AI, individen och samhället

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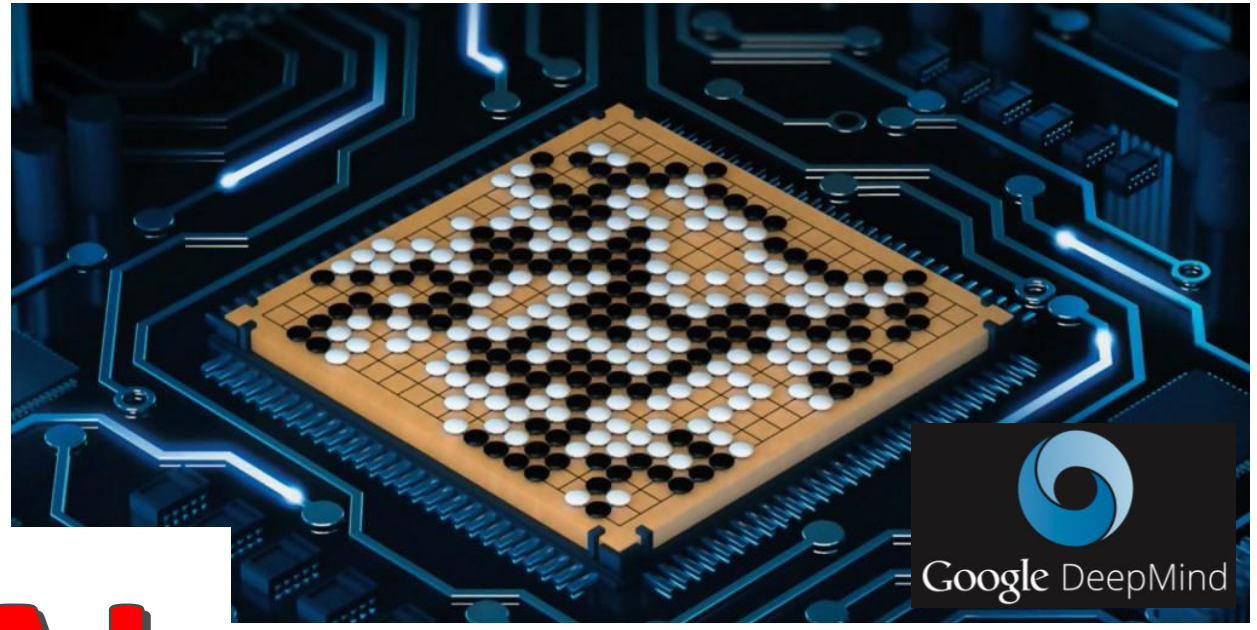
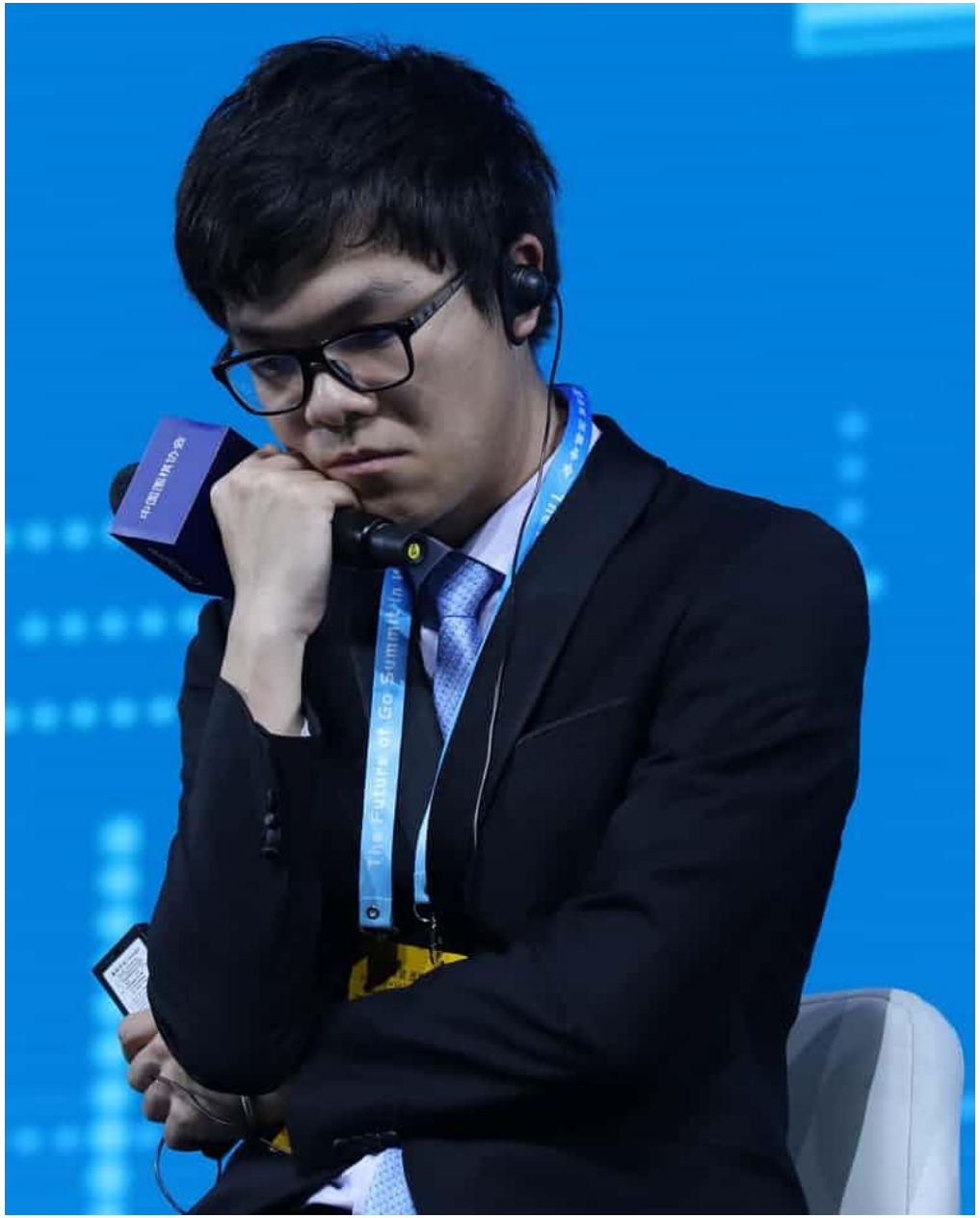

