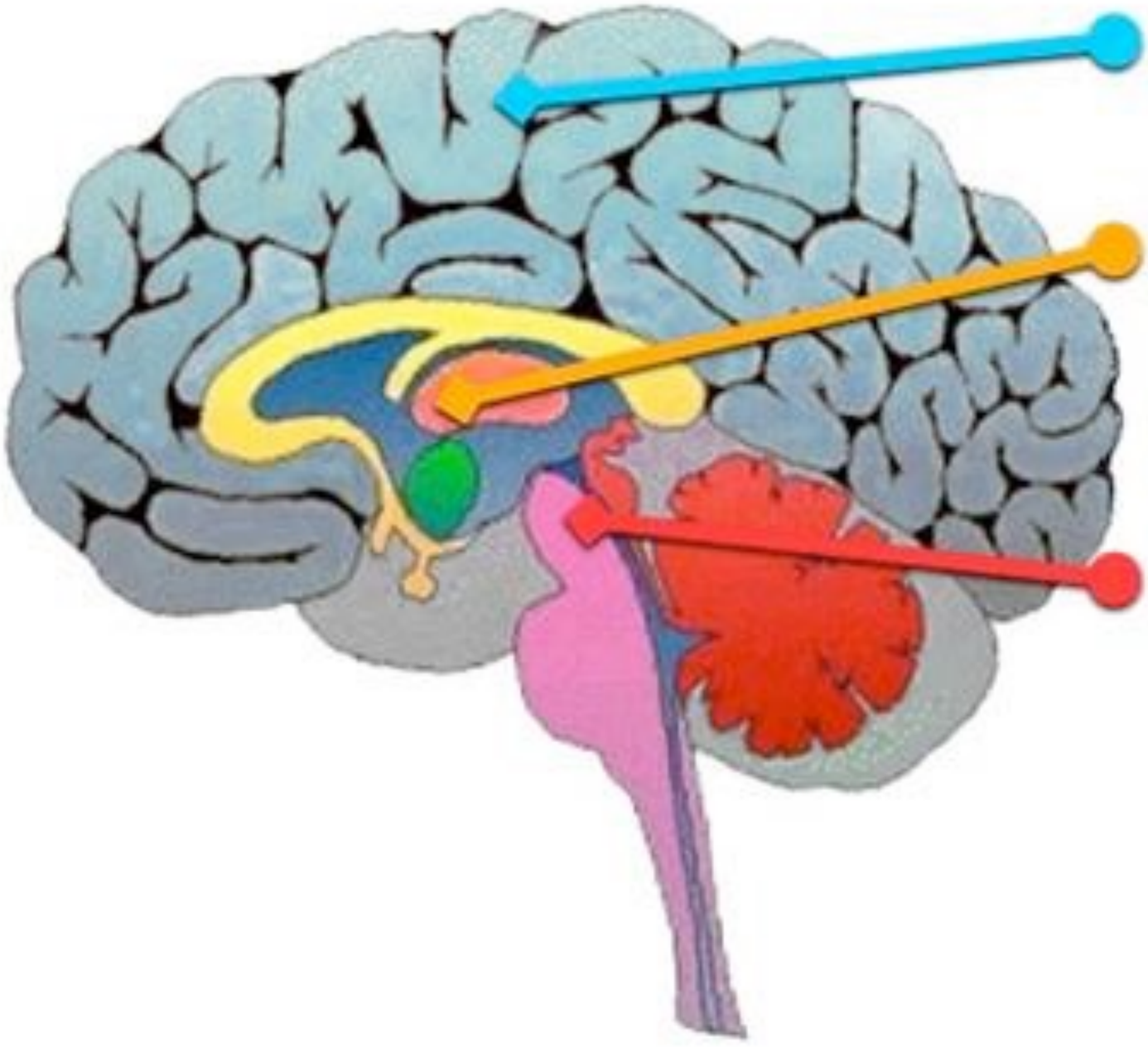
1. Reinforcement learning: **reward or punish**

2. Supervised learning:
get examples from something or someone else.

3. Unsupervised learning:
learn things from yourself, without supervision.

HUMAN LEARNING

Not known exactly how this works ...

