

Artificial Intelligence in Medical Physics: an introduction

David Sarrut

University of Lyon

CREATIS, CNRS UMR5220, Inserm U1044, INSA-Lyon, Université Lyon 1, France



Intro

Your recently viewed items and featured recommendations

Sponsored products related to this search [What's this?](#)



All-new Echo Show (2nd Gen) + Ring Video Doorbell Z - Charcoal
1 offer from \$428.99



AmazonBasics Microwave, Small, 0.7 Cu. Ft. 700W, Works with Alexa
★★★★☆ 1,375
\$59.99 ✓prime



Echo Look | Hands-Free Camera and Style Assistant with Alexa—includes Style Check to...
★★★★☆ 413
\$99.99 ✓prime



Sonos Beam - Smart TV Sound Bar with Amazon Alexa Built-in - Black
★★★★☆ 474
\$399.00 ✓prime



Echo Wall Clock - see timers at a glance - requires compatible Echo device
★★★★☆ 1,231
\$29.99 ✓prime



Echo Spot Adjustable Stand - Black
★★★★☆ 933
\$19.99 ✓prime



AHASTYLE Wall Mount Hanger Holder ABS for New Dot 3rd Generation Smart Home Speakers...
★★★★☆ 12
\$10.99 ✓prime



Angel Statue Crafted Stand Holder for Amazon Echo Dot 3rd Generation,Alexa Smart...
★★★★☆ 57
\$25.99 ✓prime

Page 1 of 3

Explore more from across the store



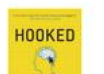
Actionable Gamification: Beyond Points, Badges, ...
Yu-kai Chou



The Model Thinker: What You Need to Know to ...
Scott E. Page



Don't Make Me Think, Revisited: A Common ...
Steve Krug



Hooked: How to Build Habit-Forming Products
Nir Eyal



Microservices Patterns: With examples in Java
Chris Richardson



Solving Product Design Exercises: Questions & ...
Artiom Dadlinsky



100 Things Every Designer Needs to Know About ...
Susan Weinschenk



Infinity
Jonathan Hickman
★★★★☆ 182

Page 1 of 6



DeepL Traducteur DeepL Pro Pourquoi DeepL ? API

Traduire du texte
26 langues

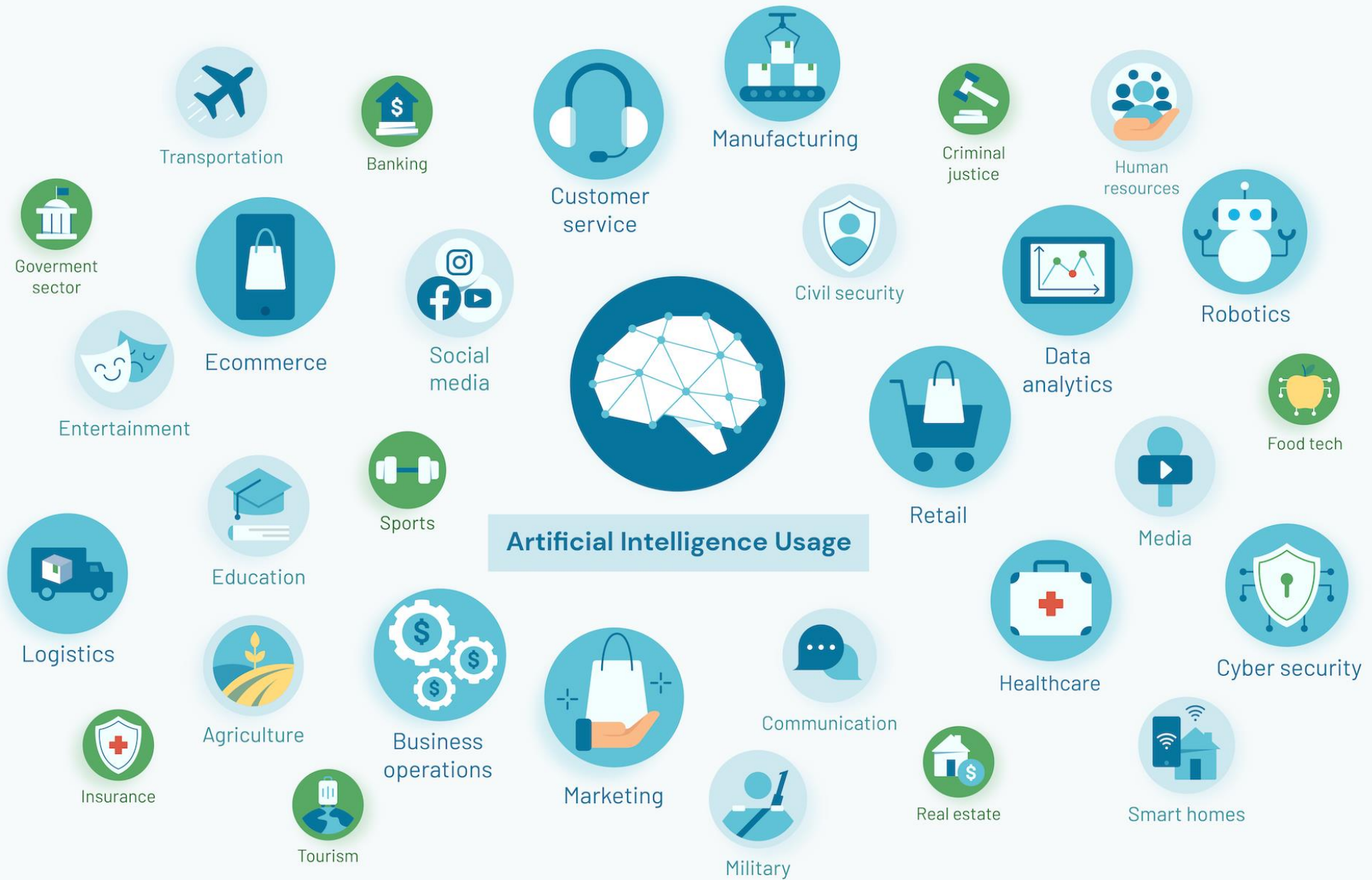
Traduire des fichiers
.pdf, .docx, .pptx