Google DeepMind

AI


THINK
$300,000
$1,000,000
$200,000
KEN
WATSON
BRAD


BostonDynamics
Boston Dynamics

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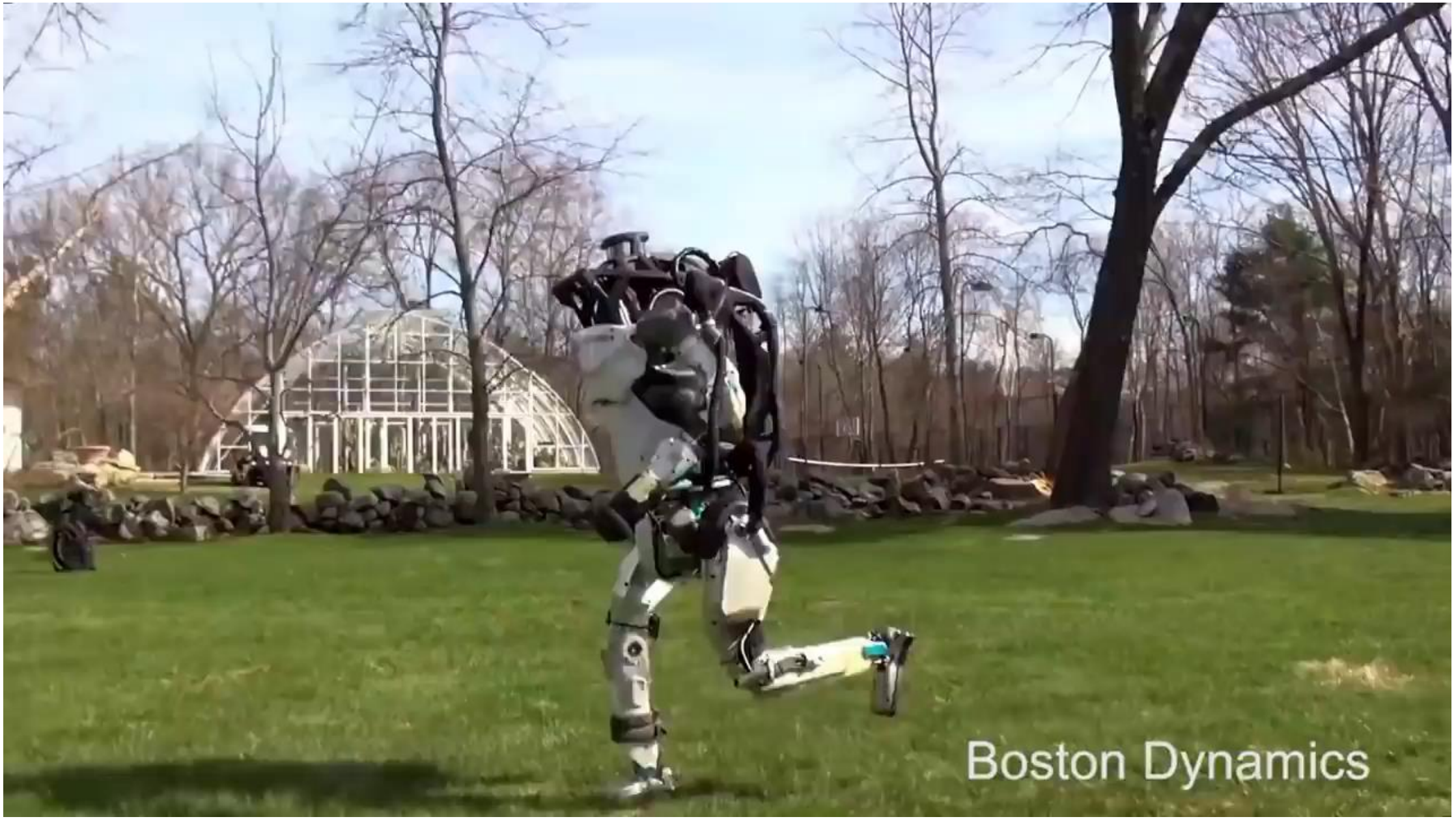
Boston Dynamics