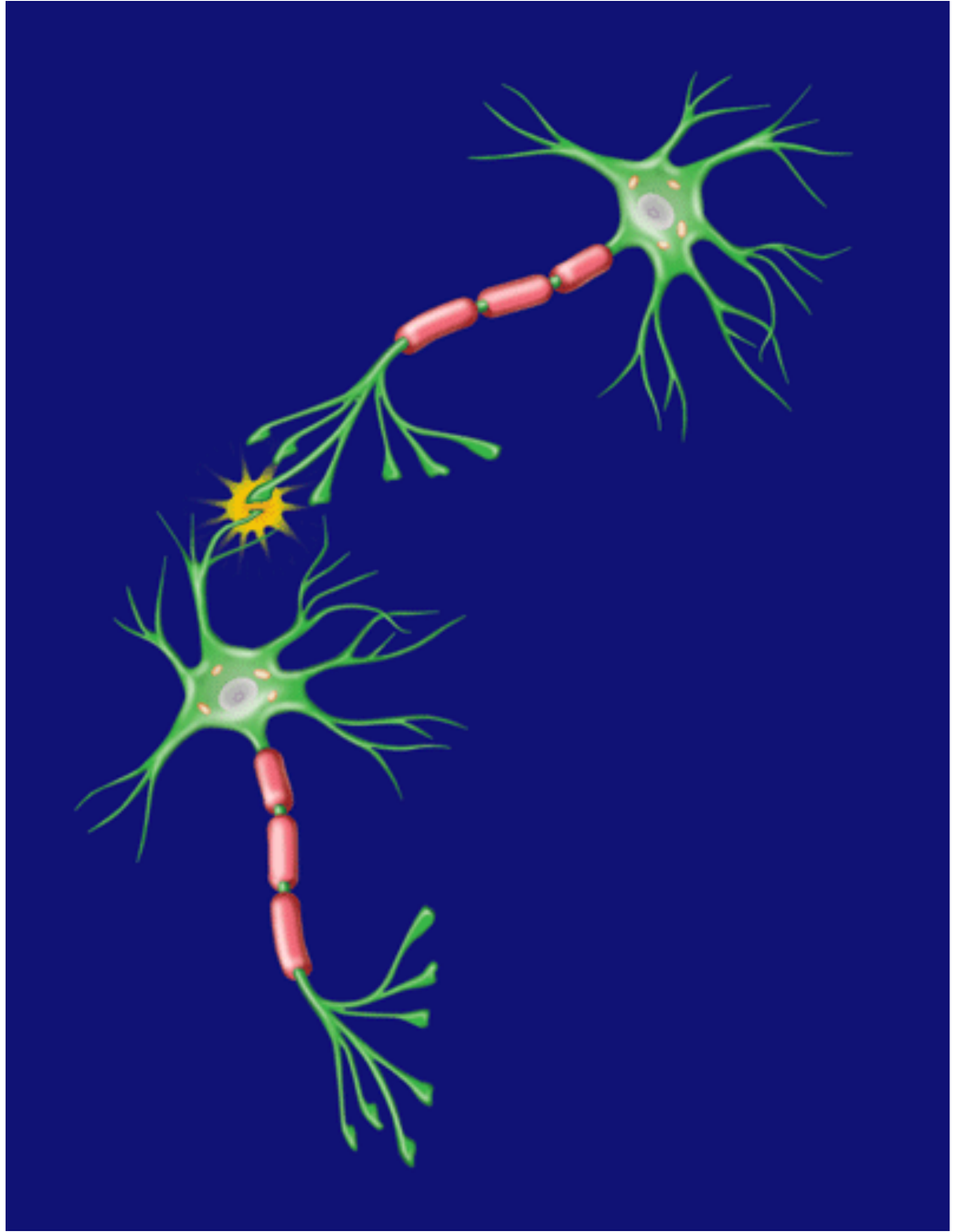


Neocortex:
Rational or Thinking Brain

Limbic Brain:
Emotional or Feeling Brain

Reptilian Brain:
Instinctual or Dinosaur Brain

100 billion neurons
and many more connections

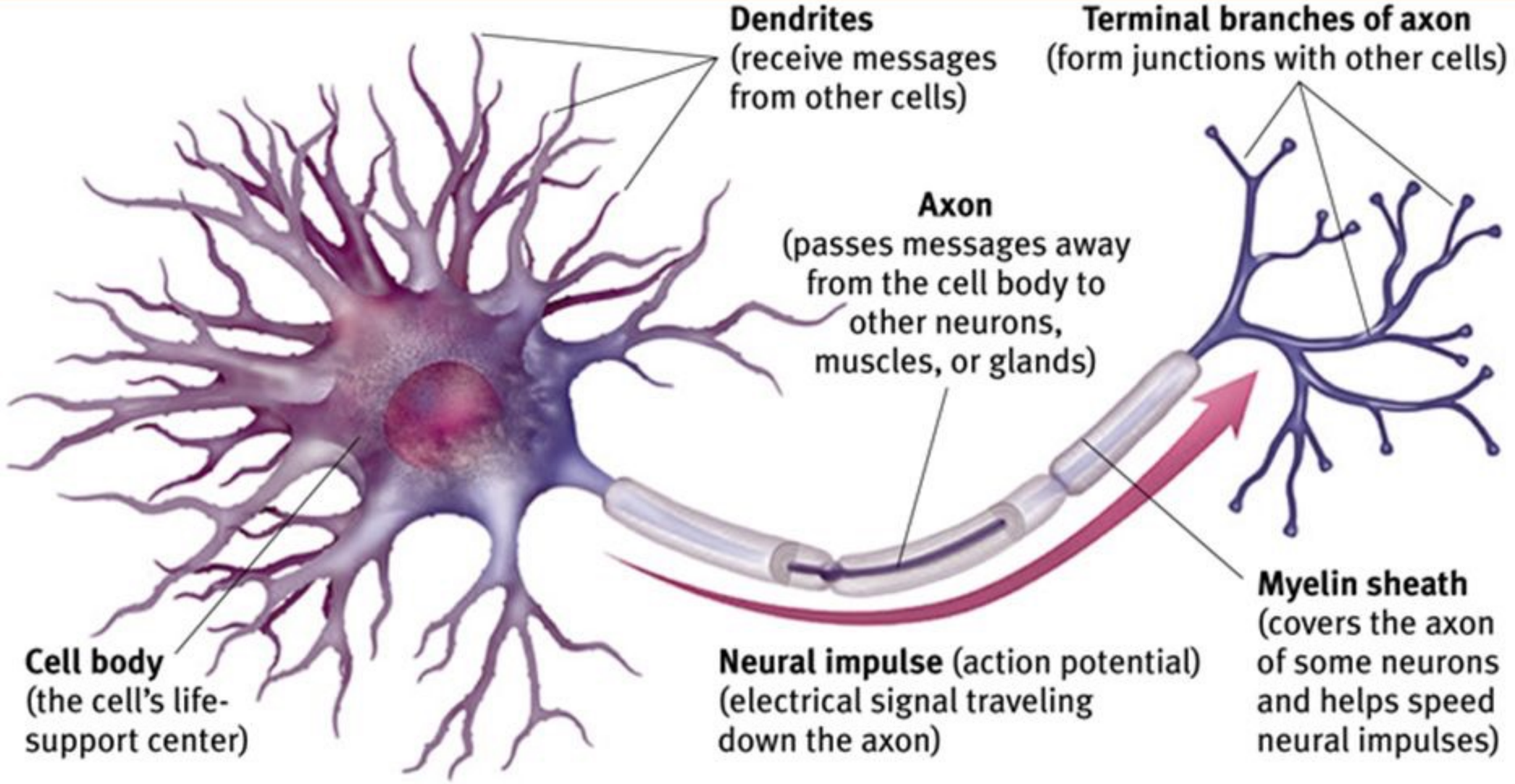


Plasticity is greatest shortly after birth.
Our brains are adapted very quickly to our living environment.
But even in adulthood there is still a certain adaptability so that we continue to be able to learn new things. The more we develop, the more new connections are made. The more often certain 'routes' are used in the brain, the faster contact is made with those certain areas. Conversely, little used, and therefore unprofitable, routes are being discontinued.

