
# Overview of Deep Learning

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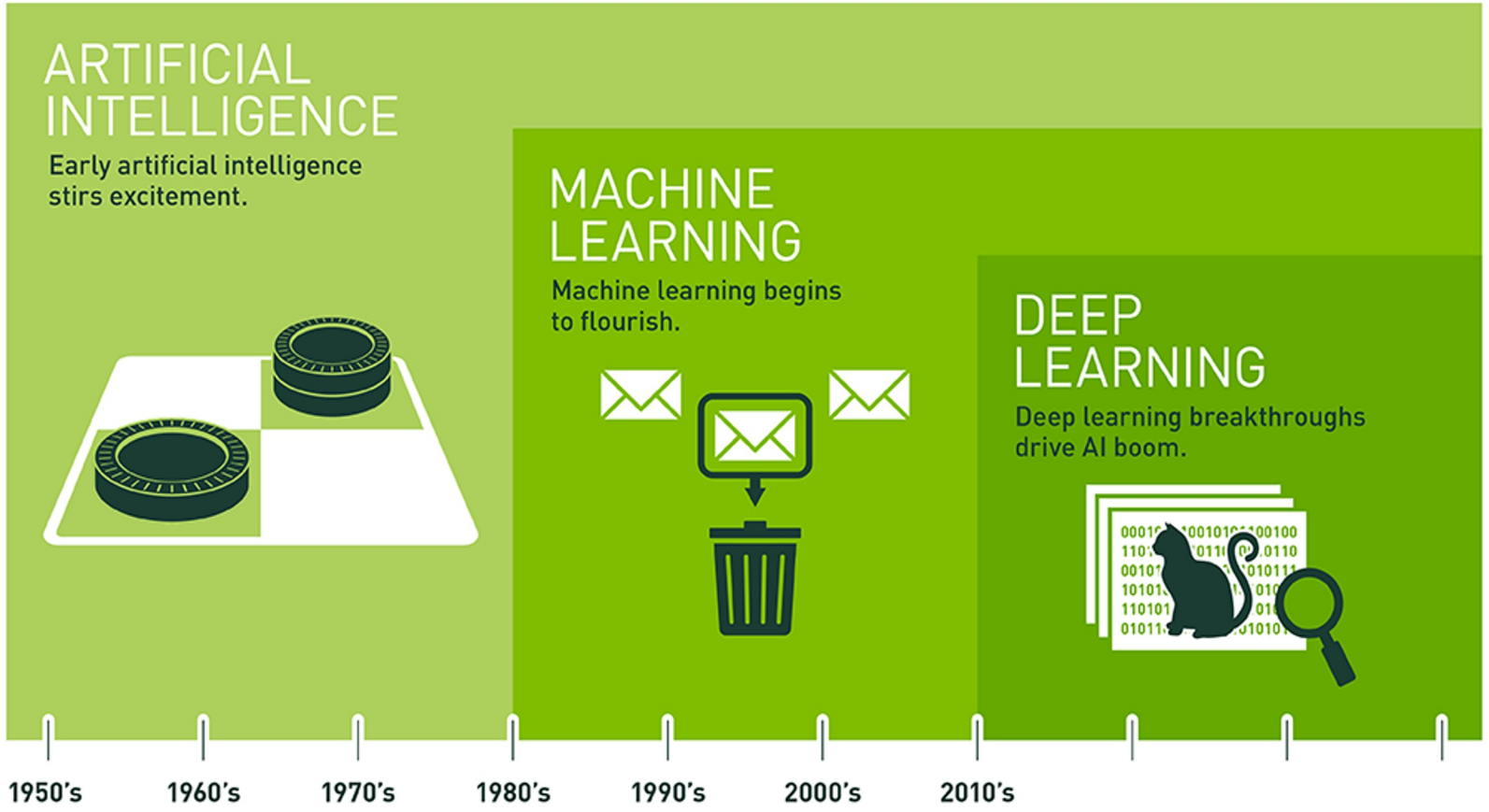
# Artificial Intelligence (AI)