CLICK
BBC
NEWS
WH
.GOV


CNBC

Evolution of Self-Driving Cars

Feet Off

Hands Off

Eyes Off

Mind Off

2000

2015

2018

>2020

Autoliv

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From Horse to Car

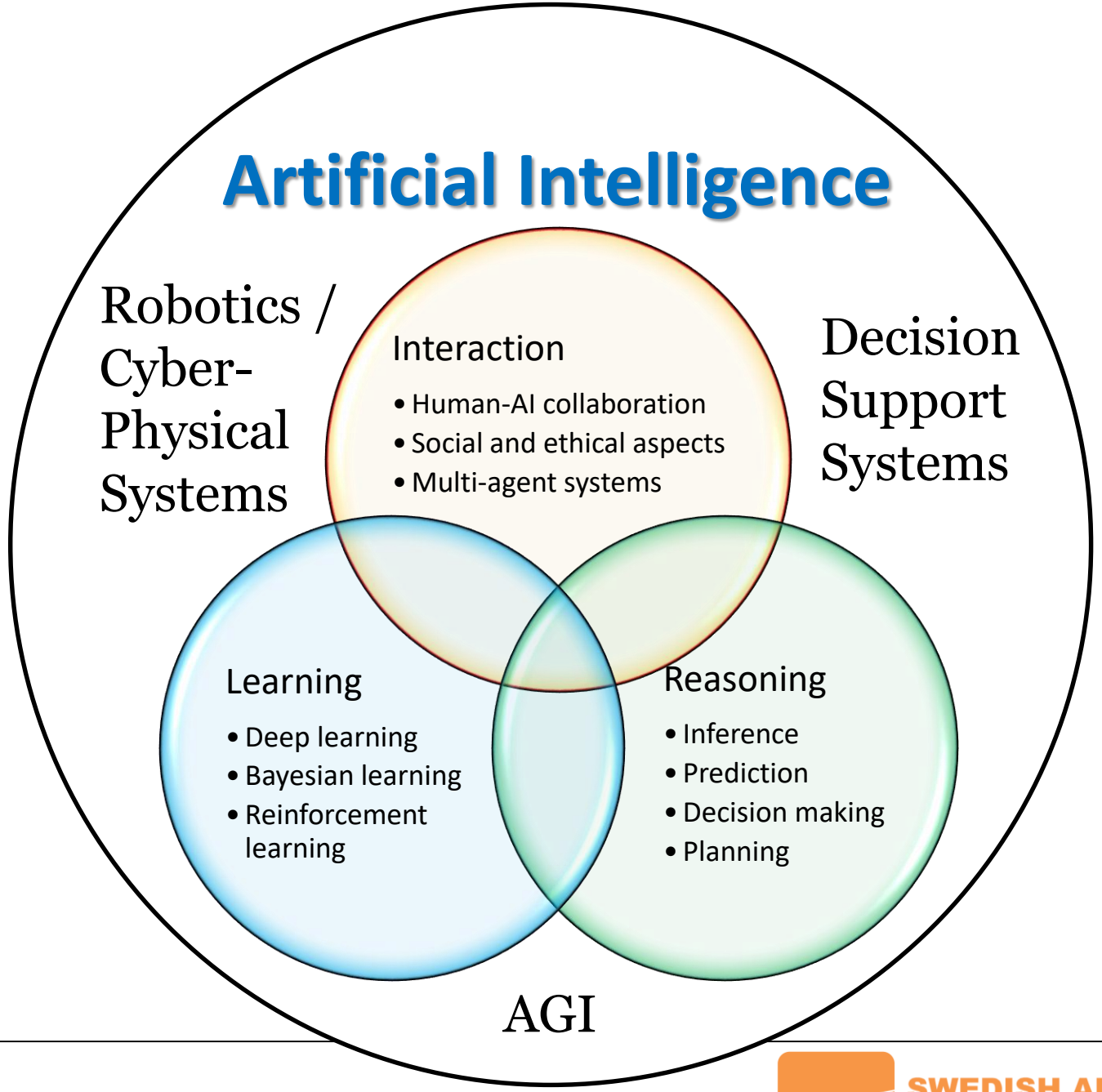
1900

1913

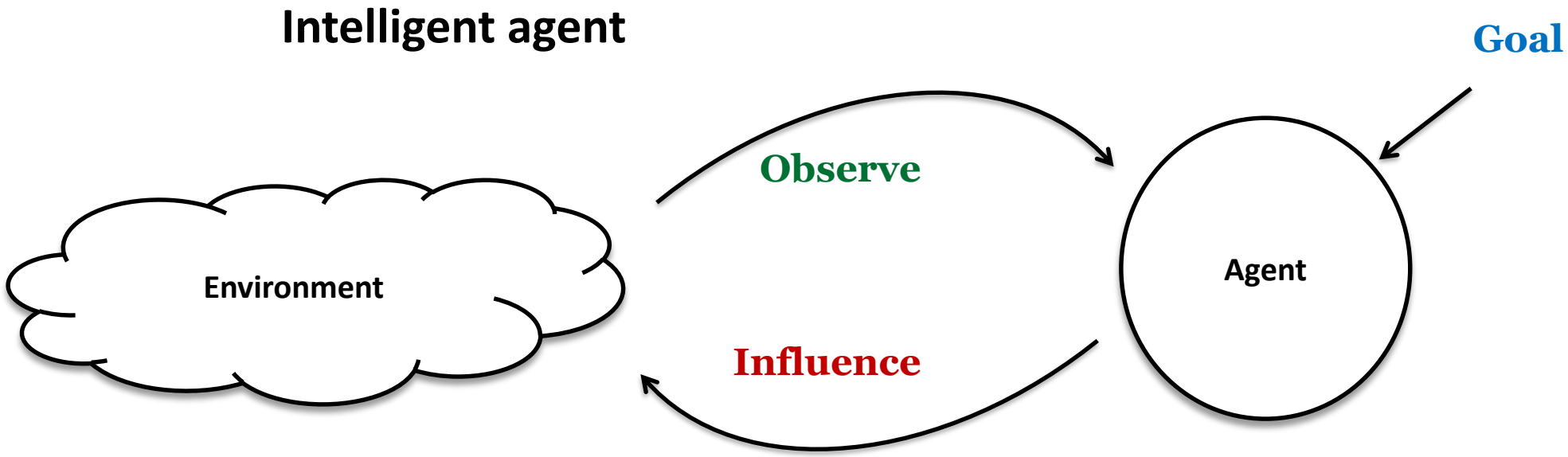
"**Artificial Intelligence** is the **science** and **engineering** of **making intelligent machines**, especially intelligent computer programs." John McCarthy, Stanford

"Artificial intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals."

EU Communication 25 April 2018



What is AI?

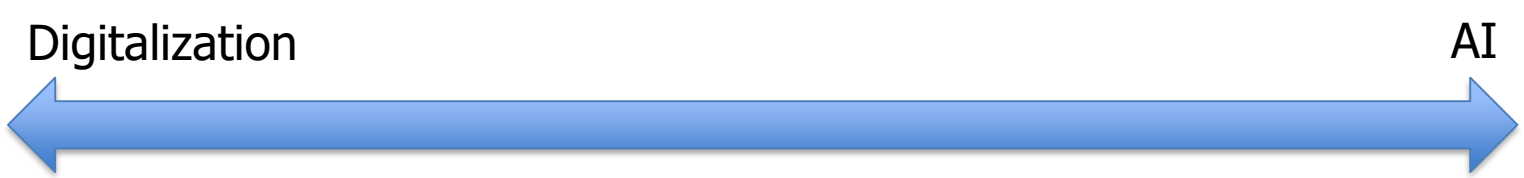

Intelligent agent
Goal
Observe
Environment
Agent
Influence

Digitalization, Big Data and AI

Digitalization first wave

Big Data second wave

AI third wave



Well defined problems
Predictable situations
Structured data
General solutions
Rationalizes
Evolutionary
...

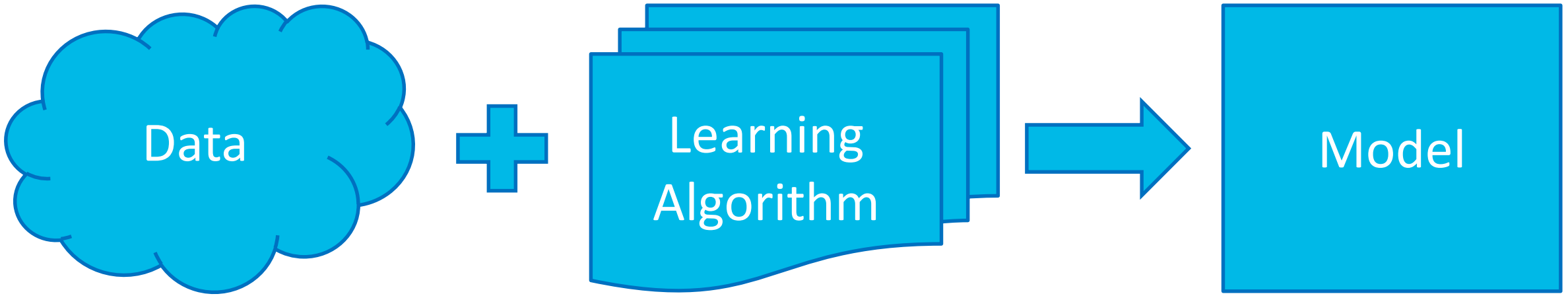
Hard to define problems
Unanticipated situations
Unstructured data
Adaptable solutions
Amplifies
Revolutionary
...