Thanks to this adaptability, there is also a chance (more or less) of recovering from a limited brain injury. The complexity of the network - there are many more connections than necessary - makes it possible to create 'detours' when the 'direct route' to certain areas of the brain is closed. **Reorganization**, that is, takeover of functions by other areas, and use of unused brain capacity is thus possible.

Day 1: How does a Neuron Work?

Neurons



MACHINE LEARNING

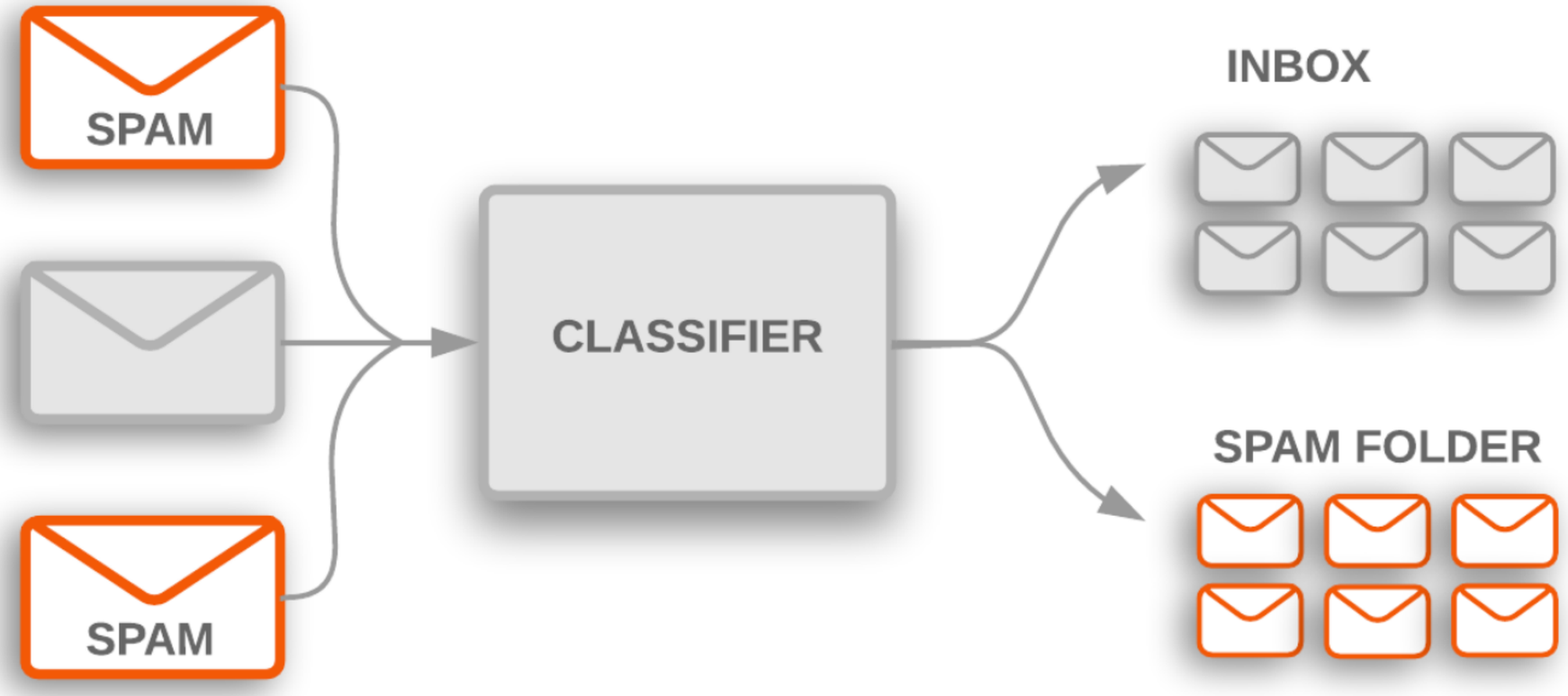
Neural networks

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 now:

