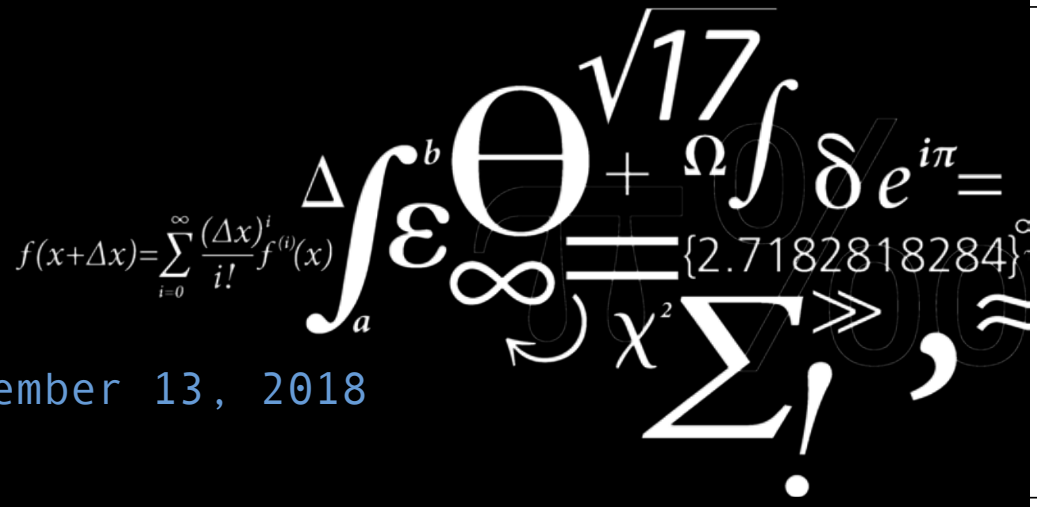
AI
Navigating the Hype

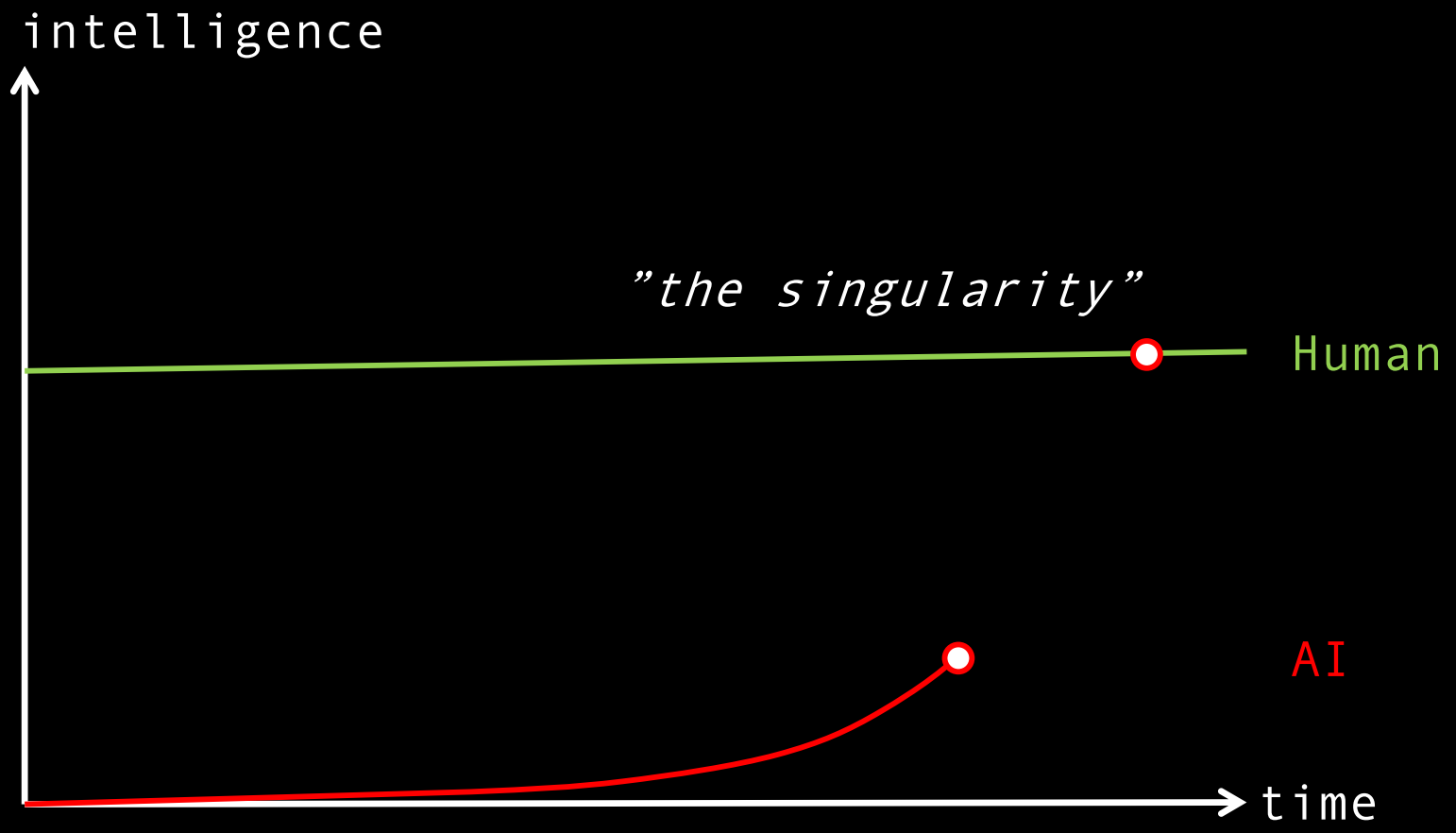
Jan Madsen, Professor
DTU Compute

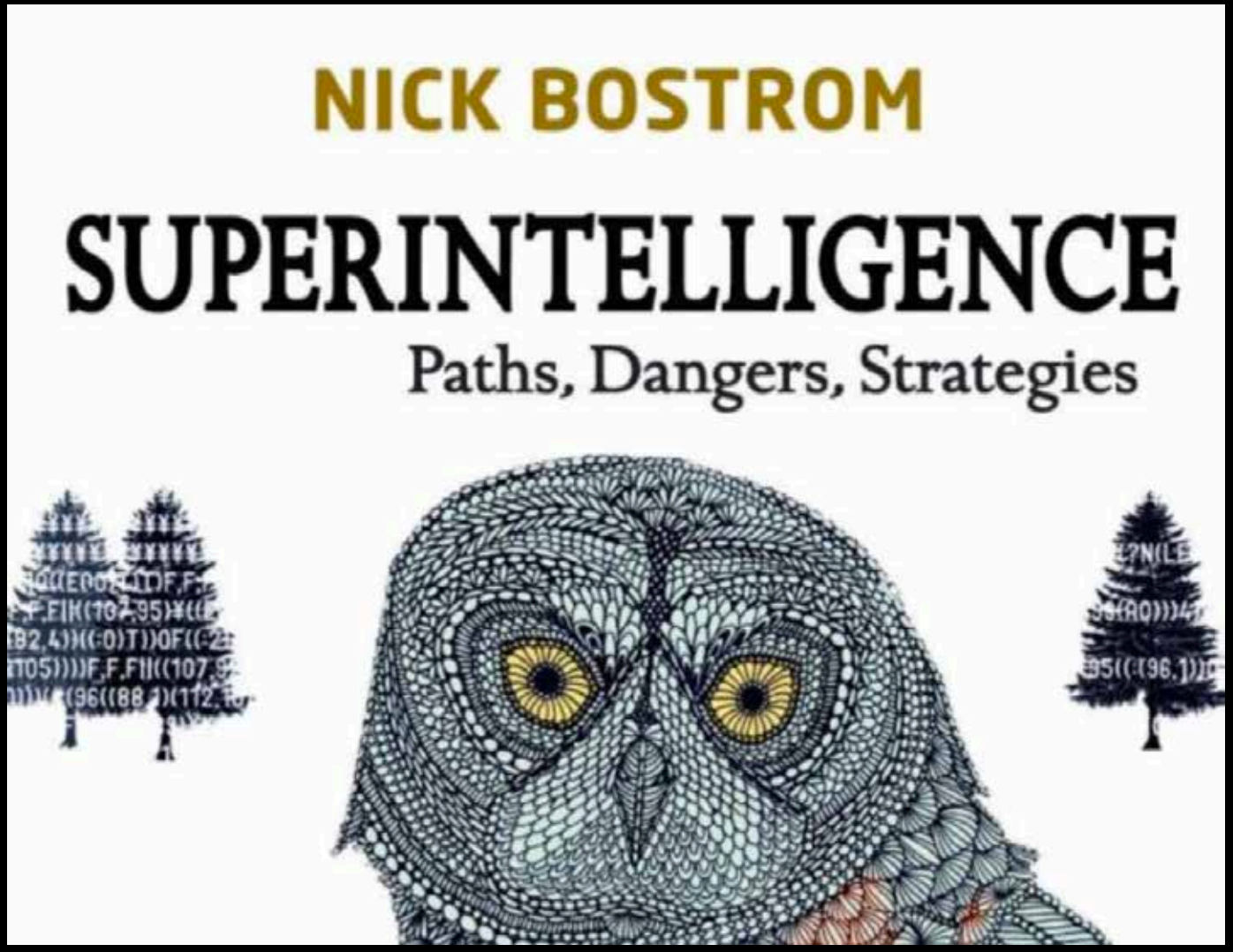


ATV's Teknologiske Topmøde, November 13, 2018