Machines exhibiting animal or human intelligence

https://www.quantamagazine.org/the-simple-algorithm-that-ants-use-to-build-bridges-20180226

# AI, Machine Learning and Deep Learning

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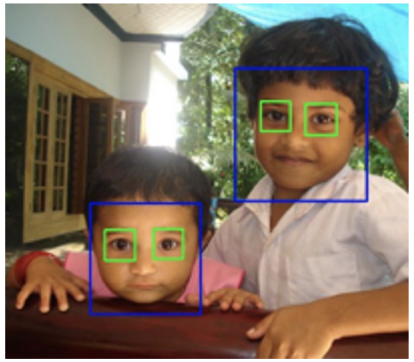
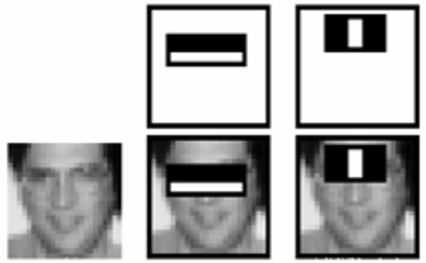
Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

# Artificial Intelligence, Machine Learning and Deep Learning on Face Detection



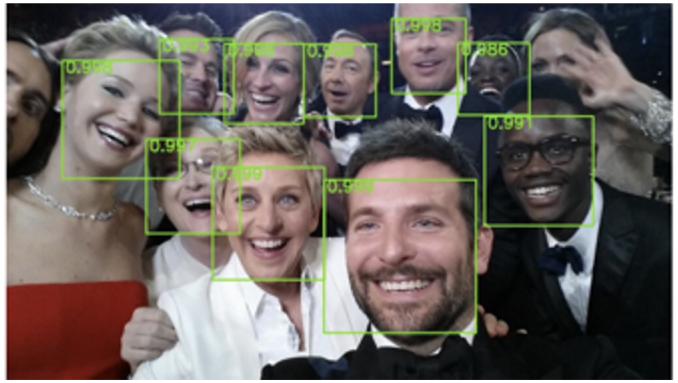
**Rule-based (AI):**
Detect facial features based on color/template
**Apply if-else-if-else**

[Viola & Jones 2001]



**Machine Learning:**
Use Haar Cascade Classifier
**Hand-crafted feature detection**

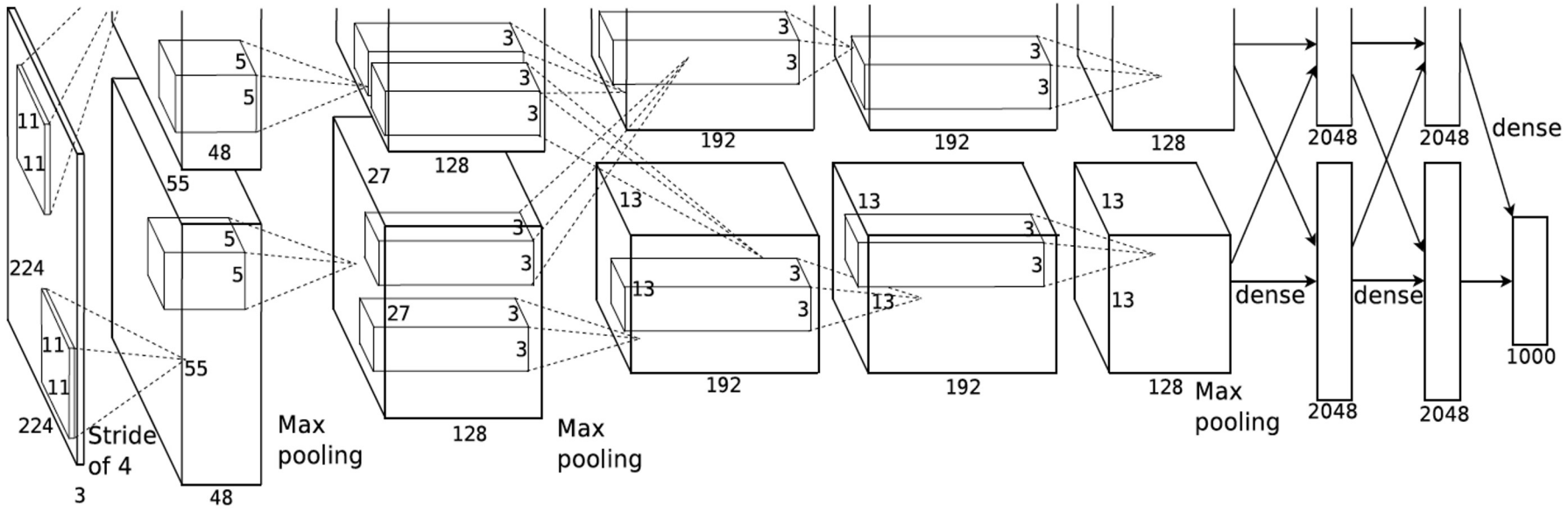
YOLO, SSD, RCNN [>2012]