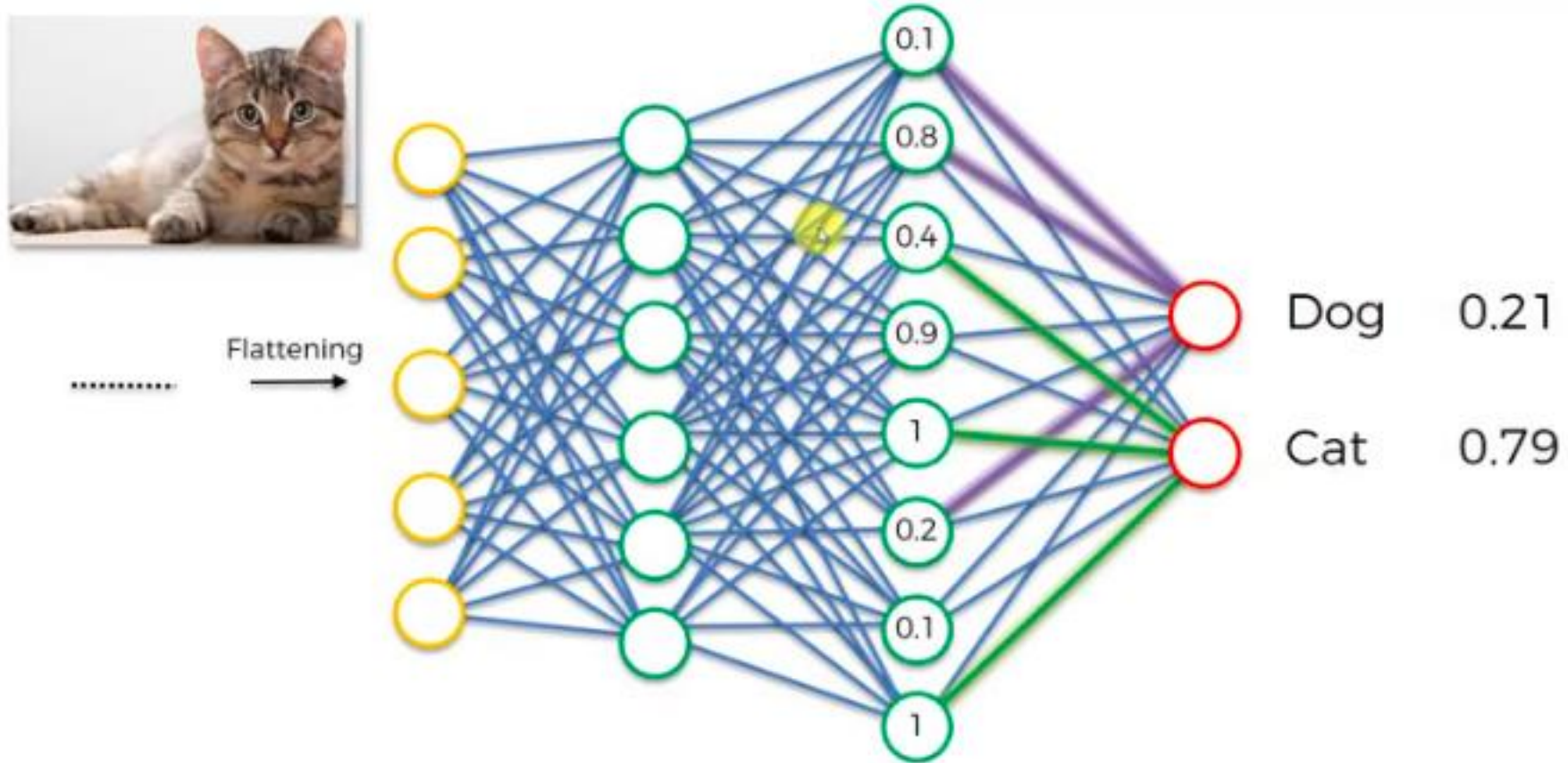
Détection automatique ▼

Écrivez ou collez votre texte

Pour traduire des fichiers PDF, Word (.docx) ou de traduction







[Explore content](#) [Journal information](#) [Publish with](#)[nature](#) > [nature reviews clinical oncology](#) > [perspectives](#) > [article](#)[Perspective](#) | [Published: 25 August 2020](#)

Artificial intelligence in radiation oncology

Elizabeth Huynh, Ahmed Hosny, Christian Guthier, Danielle S. Bitterman, Steven F. Petit, Haas-Kogan, Benjamin Kann, Hugo J. W. L. Aerts  & Raymond H. Mak

Nature Reviews Clinical Oncology **17**, 771–781 (2020) | [Cite this article](#)

Reducing the worldwide burden of Cancer

[erLink](#)[e](#) | [Published: 22 April 2020](#)

Artificial Intelligence in radiotherapy: future directions

[lini](#), [Isacco Desideri](#) , [Giulia Stocchi](#), [Viola Salvestrini](#), [Lucia](#), [orenzo Livi](#)

ology **37**, Article number: 50 (2020) | [Cite this article](#)

[es](#) | [4 Citations](#) | [4 Altmetric](#) | [Metrics](#)

The Emergence of Artificial Intelligence within Radiation Oncology Treatment Planning

Netherton T.J.^{a,b} · Cardenas C.E.^a · Rhee D.J.^{a,b} · Court L.E.^a · Beadle B.M.^c
 [Author affiliations](#)
 [Corresponding Author](#)

[Review](#) > [Rep Pract Oncol Radiother.](#) Jul–Aug 2020;25(
doi: 10.1016/j.rpor.2020.03.015.  Epub 2020 May 6.