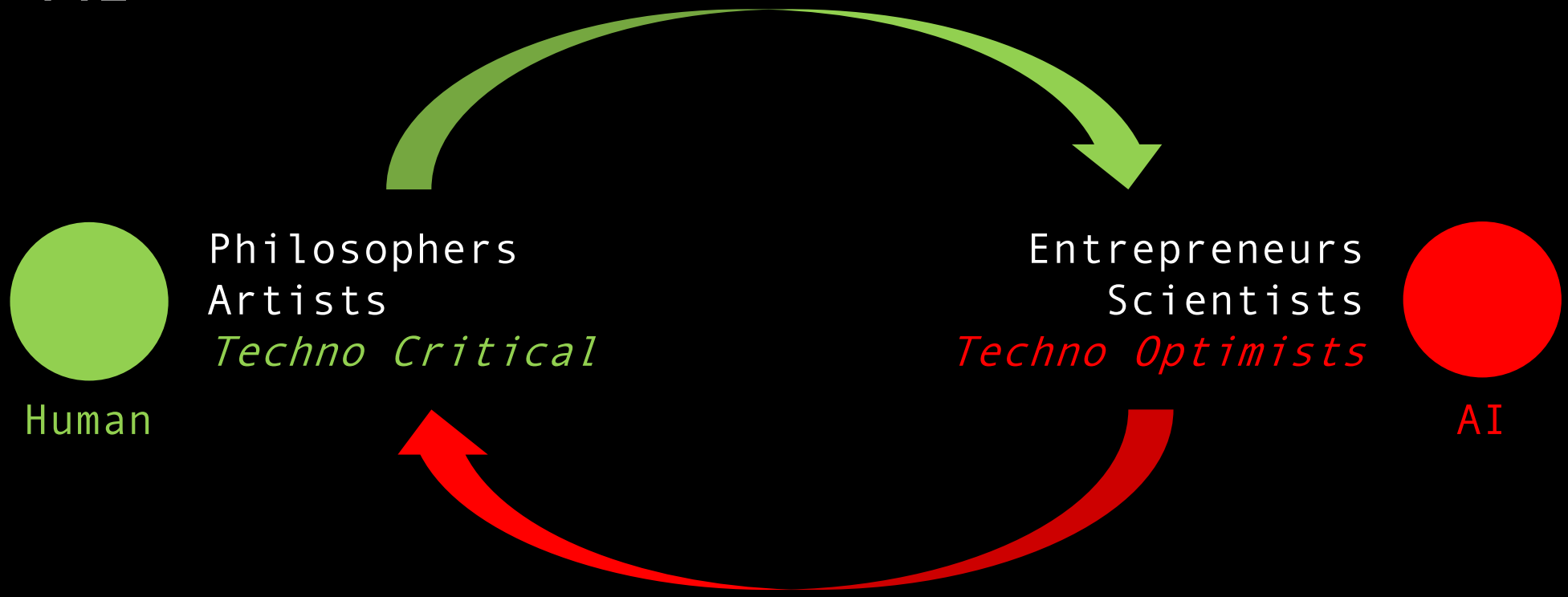
THE HYPE

AI



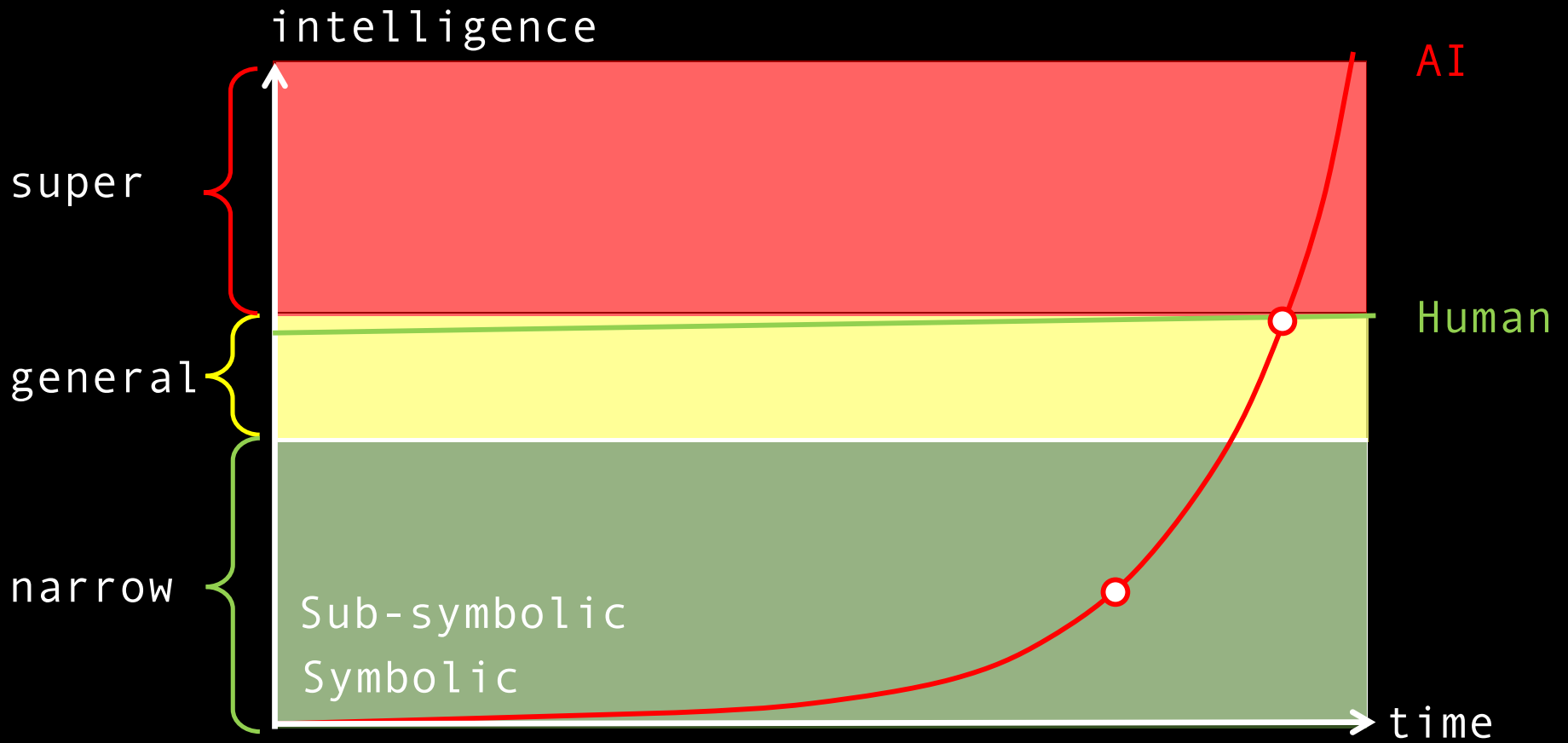

NICK BOSTROM
SUPERINTELLIGENCE
Paths, Dangers, Strategies

AI

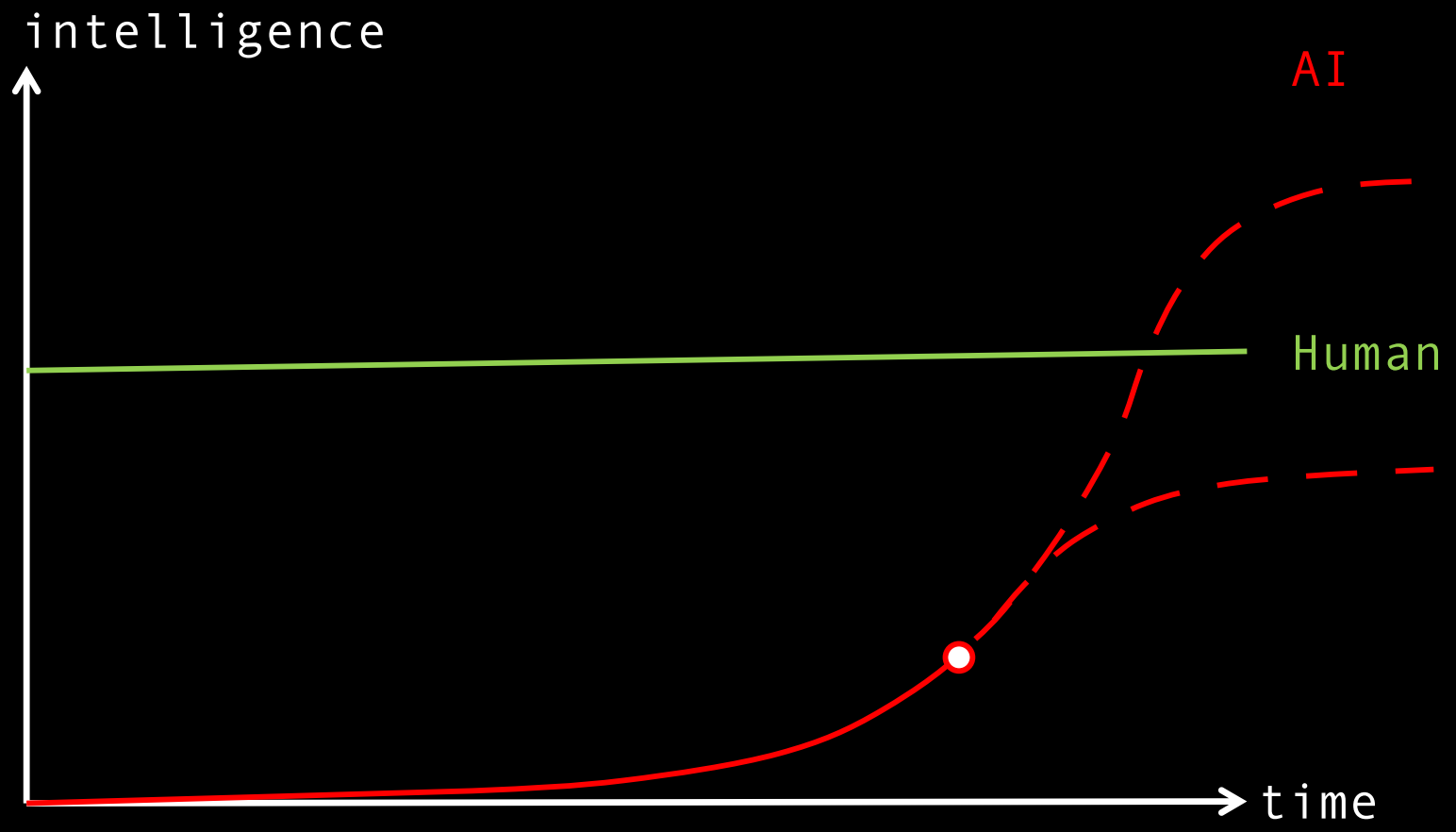

Philosophers
Artists
Techno Critical
Entrepreneurs