Supervised learning

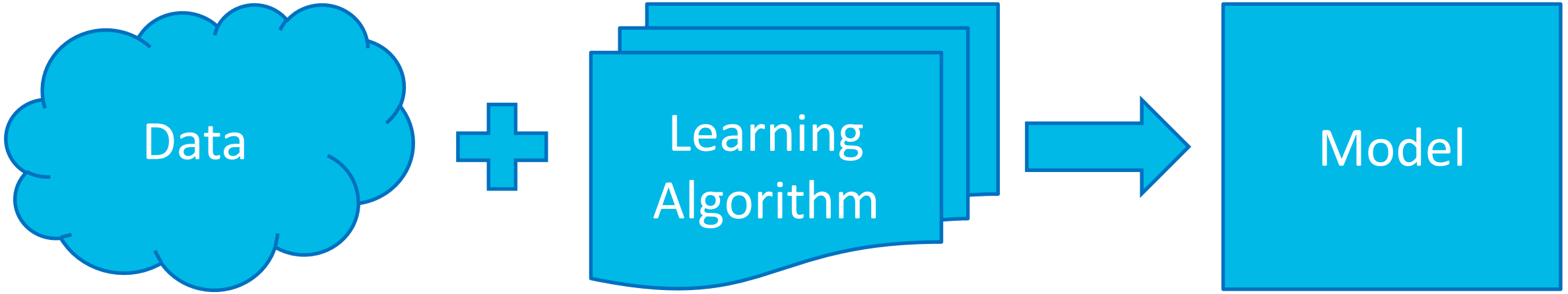
T. Mitchell, M. Jordan:
“Most of the recent progress in machine learning involves mapping from a set of inputs to a set of outputs.”

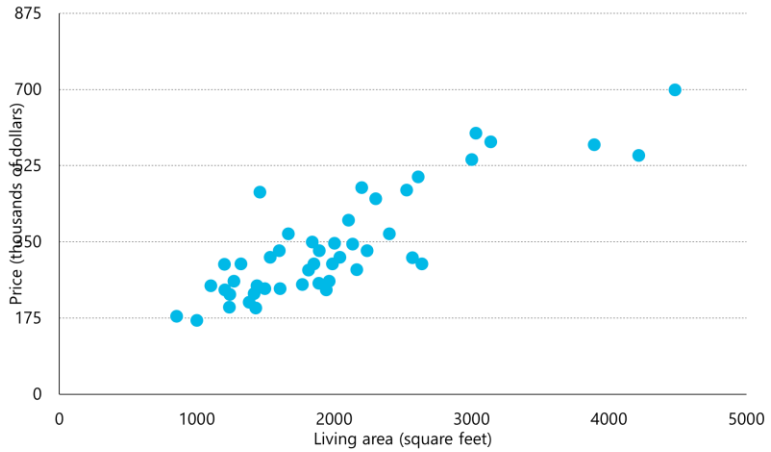
INPUT X	OUTPUT Y	APPLICATION
Voice recording	Transcript	Speech recognition
Historical market data	Future market data	Trading bots
Photograph	Caption	Image tagging
Drug chemical properties	Treatment efficacy	Pharma R&D
Store transaction details	Is the transaction fraudulent?	Fraud detection
Recipe ingredients	Customer reviews	Food recommendations
Purchase histories	Future purchase behavior	Customer retention
Car locations and speed	Traffic flow	Traffic lights
Faces	Names	Face recognition