Artificial intelligence in radiothe

Sarkar Siddique ¹, James C L Chow ² ³

[Affiliations](#) + [expand](#)

[PMID: 32617080](#) [PMCID: PMC7321818](#) DOI: [10.1016/j.rpor.](#)

[Free PMC article](#)

[Review](#) | [Open Access](#) | [Published: 23 September 2020](#)

Applications of artificial intelligence and deep learning in molecular imaging and radiotherapy

[Hossein Arabi](#) & [Habib Zaidi](#) 

European Journal of Hybrid Imaging **4**, Article number: 17 (2020) | [Cite this article](#)

Radiotherapy
& Oncology

REVIEW ARTICLE | VOLUME 153, P55-66, DECEMBER 01, 2020

Overview of artificial intelligence-based applications in radiotherapy: Recommendations for implementation and quality assurance

Liesbeth Vandewinckele ¹  · Michaël Claessens ¹  · Anna Dinkla ¹  · ... [Wouter Crijns](#) 

[Dirk Verellen](#)  · [Wouter van Elmpt](#)  · [Show all authors](#) · [Show footnotes](#)

[Open Access](#) · [Published: September 09, 2020](#) · DOI: [https://doi.org/10.1016/j.radonc.2020.09.008](#) 

in Artificial Intelligence Medicine and Public Health

[SECTION](#) [ABOUT](#) [ARTICLES](#) [RESEARCH TOPICS](#) [FOR AUTHORS](#) [EDITORIAL BOARD](#)   [ARTICLE ALERTS](#)

[Articles](#)

THIS ARTICLE IS PART OF THE RESEARCH TOPIC
Artificial Intelligence for Precision Medicine [View all 10 Arti](#)

REVIEW article

Front. Artif. Intell., 29 September 2020 | [https://doi.org/10.3389/rai.2020.577620](#) 

Integration of AI and Machine Learning in Radiotherapy QA

 [Maria F. Chan](#)^{1*},  [Alon Witztum](#)² and  [Gilmer Valdes](#)²

¹Department of Medical Physics, Memorial Sloan Kettering Cancer Center, New York, NY, United States

²Department of Radiation Oncology, University of California, San Francisco, San Francisco, CA, United States

Industry

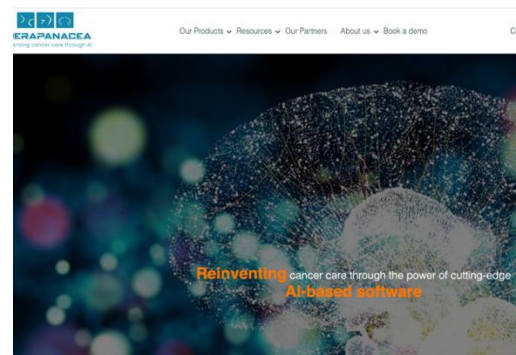
By Duska Anastasijevic

Mayo Clinic, Google launch AI initiative for radiation therapy

October 28, 2020



ROCHESTER, Minn. — Mayo Clinic and a joint initiative focusing on research into intelligence (AI) to radiation therapy plan component of cancer care. Radiation the Clinic, including radiation oncologists, m dosimetrists and service design, will coll Health's experts in applying AI to medica



Innovate Healthcare
RADIOLOGY BUSINESS
FOR LEADERS NAVIGATING VALUE-BASED CARE

NEWS TOPICS MAGAZINE & LONGREADS CONFERENCES EXPERIENCE STORIES SUBSCRIBE

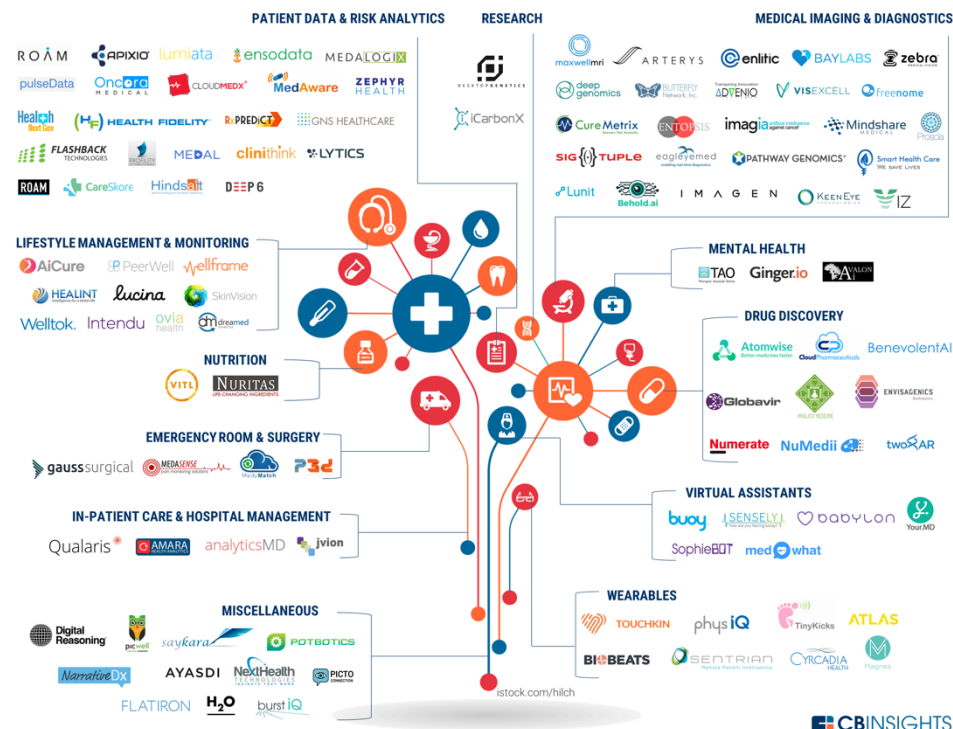
AI software cuts long radiation therapy planning process to just 20 minutes