Scientists
Techno Optimists
Human
AI

R E A L I T Y

AI

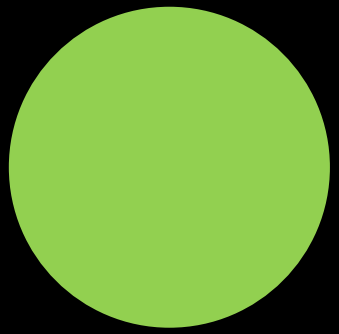

intelligence
AI
super
Human
general
narrow
Sub-symbolic
Symbolic
time

AI



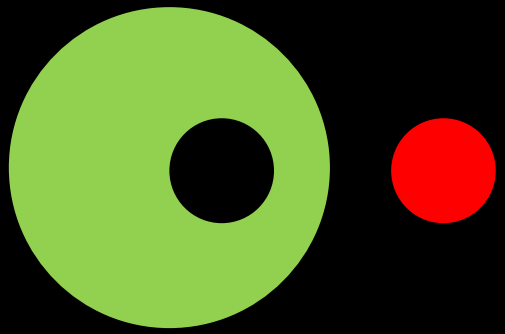
P E R S P E C T I V E S

AI perspectives



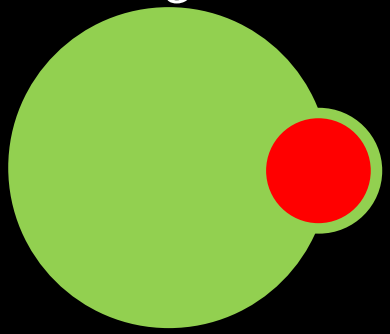
AI perspectives

1. Automation



ROSS

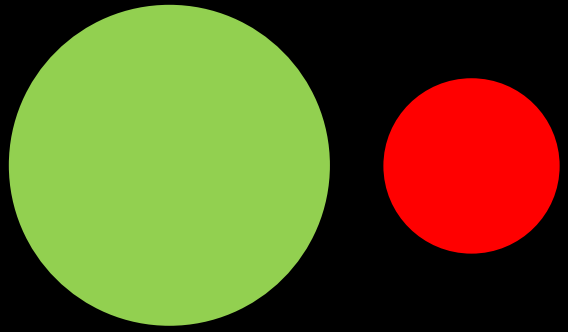
2. Augmentation



IBM Watson

Corti

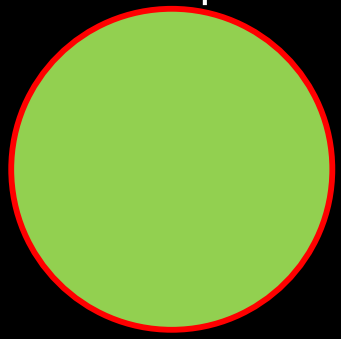
4. Autonomous



WAYMO

SKY-WATCH

3. Adaptive



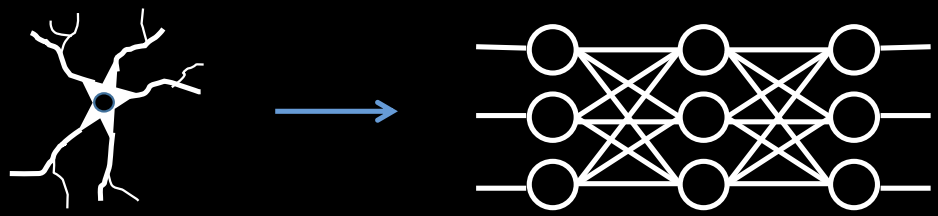
UBISOFT

T E C H N O L O G I E S

A L G O R I T H M S & M A C H I N E S

AI algorithms

- Sub-symbolic
  - Genetic/Evolutionary algorithms
  - Machine Learning
  - Deep learning