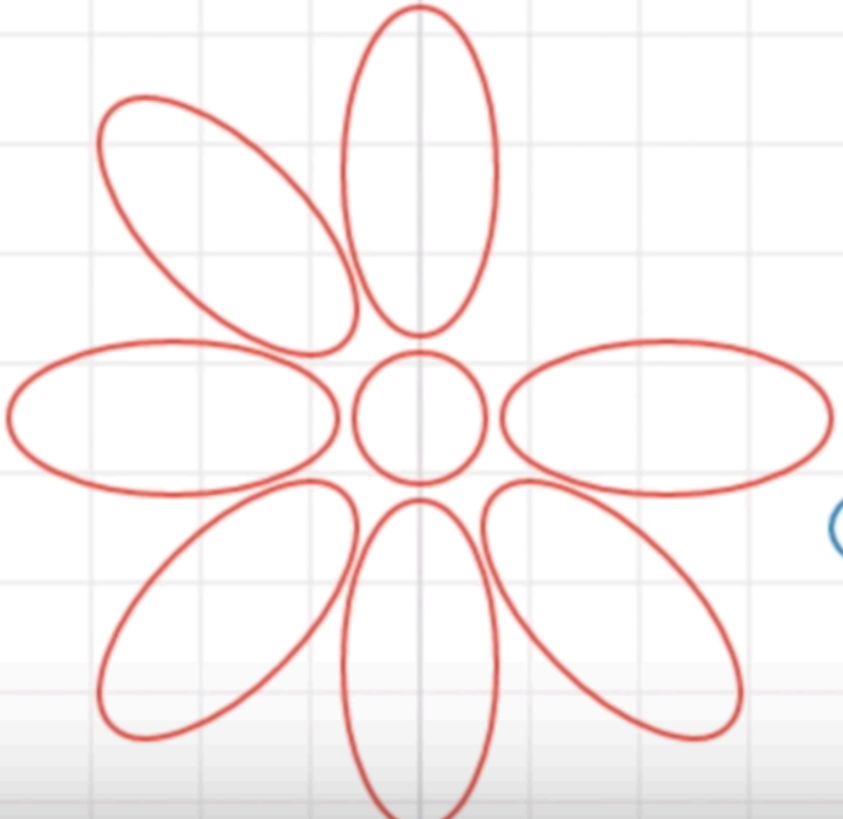
- Classification
- Prediction

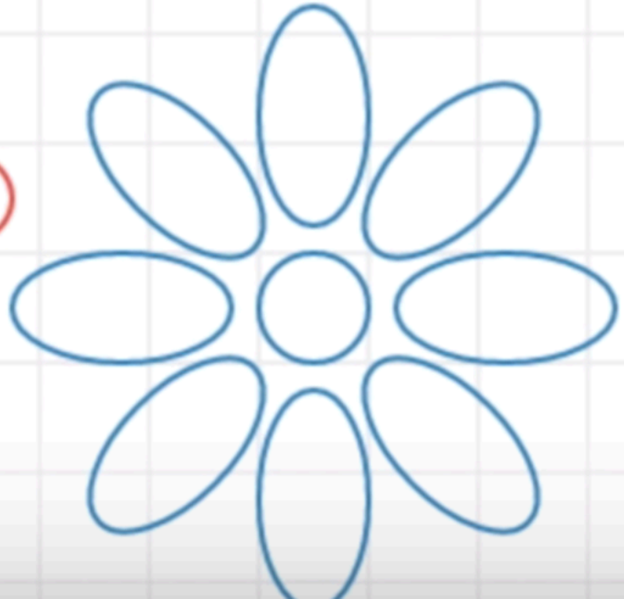
Example of classification







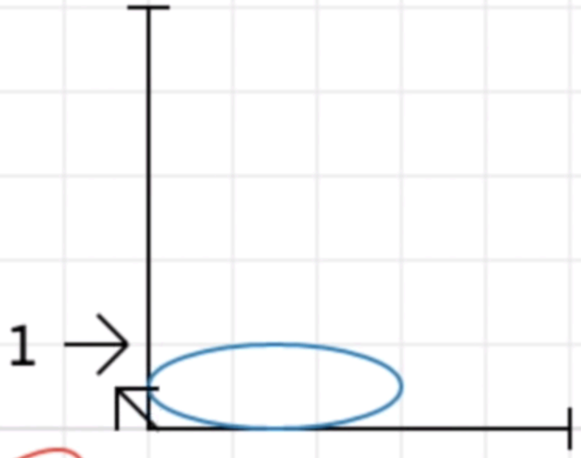


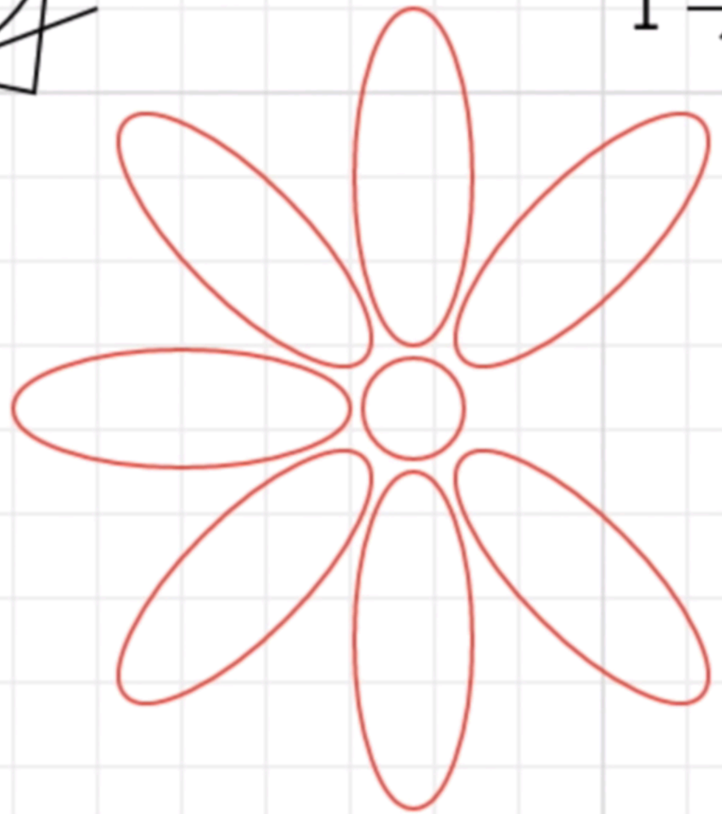


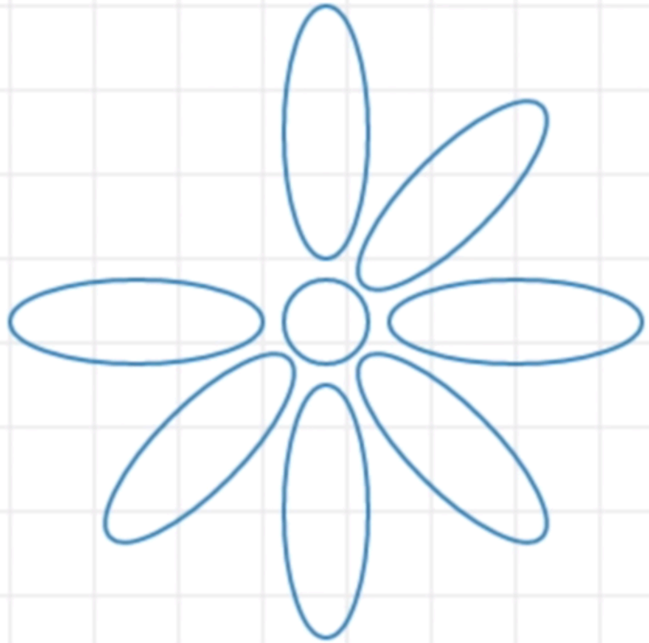
Prediction based on data

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