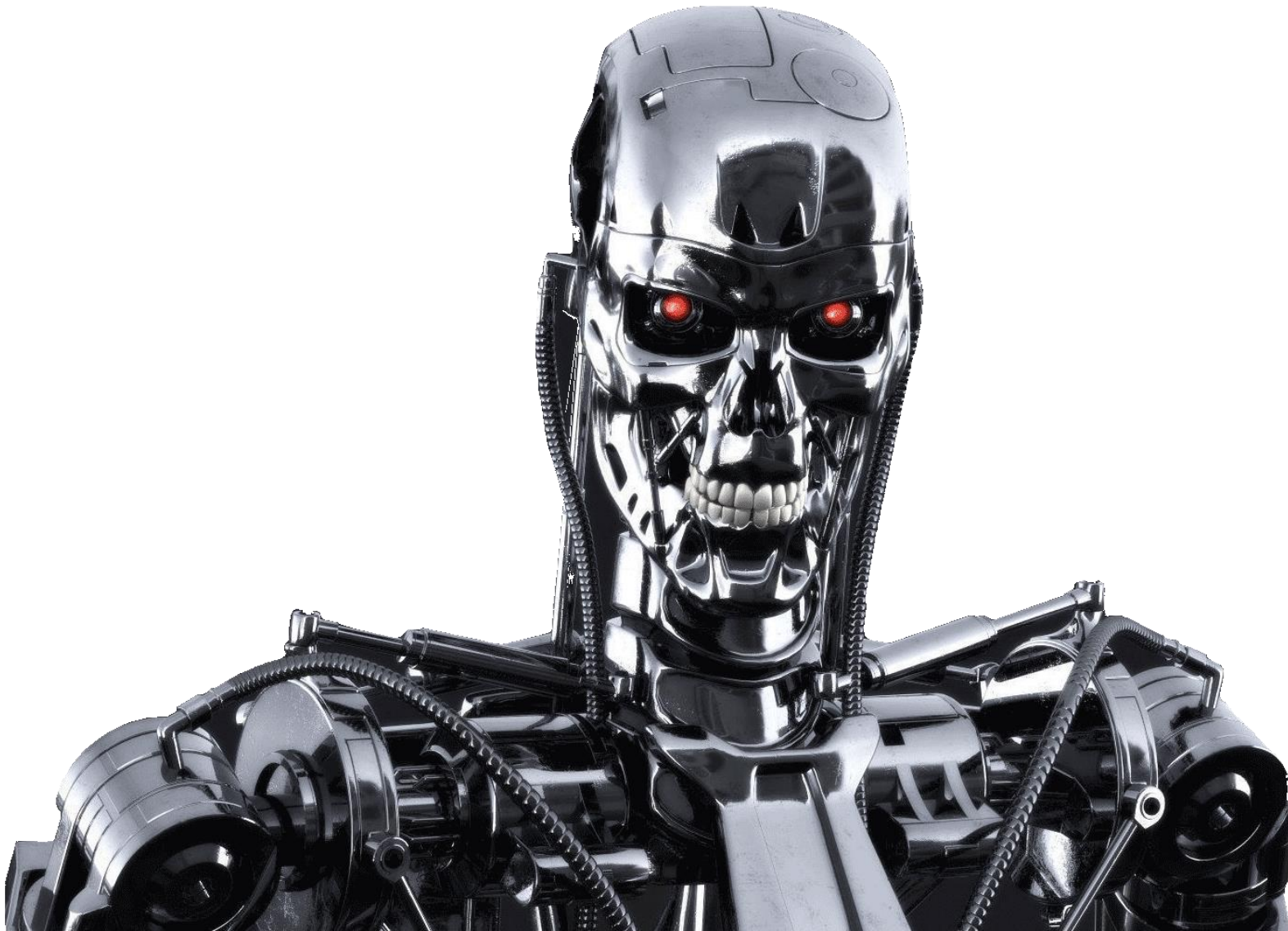
Anicka Slachta | August 02, 2018 | Artificial Intelligence



THERAPANACEA
Reinventing cancer care through AI

106 STARTUPS TRANSFORMING HEALTHCARE WITH AI





"With artificial intelligence we are summoning the demon" -- Elon Musk



"We're really closer to a smart washing machine than Terminator"
-- Fei-Fei Li, Director of Stanford AI Lab

Paradigm shift:
data driven

Disclaimer

- Large part of those slides came from Fidle CNRS
- Fidle.Contact@grenoble.cnrs.fr
- <https://fidle.cnrs.fr>

*“Tout ce qu'il faut savoir sur
les réseaux de neurones
pour devenir un héros !”*