Machine Learning



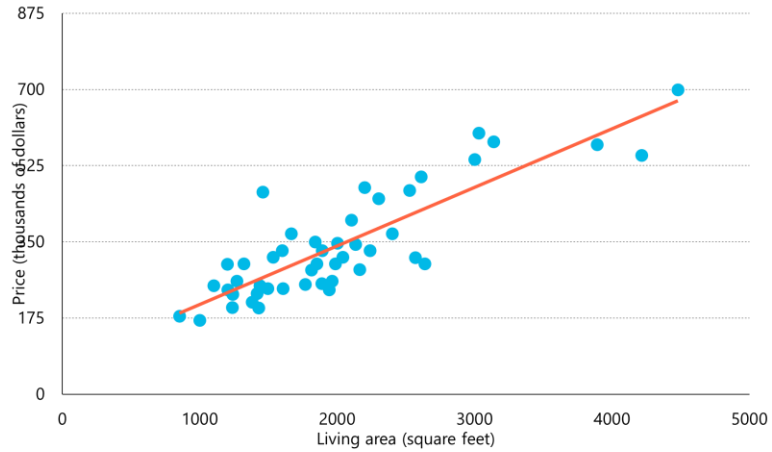
Machine Learning



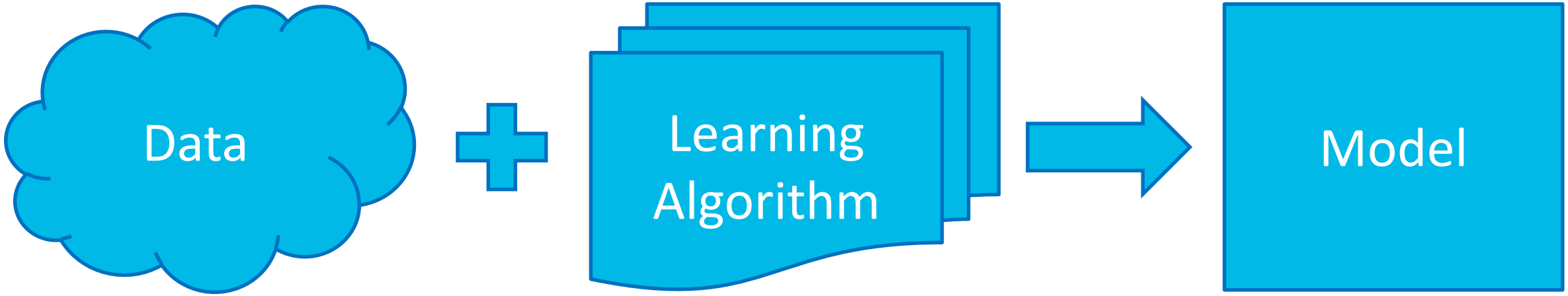


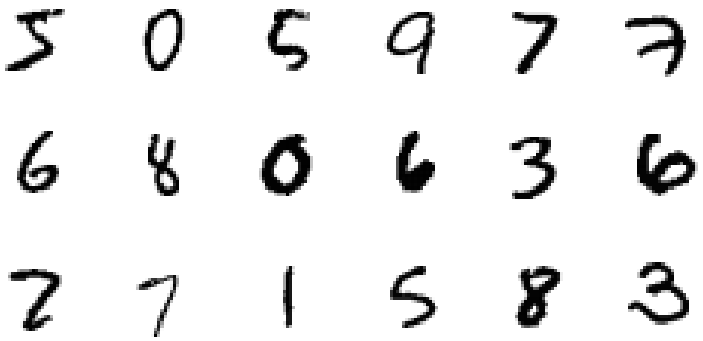
Linear regression

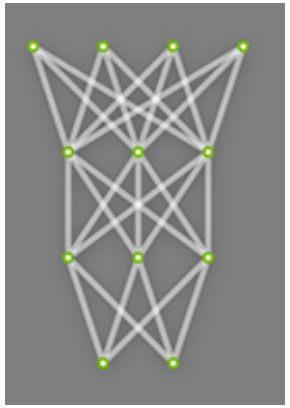
$$\hat{y} = \boldsymbol{x}\boldsymbol{\theta}$$