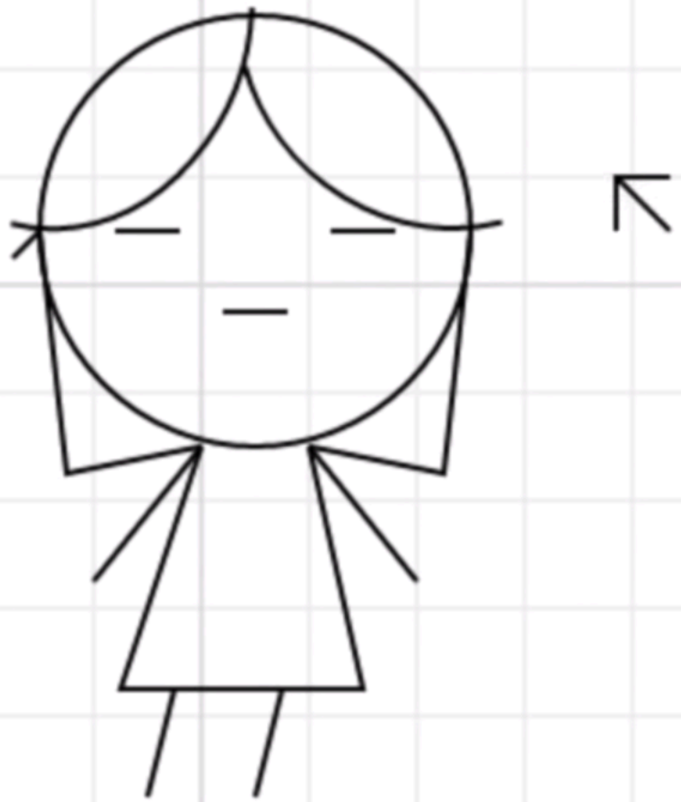






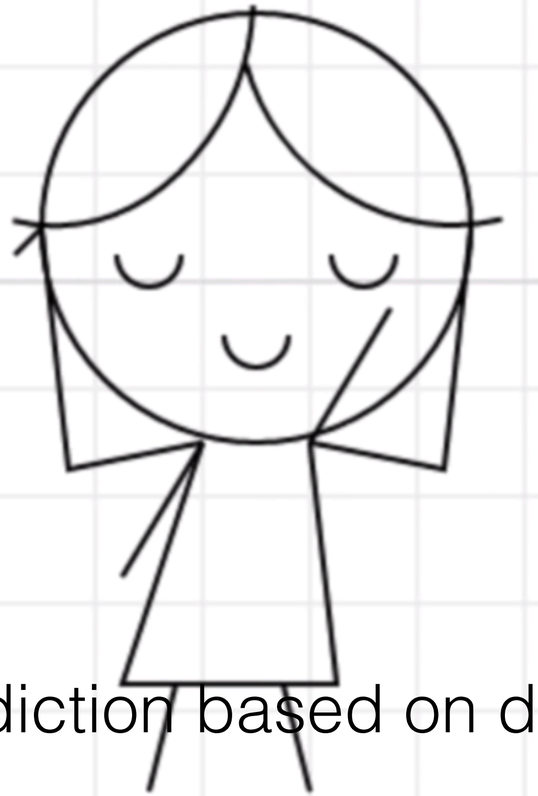
Prediction based on data

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



Prediction based on 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

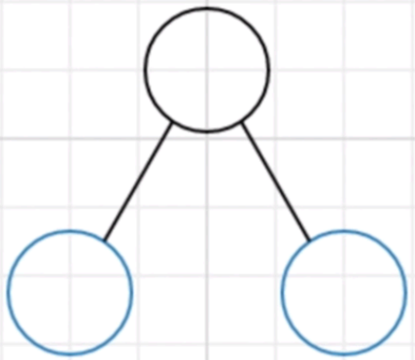


Prediction based on data

How can software calculate this?