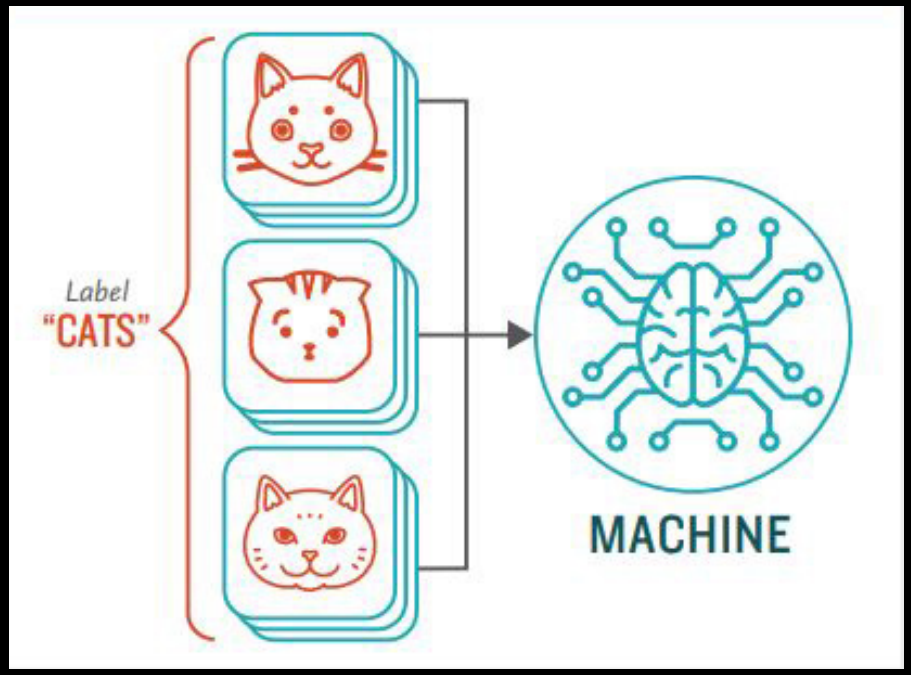
- Symbolic
  - Reasoning
  - Model-of-Mind

Deep learning

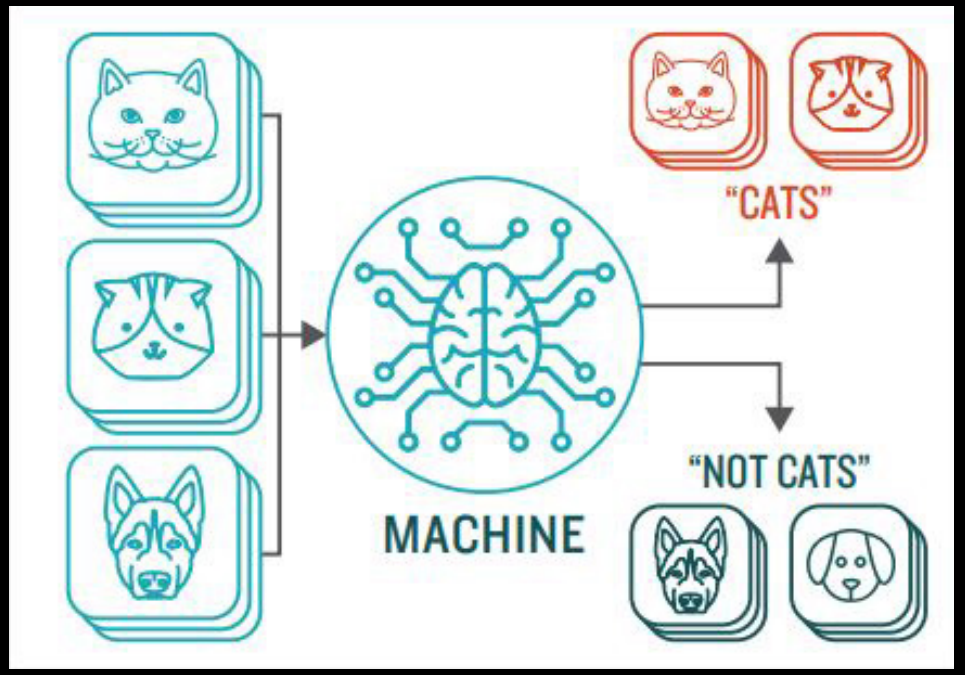
- Supervised learning
- Reinforcement learning
- Unsupervised learning