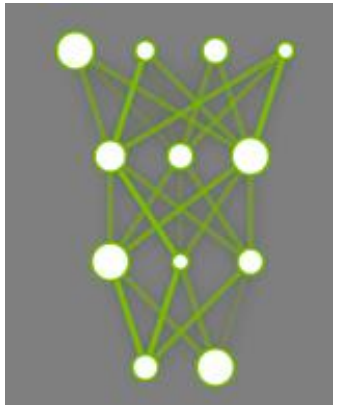
Machine Learning



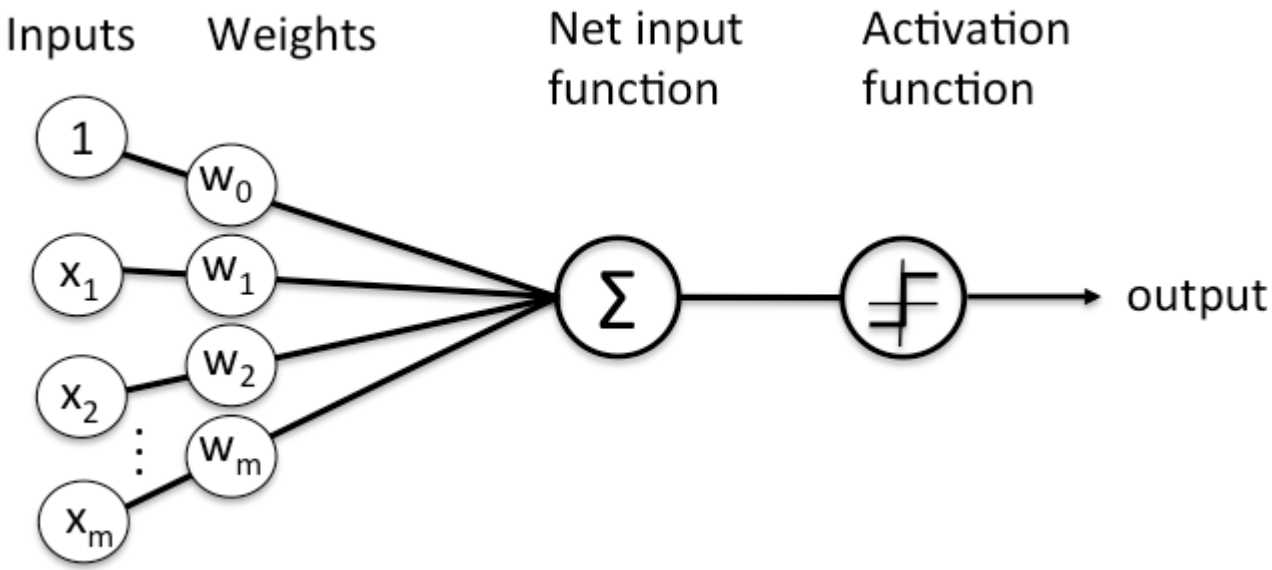


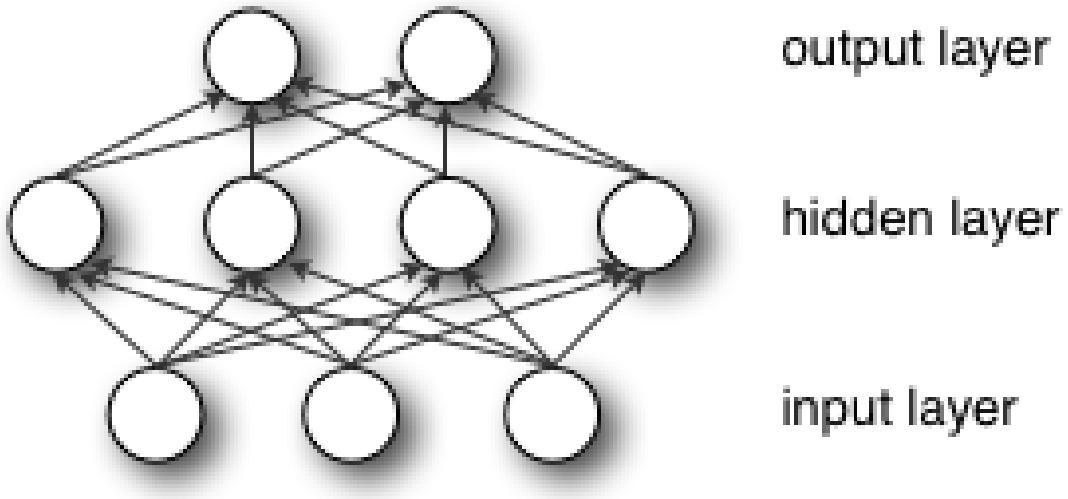


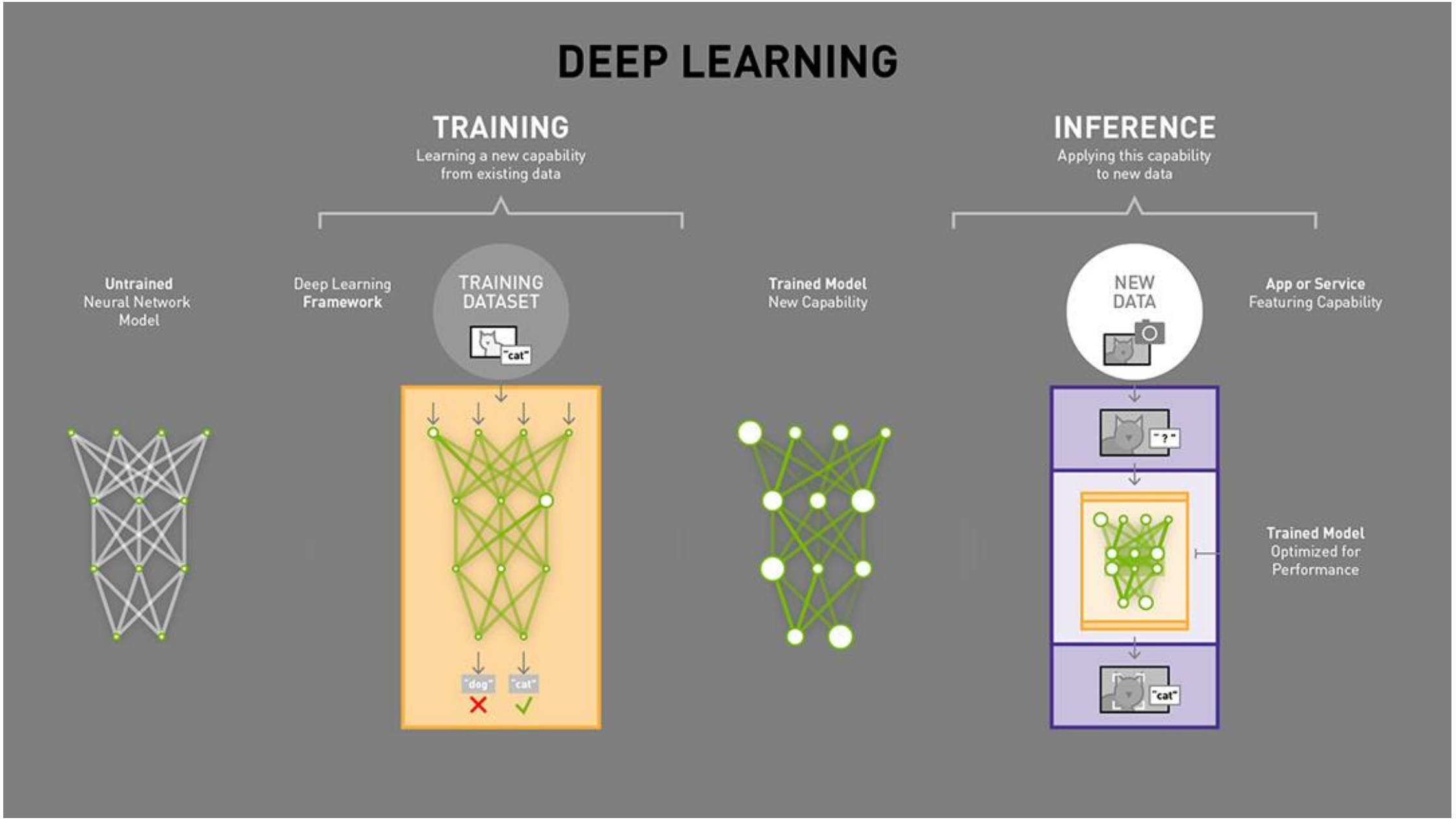
Neural network (Gradient Descent)