Using **Artificial Neural Networks**

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



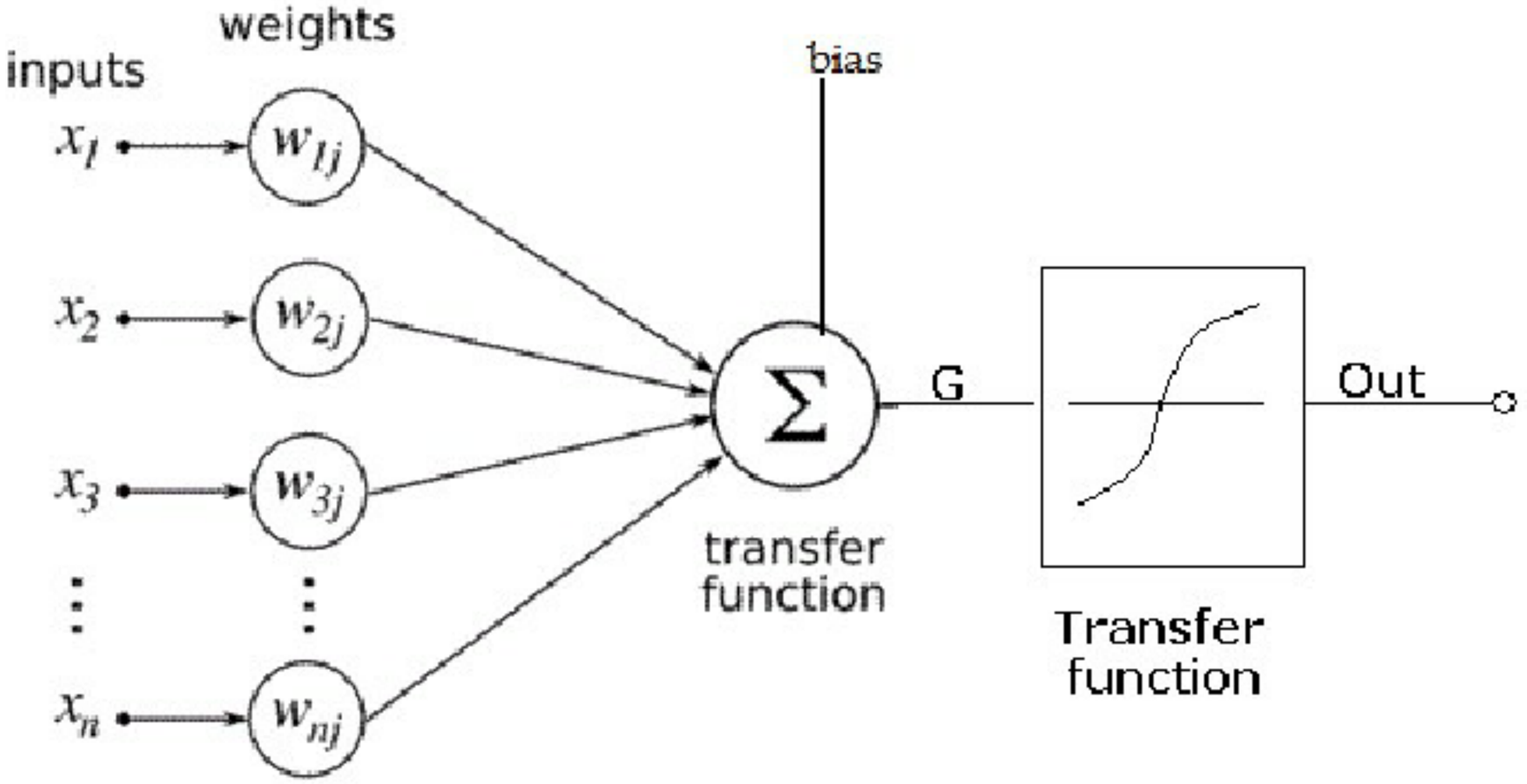
$$NN(2, 1) = sigmoid(w1 \cdot m1 + w2 \cdot m2 + b)$$

What if the result is wrong?

Correcting: human intervention.
Adjust the parameters (weights or bias). Correcting: human intervention.
Adjust the parameters (weights or bias).

Supervised learning

People check the output and adjust the “parameters”.
The computer then learns and makes fewer mistakes.


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. Add up the weight of all inputs ...
2. Do something with it (a calculation)
3. Determine the output (based on previously shown examples)



Current AI applications

1. Image: computer vision
2. Text: natural language processing & generation
3. Speech: speech recognition, speech synthesis
4. Forecast & suggestions
5. Virtual assistants: chatbots, smart assistants
6. Robotics
7. Recommendation engines
8. …

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, conjur, EYEVERIFY, BITSIGHT, CYLANCE, AREA 1 SECURITY, 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, Incredible, CLARA LABS

INTELLIGENCE TOOLS
ADATAO, 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, Orbital Witness

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

MANUFACTURING
SIGHT MACHINE, MICROSCAN, IVISYS, BOULDER IMAGING

MEDICAL
Parzival, 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, BILLGUARD, LendUp, LendingClub, Kabbage

PHILANTHROPIES
DataKind, thorn, THE DATA GUILD

AUTOMOTIVE
Google, Continental, TESLA, MOBILEYE, CRUISE

DIAGNOSTICS
enlitic, 3SCAN, lumiata, ENTOPSIS

RETAIL
BAY SENSORS, PRISM SKYLABS, celect, euclid

RETHINKING HUMANS / HCI

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

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, TERADEEP, 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

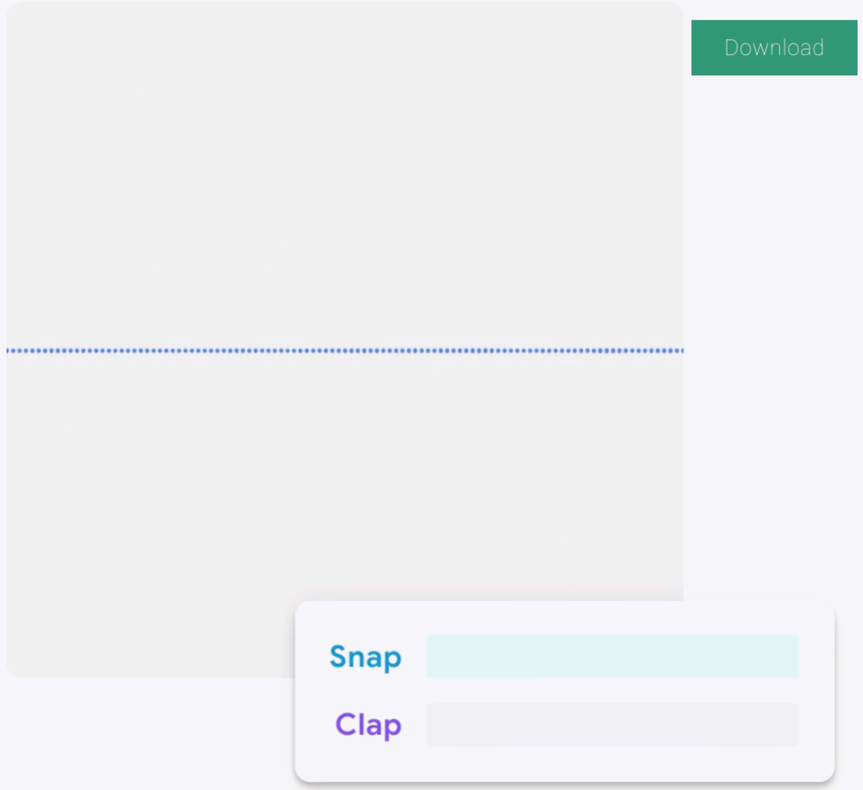
https://teachablemachine.withgoogle.com/