Janvier 2025

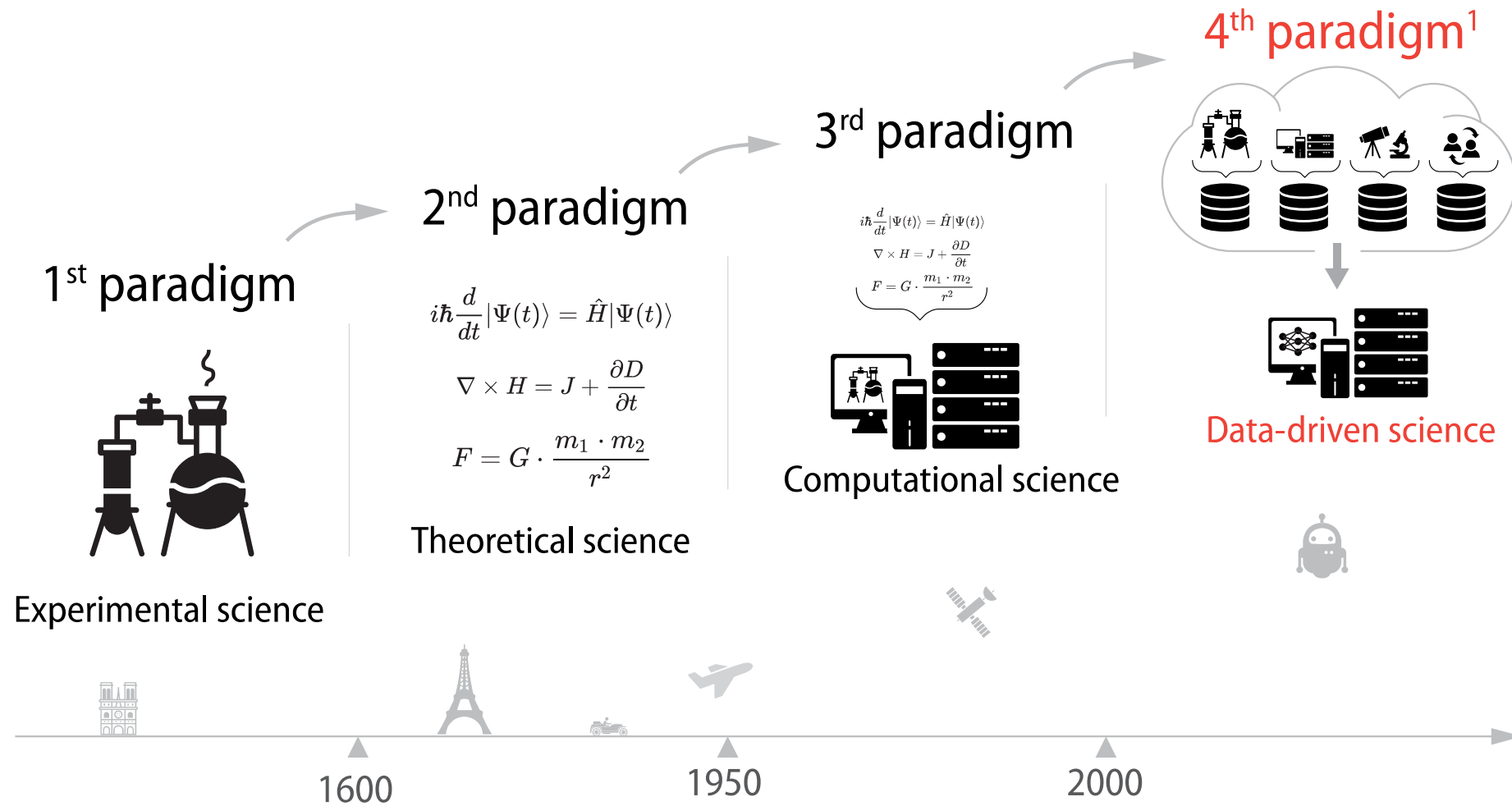


About Fidle

This repository contains all the documents and links of the **Fidle Training** .
Fidle (for Formation Introduction au Deep Learning) is a 2-day training session
co-organized by the Formation Permanente CNRS and the Resinfo/SARI and DevLOG CNRS networks.

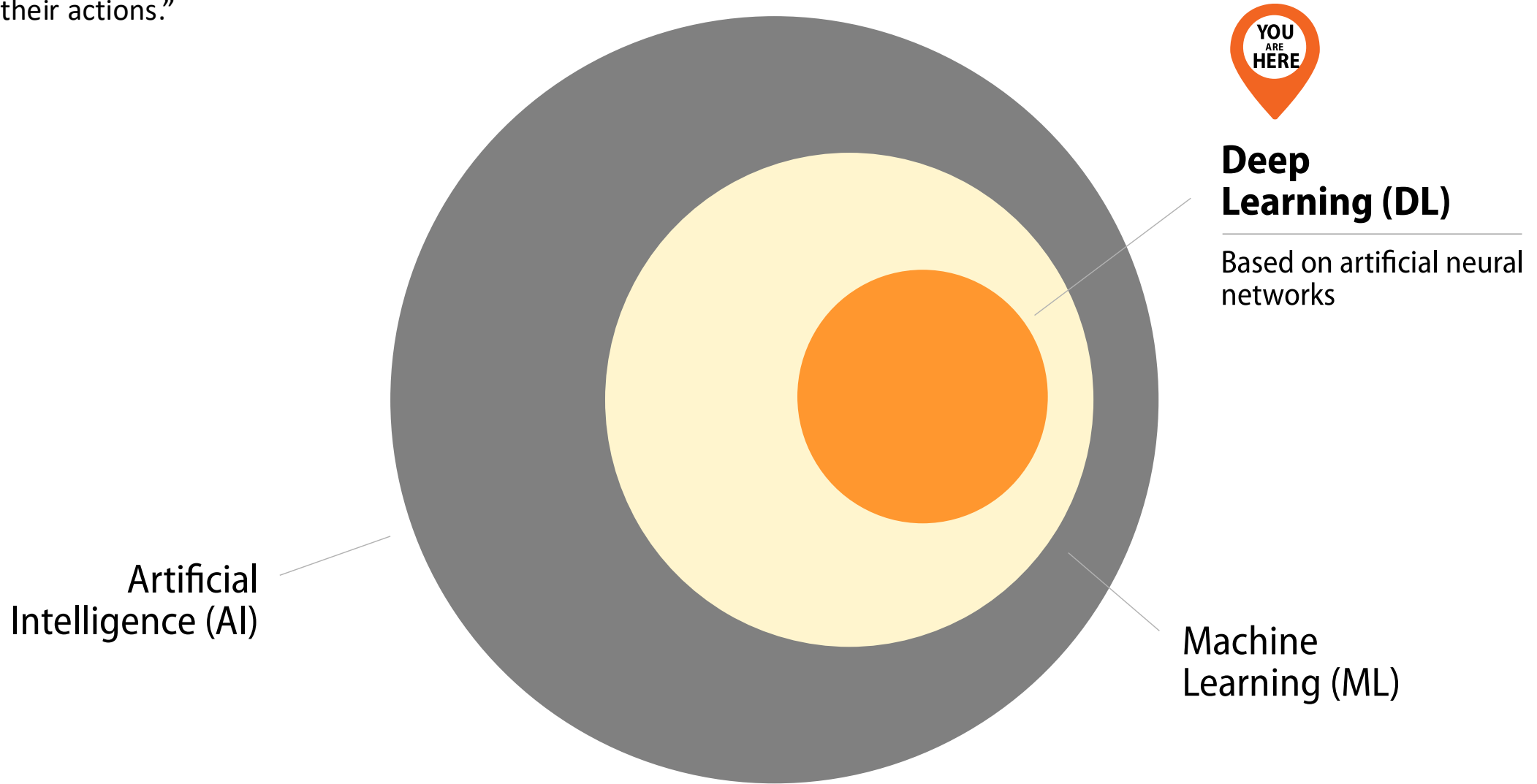
The objectives of this training are :