Neural Networks

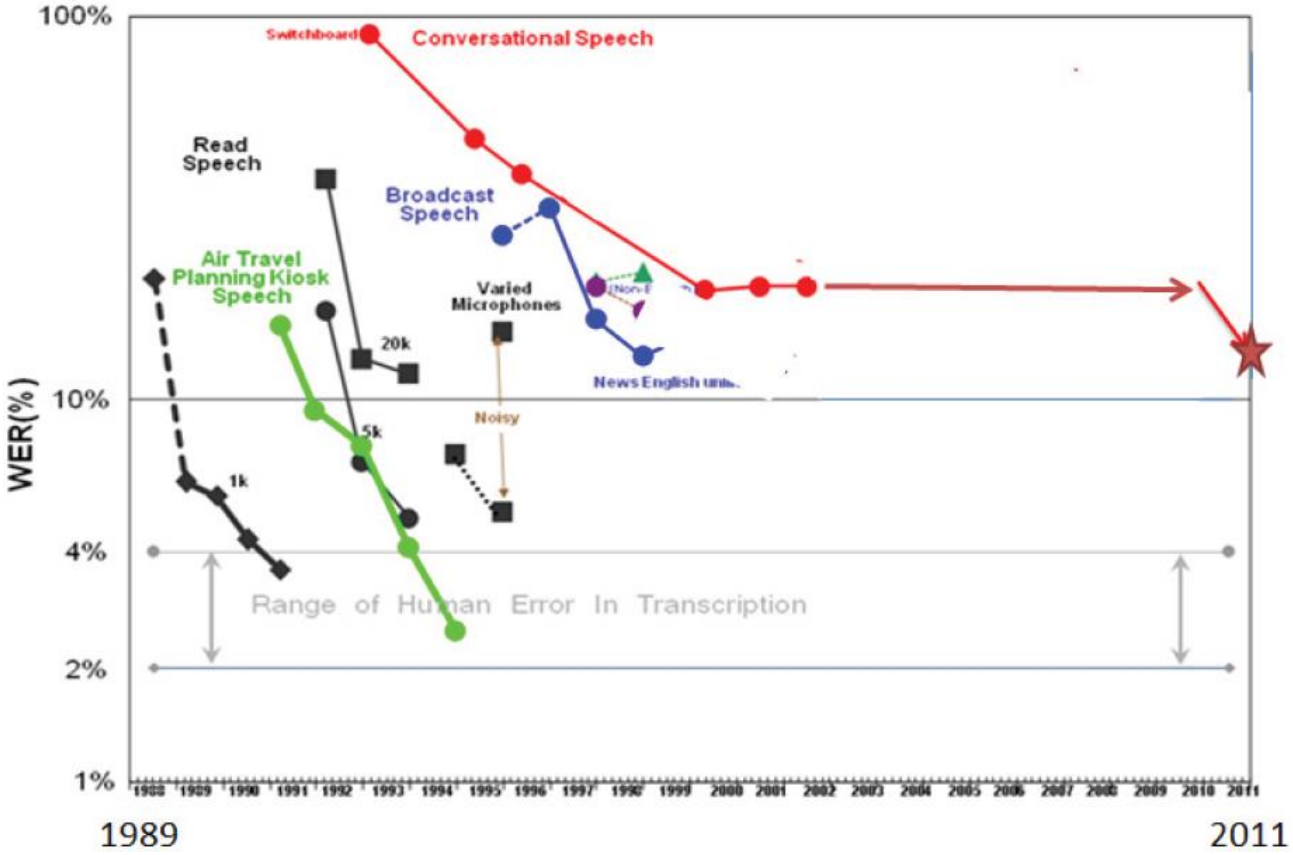


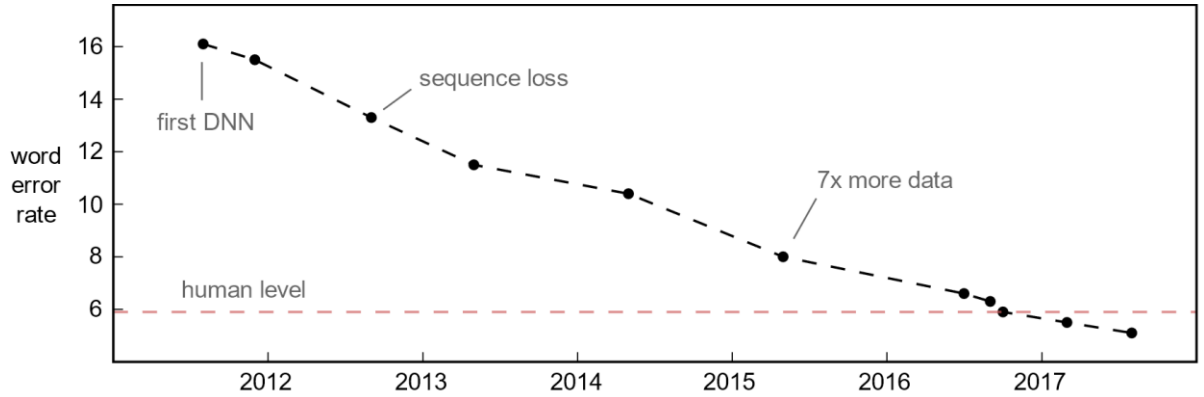




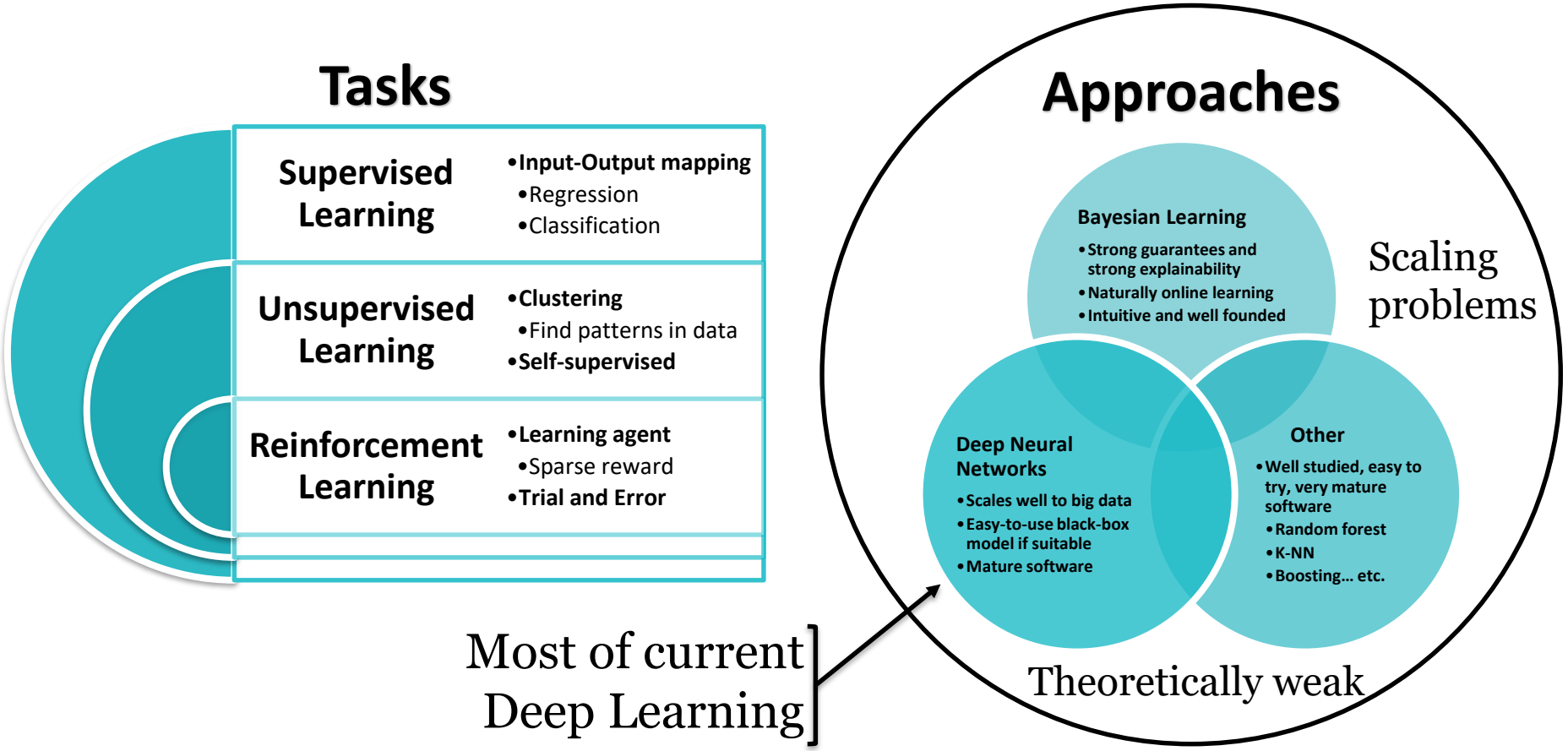
https://blogs.nvidia.com/blog/2016/08/22/difference-deep-learning-training-inference-ai/