**Deep Learning:**
Train a network by showing thousands of labelled region of faces
**Automatic feature detection**

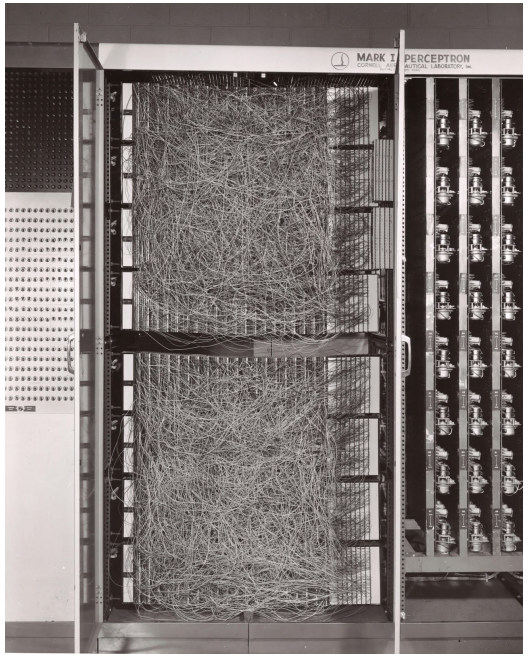
# Deep Learning Moment - 2012

- AlexNet – 650,000-neuron deep neural network won 2012 ImageNet1k competition with 15% Top-5 error rate compared to 2nd place with 26%. It's top 1 accuracy is 63.3%.



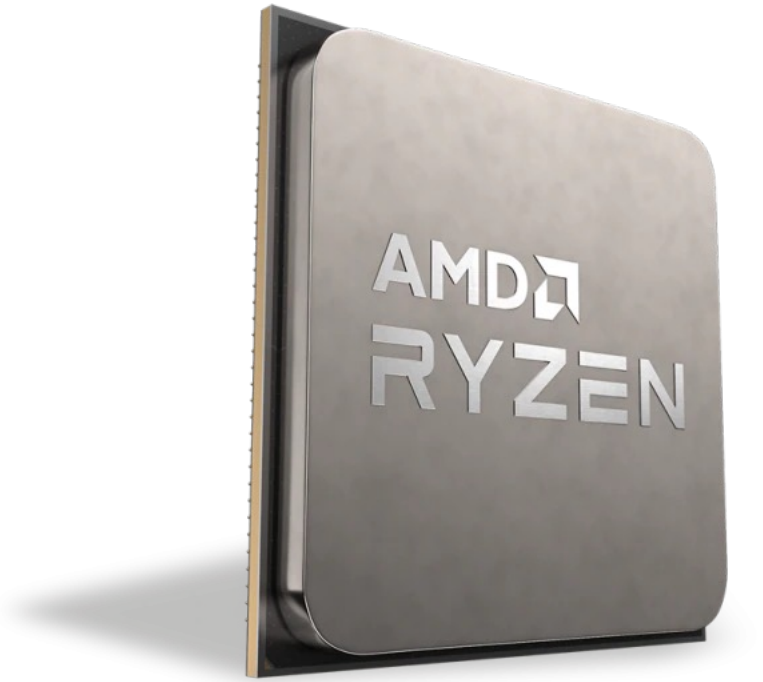
# Deep Learning - what made it work?