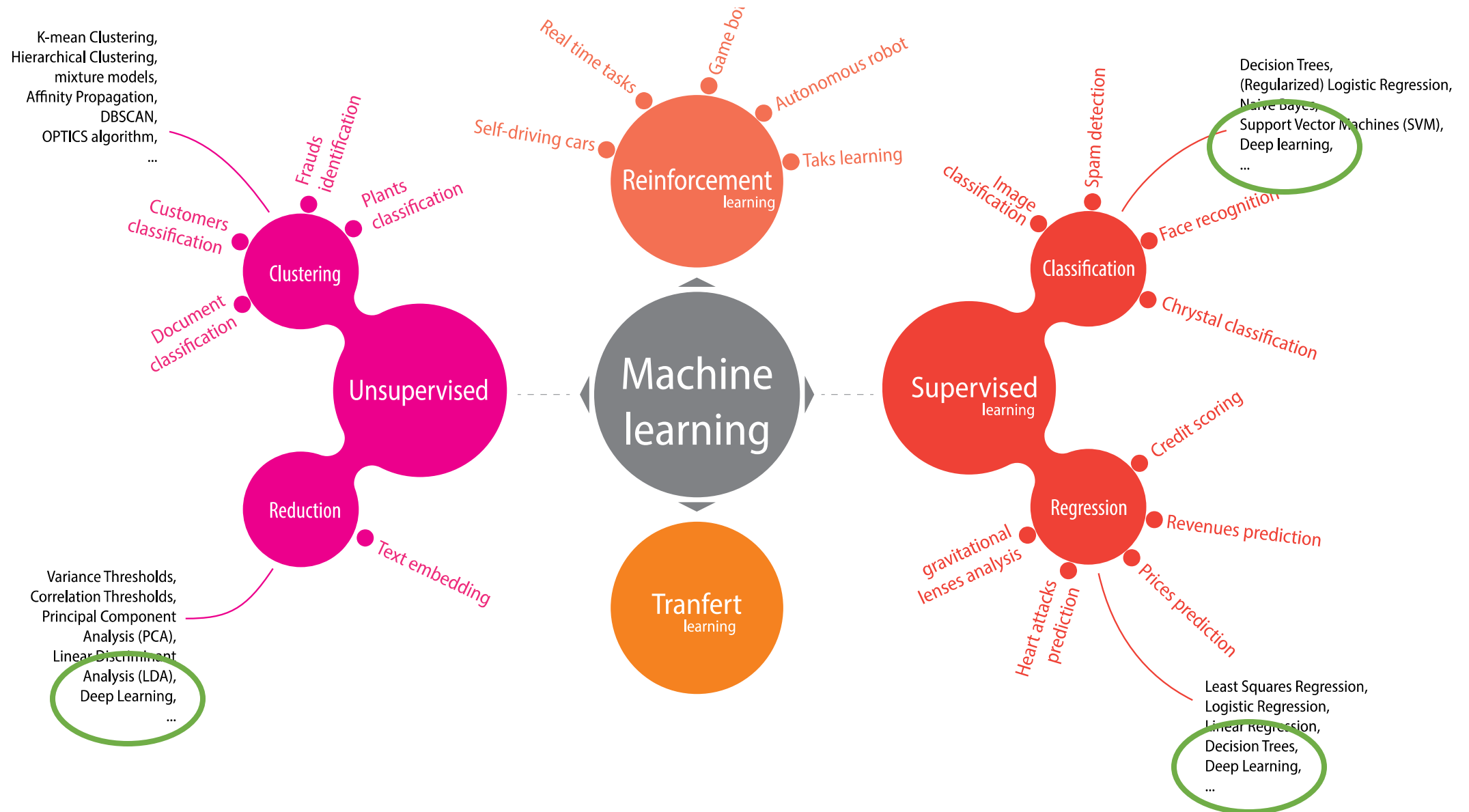
- Understanding the **bases of Deep Learning** neural networks



¹ Jim Gray, 2007 [GRAY]

“Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions.”