Supervised learning

Step 1

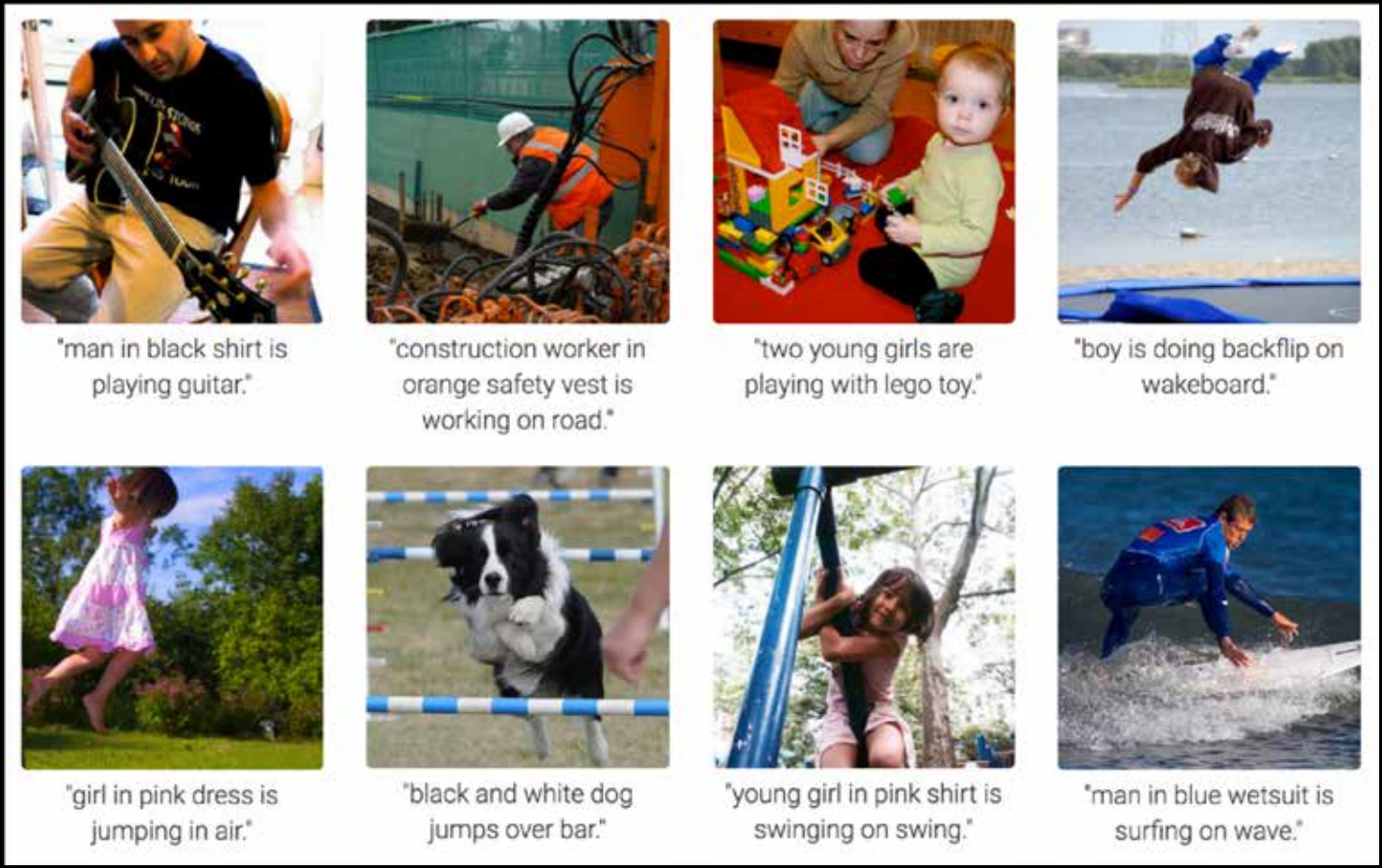


Step 2



Source: A Quick Guide to How Machines Learn, Boozallen.com

Image captioning challenge



Karpathy & Fei-Fei, 2015; Donahue et al., 2015; Xu et al, 2015;

Source: Pieter Abbeel, UC Berkeley

Visual challenge

What vegetable is on the plate?
Neural Net: broccoli
Ground Truth: broccoli

What color are the shoes on the person's feet ?
Neural Net: brown
Ground Truth: brown

How many school busses are there?
Neural Net: 2
Ground Truth: 2

What sport is this?
Neural Net: baseball
Ground Truth: baseball

What is on top of the refrigerator?
Neural Net: magnets
Ground Truth: cereal

What uniform is she wearing?
Neural Net: shorts
Ground Truth: girl scout

What is the table number?
Neural Net: 4
Ground Truth:40

What are people sitting under in the back?
Neural Net: bench
Ground Truth: tent

Source: Pieter Abbeel, UC Berkeley

Stanislaw Antol, Aishwarya Agrawal, Jiasen Lu, Margaret Mitchell, Dhruv Batra, C. Lawrence Zitnick, Devi Parikh

Deep learning

- Supervised learning
  - Pattern recognition, if enough data, the neural net can learn the pattern
- Reinforcement learning
- Unsupervised learning

Reinforcement learning

Robot kindergarden

Source: https://ai.google/research/teams/brain/robotics/

Deep learning

- Supervised learning
  - Pattern recognition, if enough data, the neural net can learn the pattern
- Reinforcement learning
  - Learning goal-oriented behaviors from trial and error
- Unsupervised learning