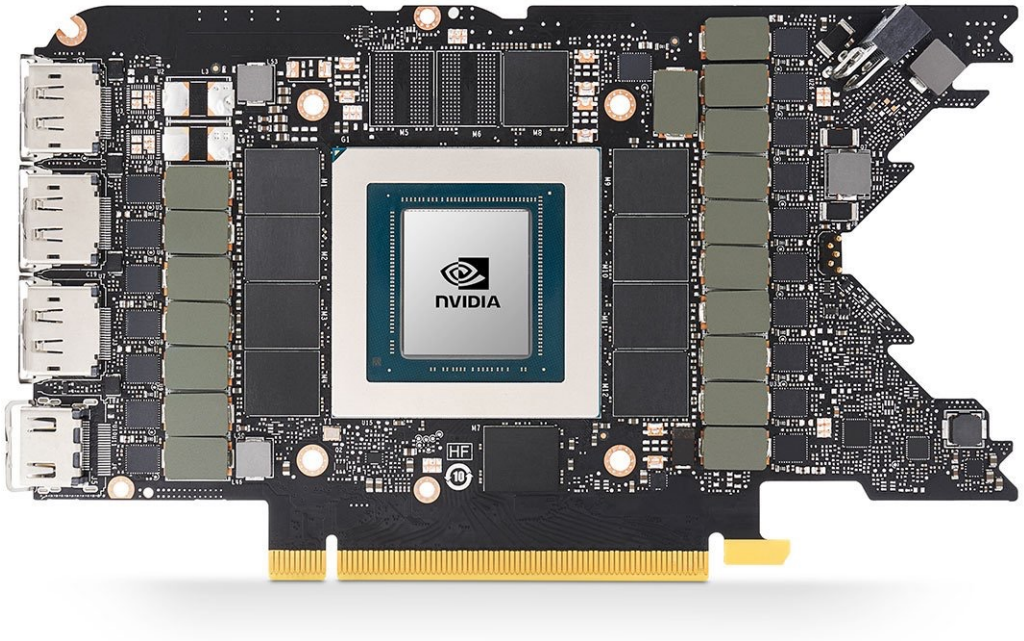
- Concepts of artificial neural network (ANN) and convolutional neural network (CNN) are old
  - Neurons in perceptron (1-layer NN) – 1958
  - Neocognitron (1980) and CNN (1989)
  - Backpropagation (1986)
- What's new?
  - Computing power – Massive number of GPU CUDA cores
  - Data – from the Internet