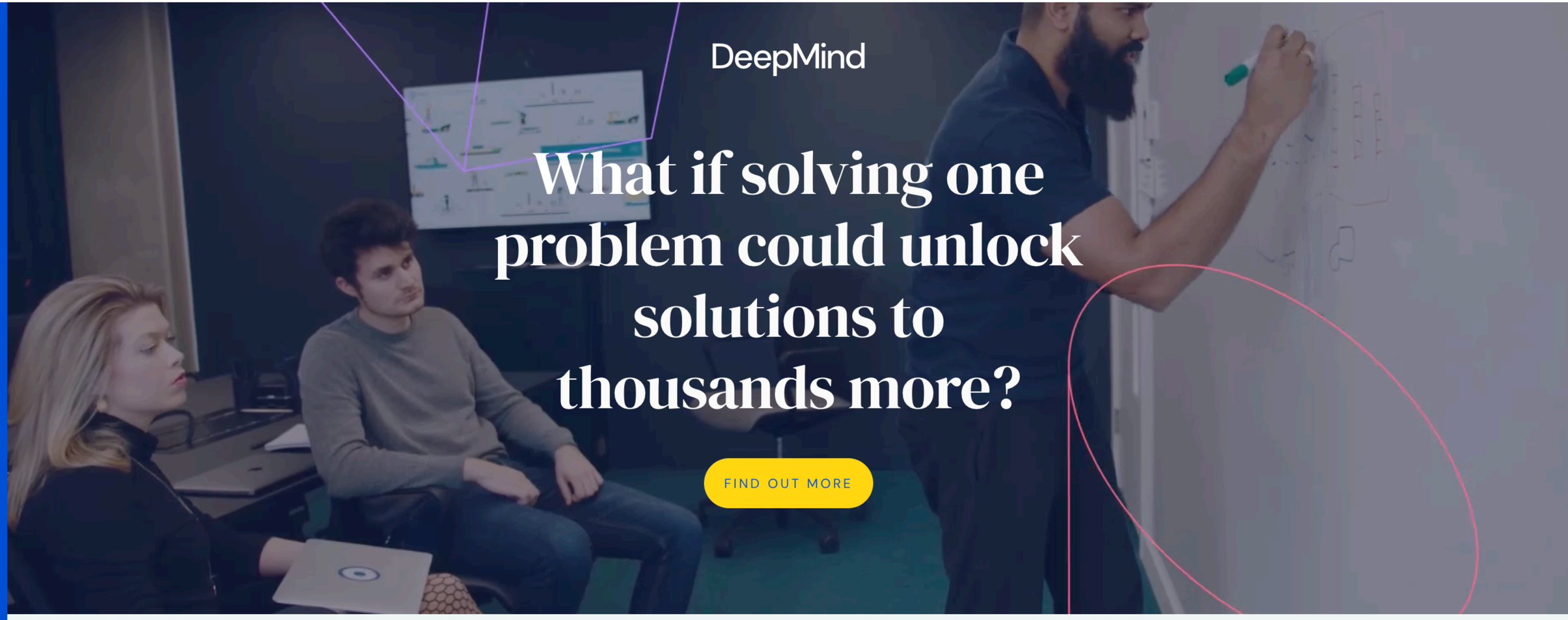
Teachable Machine

Train a computer to recognize your own images, sounds, & poses.

A fast, easy way to create machine learning models for your sites, apps, and more – no expertise or coding required.

Get Started





DeepMind may serve cookies to analyse traffic to this site. Information about your use of this site is shared with DeepMind for that purpose

SEE DETAILS

OK, GOT IT

Google is committed to advancing racial equity for Black communities. See how.

An end-to-end open source machine learning platform



TensorFlow | For JavaScript | For Mobile & IoT | For Production

The core open source library to help you develop and train ML models. Get started quickly by running Colab notebooks directly in your browser.

Get started with TensorFlow

This site uses cookies from Google to deliver its services and to analyze traffic.

More details OK

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
Intelligence in the cloud

What they learn through ML, stored in the cloud

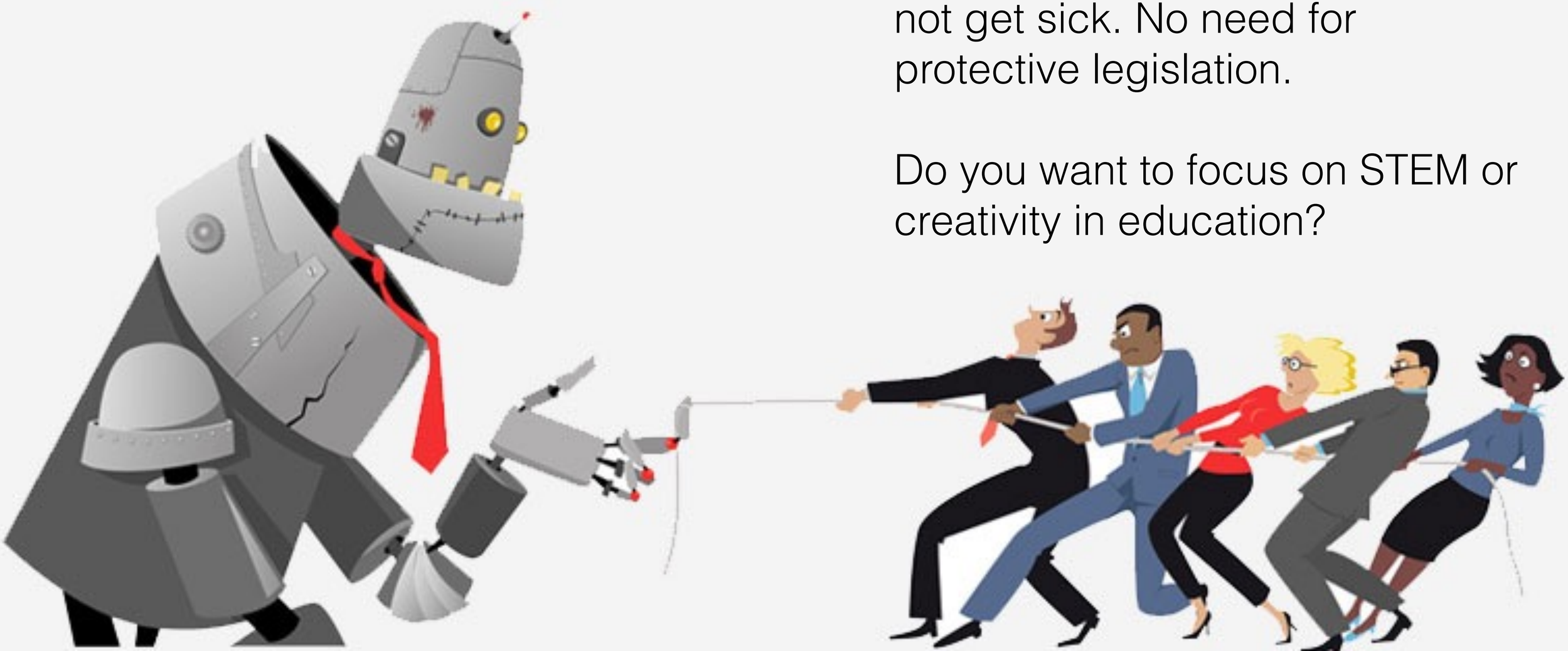
When they are broken, intelligence or “function” is not lost