Machine Learning, Deep Learning

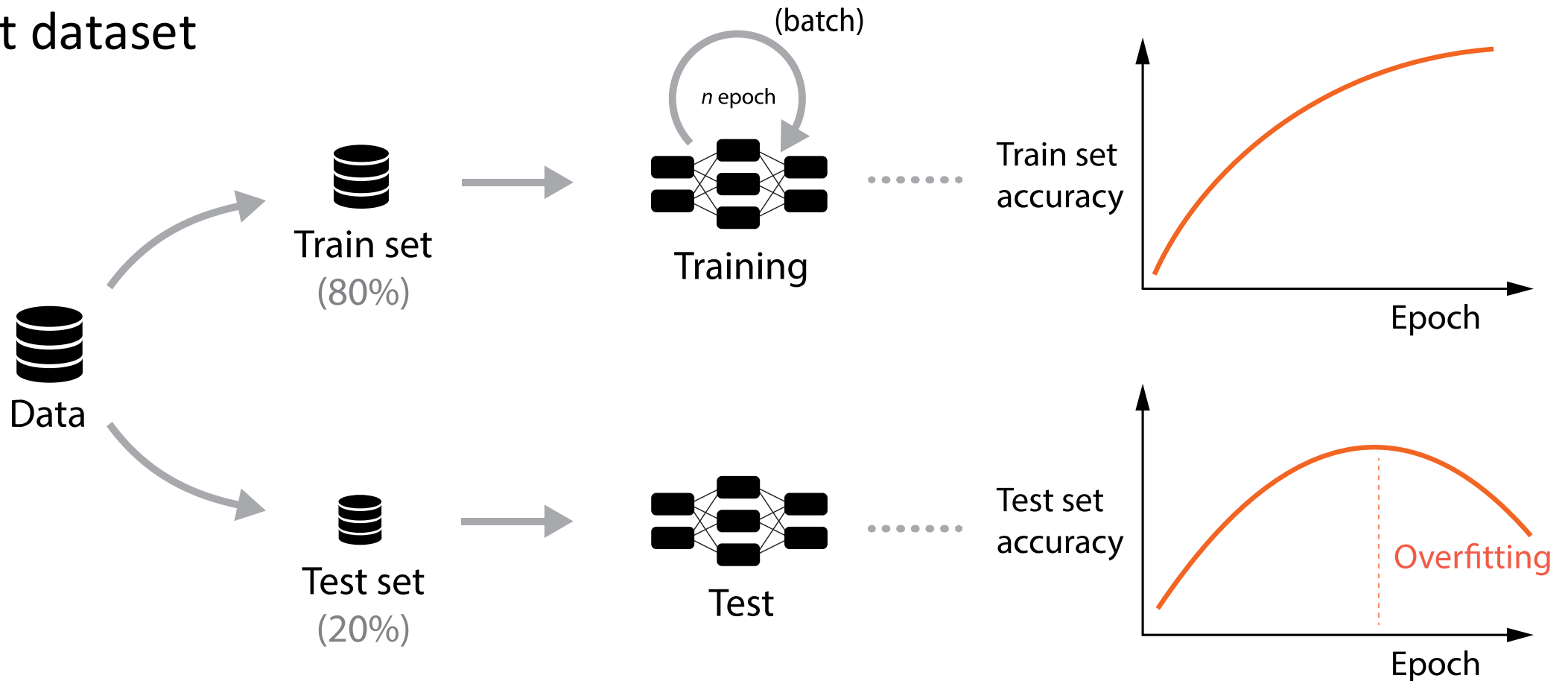
- Large ensemble of computerized methods
- Applicable in various domains, with various data type
 - Text, labels, numbers, signals, images ...
- Exploiting data during a training process
- Step1: training
- Step2: prediction (inference)