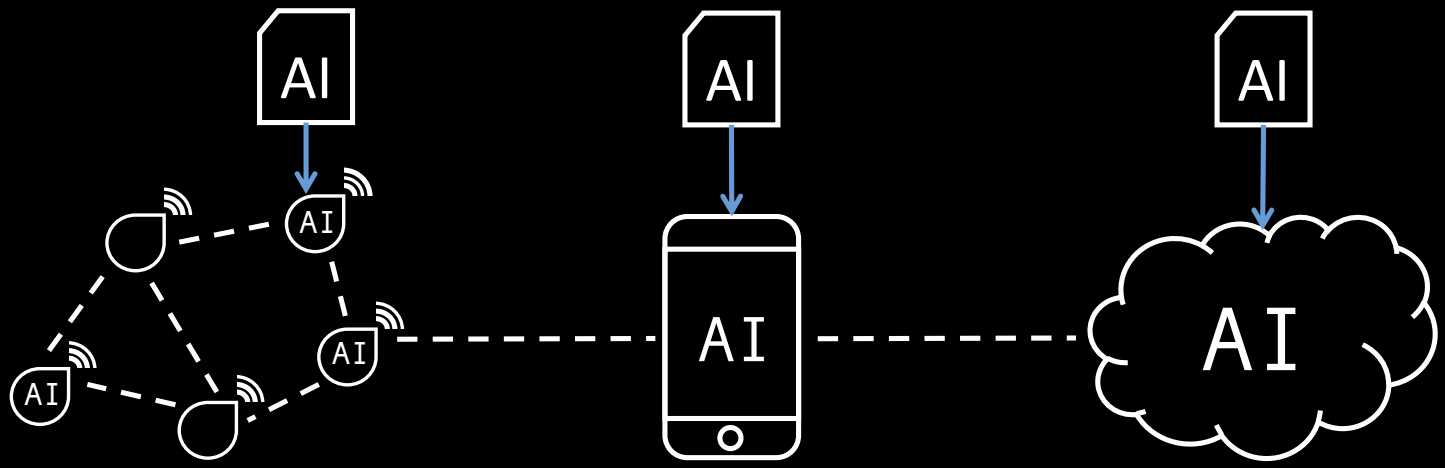
Unsupervised learning

Source: Everybody can Dance Now, UC Berkeley, https://www.youtube.com/watch?v=PCBTZh41Ris&feature=youtu.be&t=2m13s

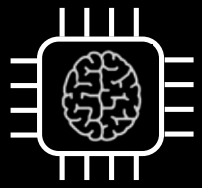
Deep learning

- Supervised learning
  - Pattern recognition, if enough data, the neural net can learn the pattern
- Reinforcement learning
  - Learning goal-oriented behaviors from trial and error
- Unsupervised learning
  - Learning structure of the world w/o explicit supervision

AI machines

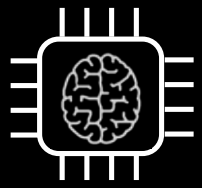


IoT



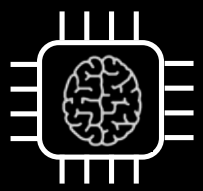
SqueezeNet

mobile



A11 [Apple]

cloud



GPU [NVidia]

SyNAPSE [IBM]

TPU [Google]

NNP [Intel/FaceBook]

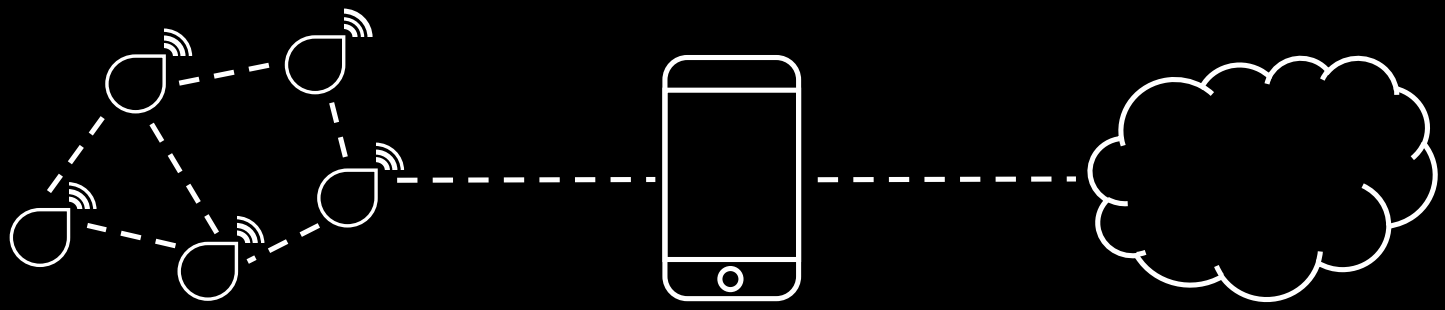
T R E N D S

AI – why now?

- Data
- Computing
- AI expertise

AI trends

3. The world is machine readable
2. Human behavior is machine readable
1. Information is machine readable



IoT mobile cloud

AI trends

- Robots with eyes
- Teachable robots
- Shared learning
- Explainable AI


Thank you