Employment & jobs

Robots, automation, AI: expensive to purchase but will not get sick. No need for protective legislation.

Do you want to focus on STEM or creativity in education?



Creative 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

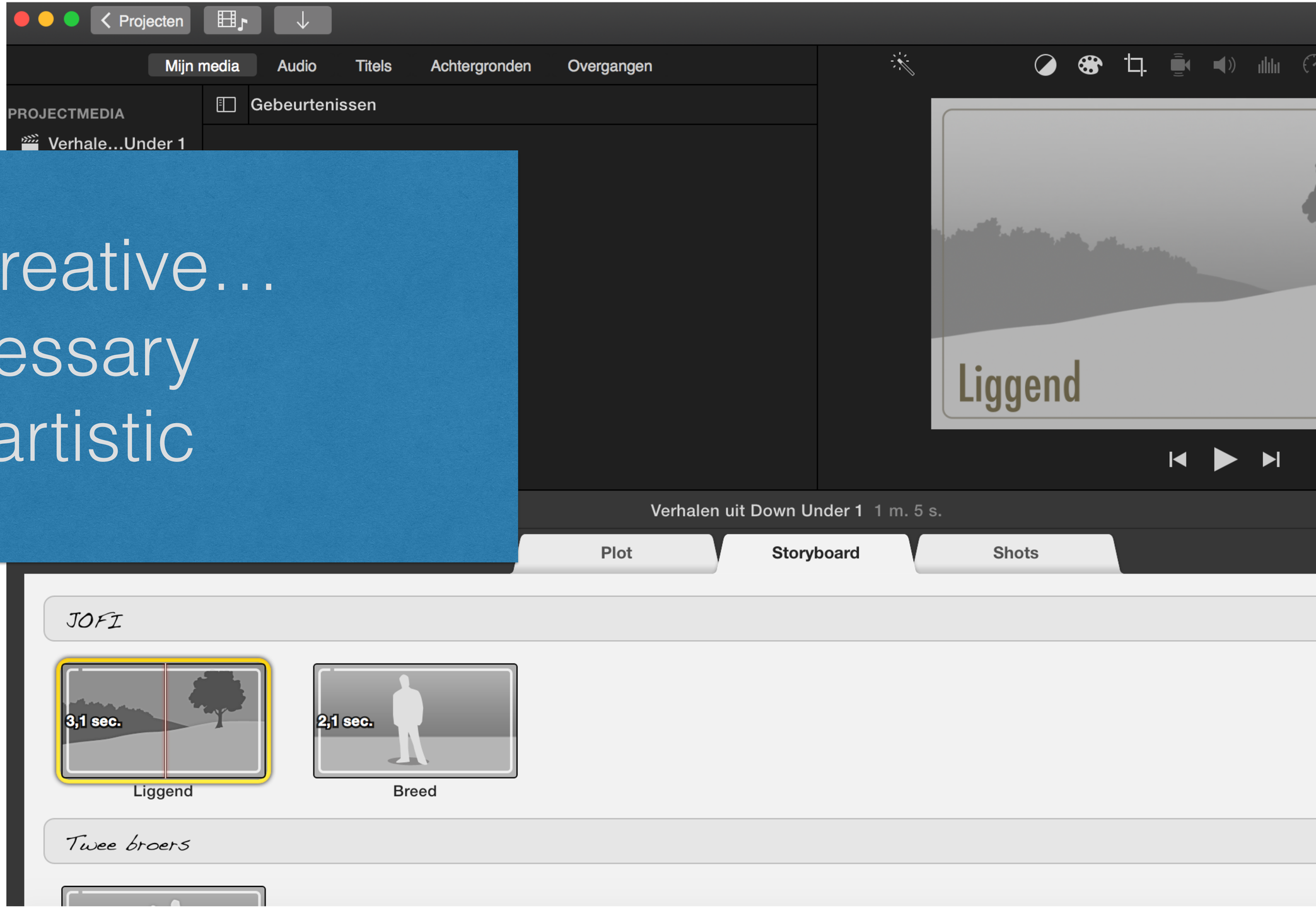
“It’s easy for AI to come up with something novel just randomly. But it’s very hard to come up with something that is novel and unexpected and useful.”

— 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

Being creative…
not necessary
new or artistic



People remain unique because they die.
Because they plan. Because they know that everything is finite.
They will always make the difference in that.
Maybe that's why they came up with AI.

To no longer be finite.

https://www.oxfordinsights.com/ai-readiness2019