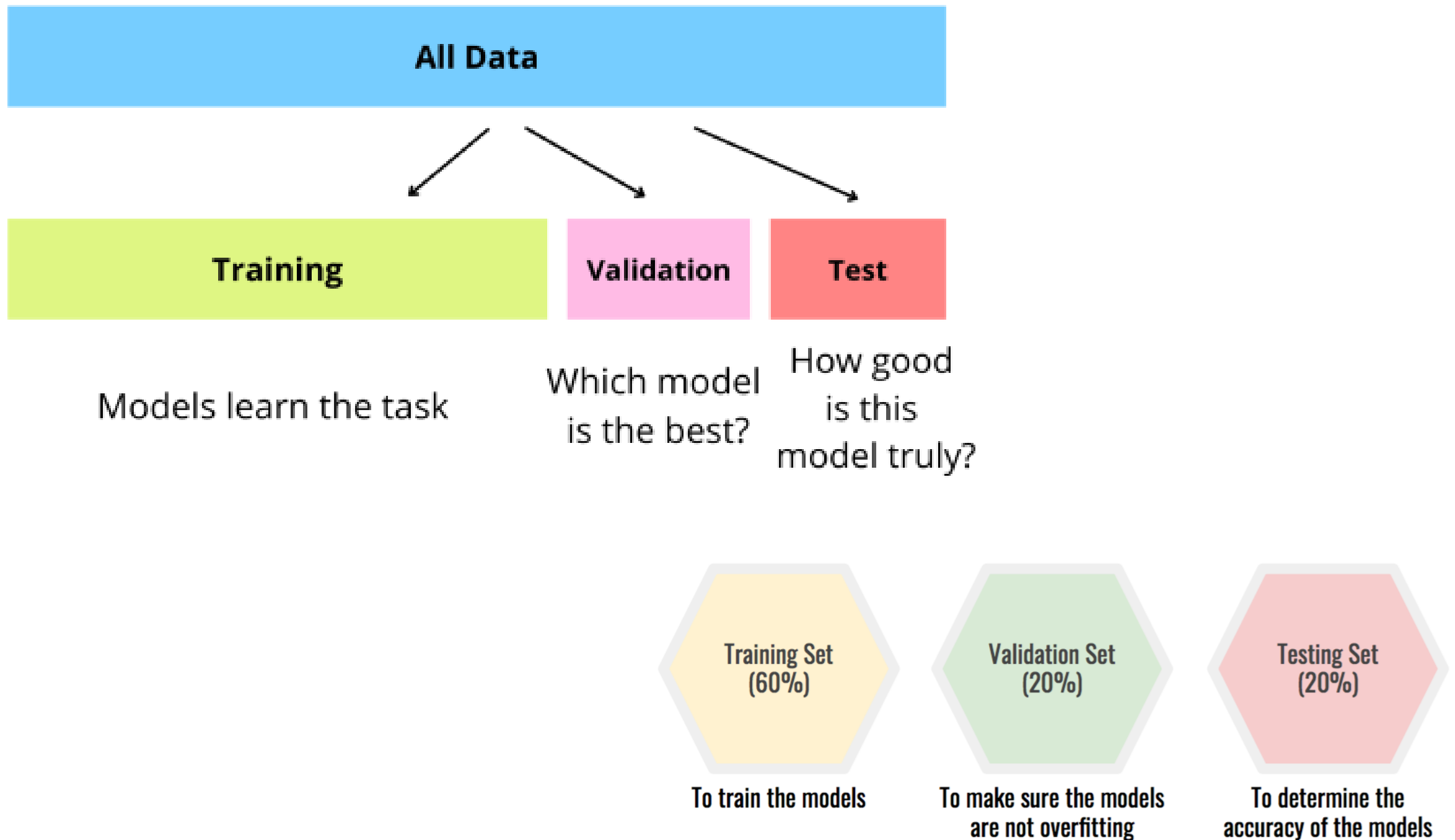
This is not magic ...
... it's statistics!



Validation, evaluation

1. Training dataset
2. Test dataset



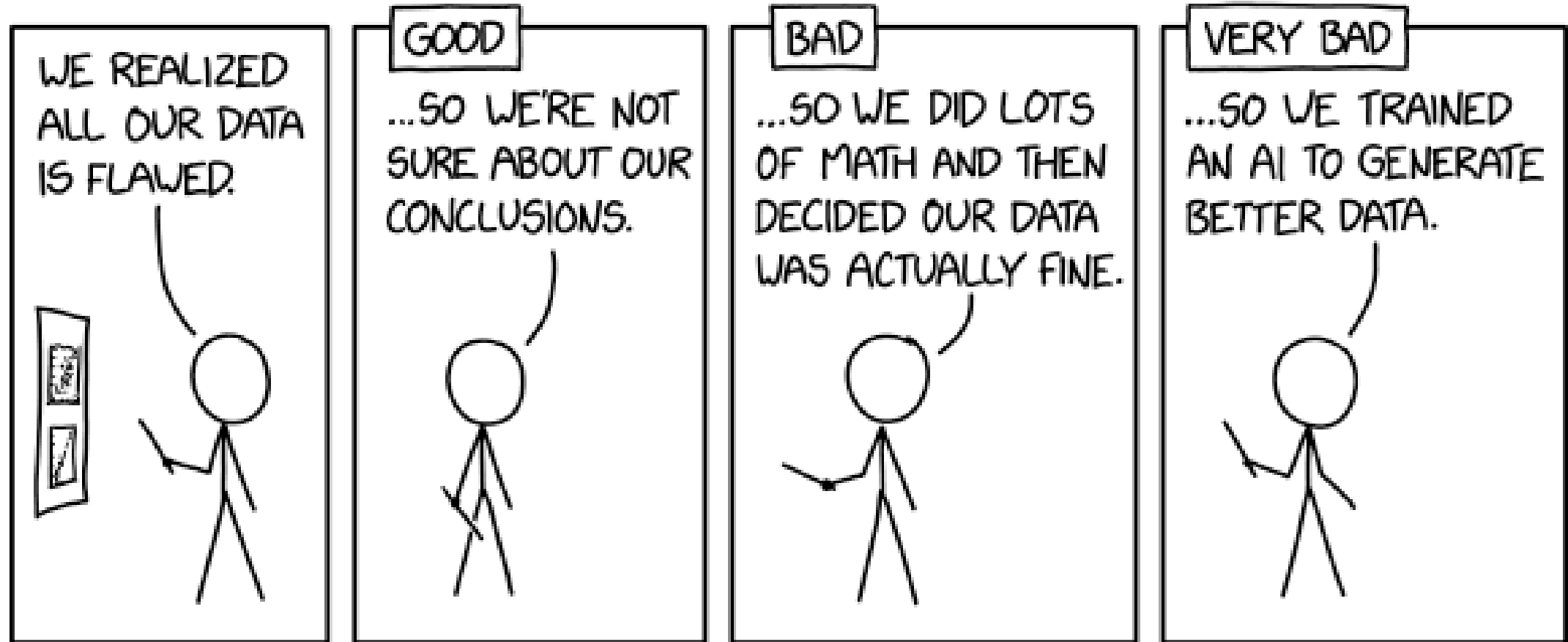


Advantages / Drawbacks of DL

- Generic method
 - Automated
 - Adaptive
 - Toolkits, models available
 - It works !
- Need high quality data
 - Depends on data
 - GPU++ needed (long training)
 - Validation needed (sometimes a bit “overconfident”)
 - A lot of parameters tuning

This is not magic ...
... it's statistics!





Code

Lot of high quality **toolkits** available

Lot of **models** available

<https://modelzoo.co>