Perceptron is a binary classifier

# CPU (AMD RyZen) vs GPU (RTX 3090)



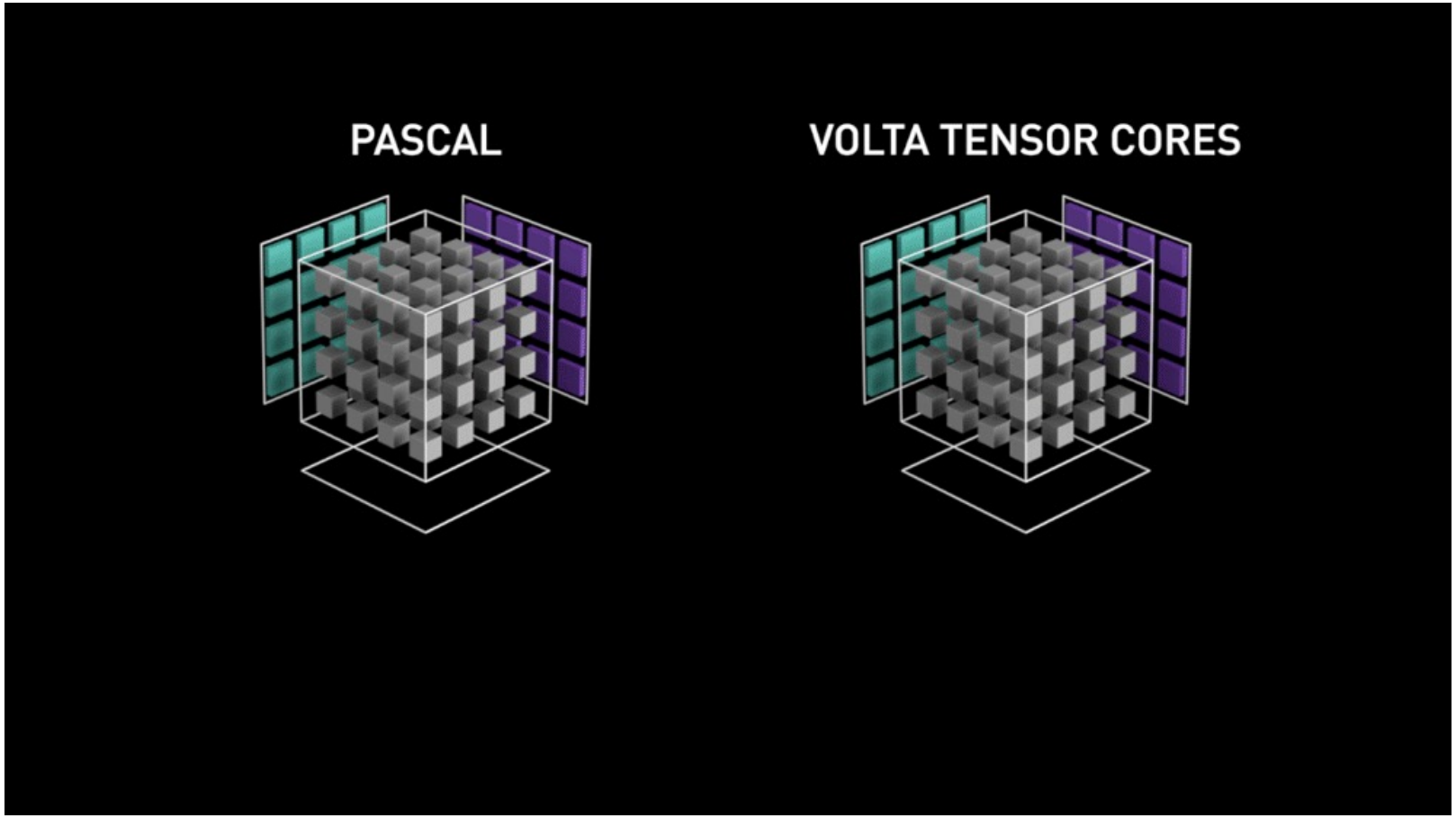

64 3.7GHz super fast cores

6.9 TFLOPS

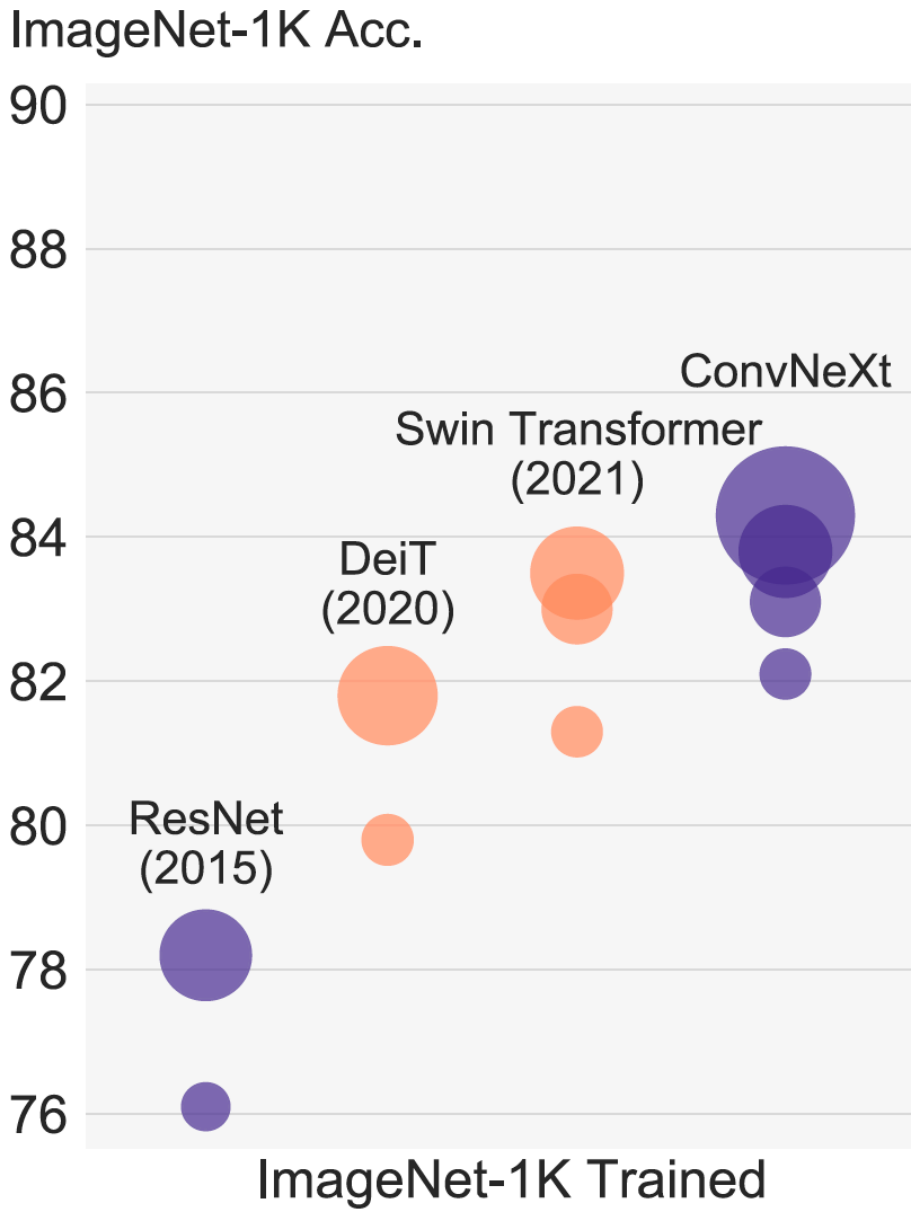
10,496 1.4GHz fast cores

35.6 TFLOPS

# Scalar vs Tensor Operation



# The Rest is History



# Barely scratching the surface of AI

$Imagining$

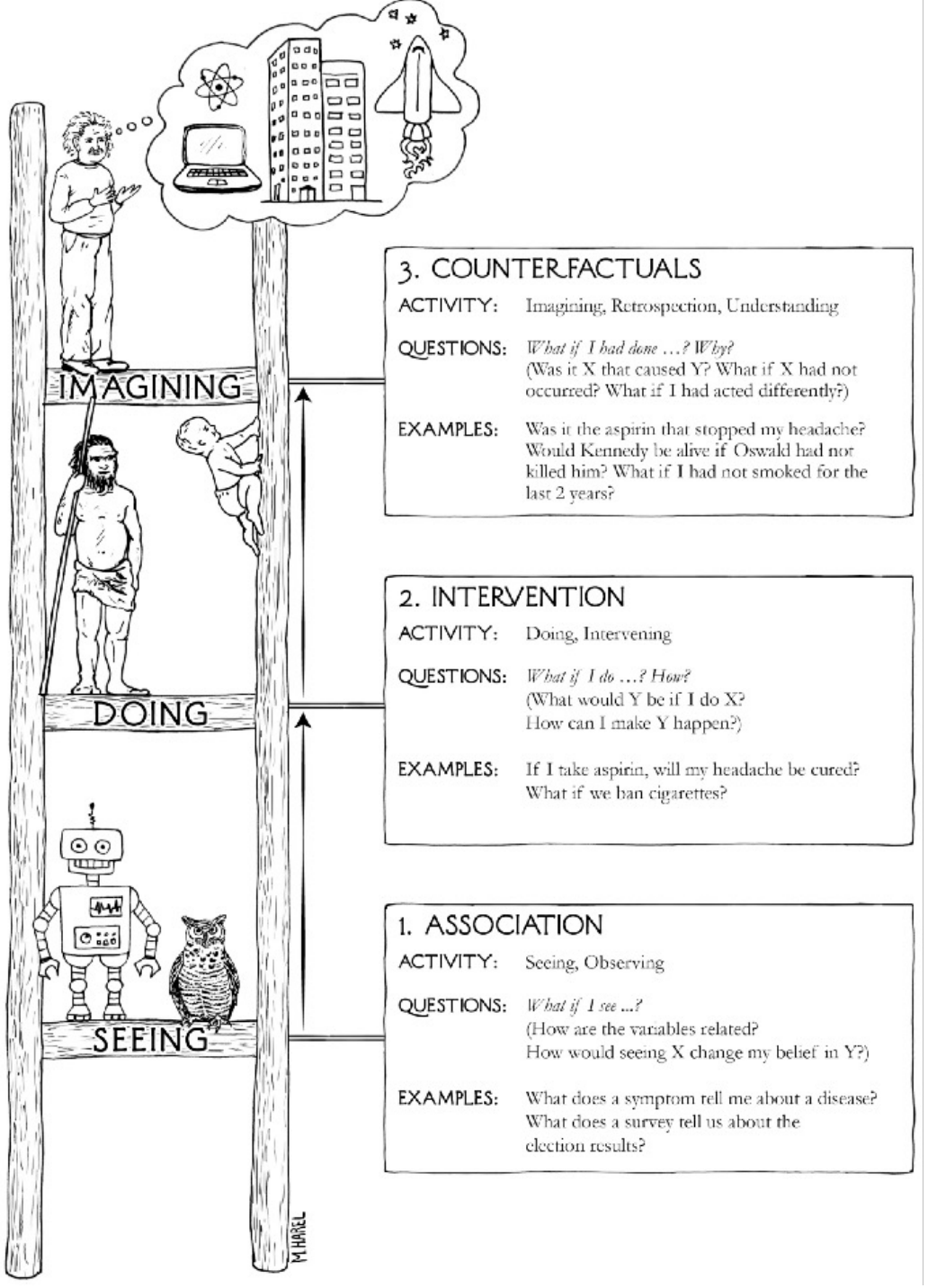
Starting to move here

$Doing: p(\boldsymbol{y}|do(\boldsymbol{x}))$

We are here

$Seeing: p(\boldsymbol{y}|\boldsymbol{x})$

Pearl, Book of Why



# References

Strickland, E. The Turbulent Past and Uncertain Future of Artificial IntelligenceIs there a way out of AI's boom-and-bust cycle? https://spectrum-ieee-org.cdn.ampproject.org/c/s/spectrum.ieee.org/amp/history-of-ai-2655064200

Liu, Zhuang, et al. "A ConvNet for the 2020s." arXiv preprint arXiv:2201.03545 (2022).

NVIDIA.com

AMD.com

ODSC

# FREE IN-PERSON MEETUP
in Manila, The Philippines

September 8th
5:00 PM–6:30 PM
PHST (GMT+8)

## Building Efficient Deep Neural Networks

**Rowel Atienza, PhD**
Professor at the Electrical and Electronics Engineering Institute
of the University of the Philippines

## Self-Supervised Learning for NLP and CV

**Prospero C. Naval, Jr., PhD**
Professor at Department of Computer Science
at University of the Philippines
and Laboratory Head of Computer Vision and
Machine Intelligence Group

Electrical and Electronics Engineering Building,
**University of the Philippines**

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