Speech Recognition





Machine Learning, ML



Stanford Algorithm Can Diagnose Pneumonia Better Than Radiologists

By Tekla S. Perry
Posted 17 Nov 2017 | 18:30 GMT

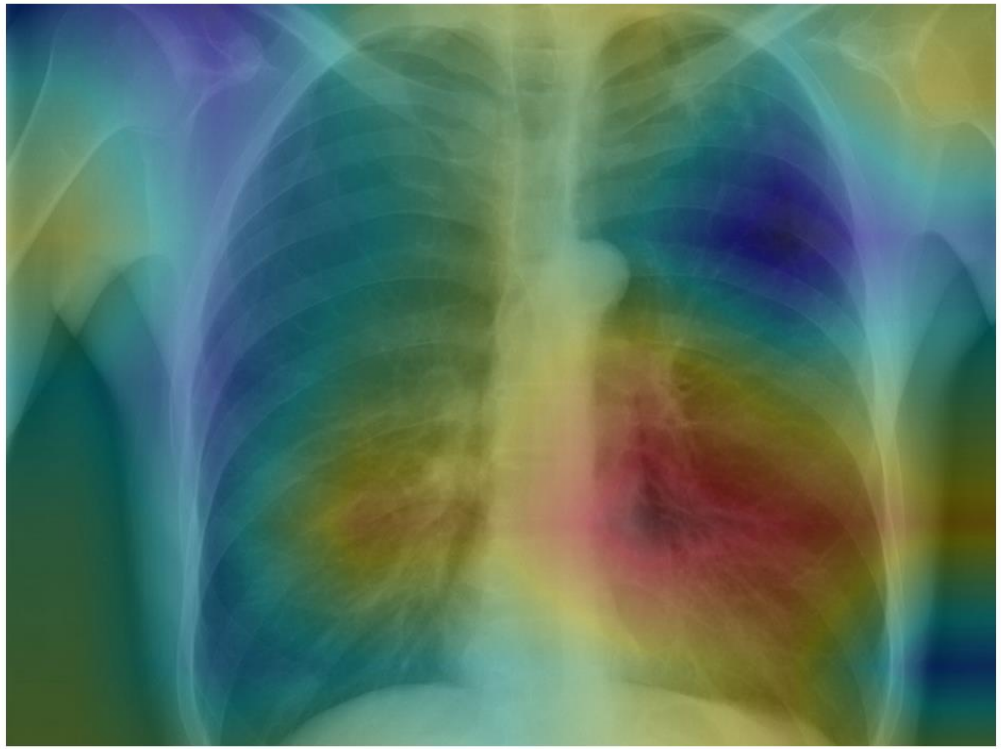


Photo: Stanford

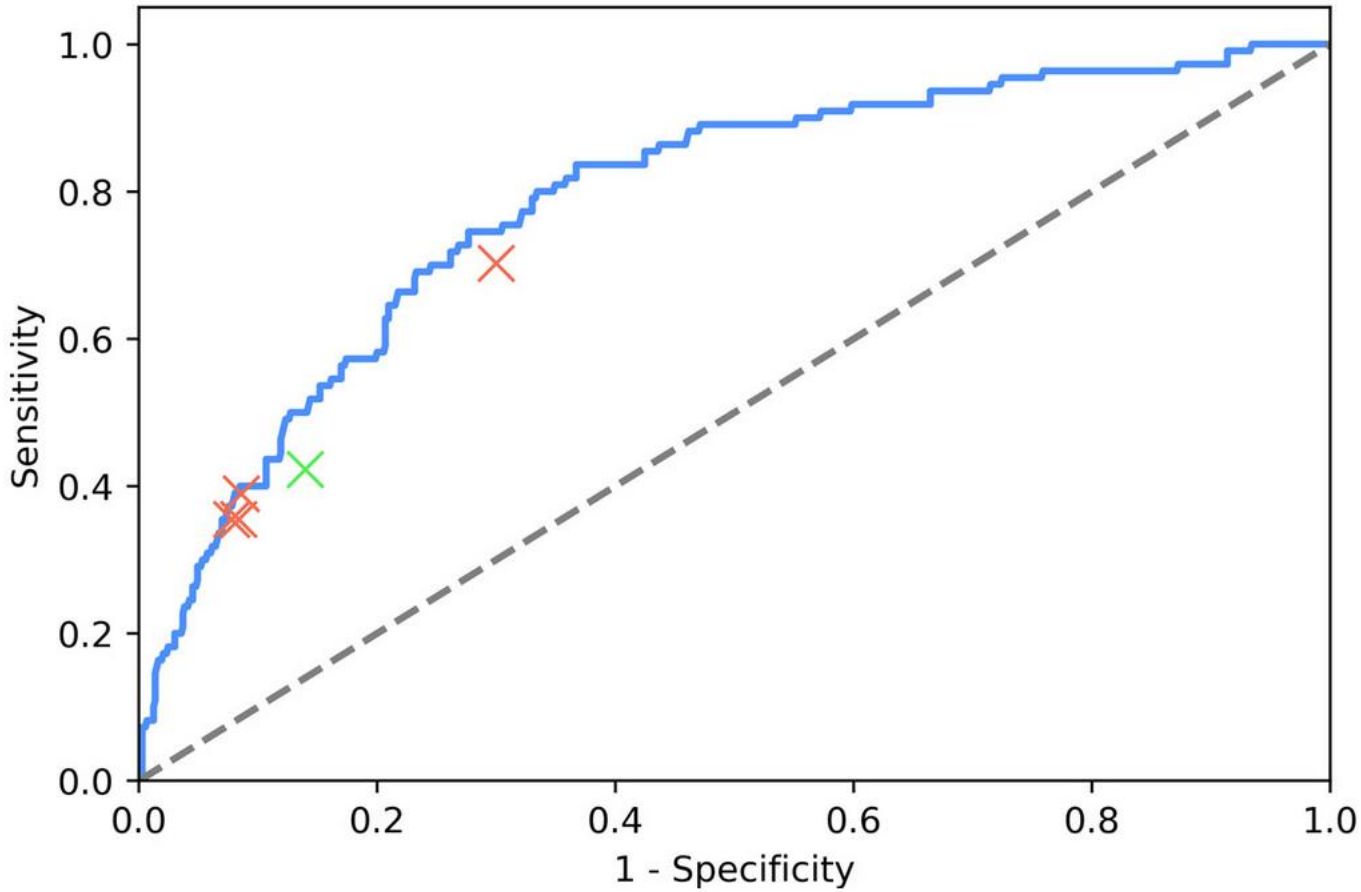


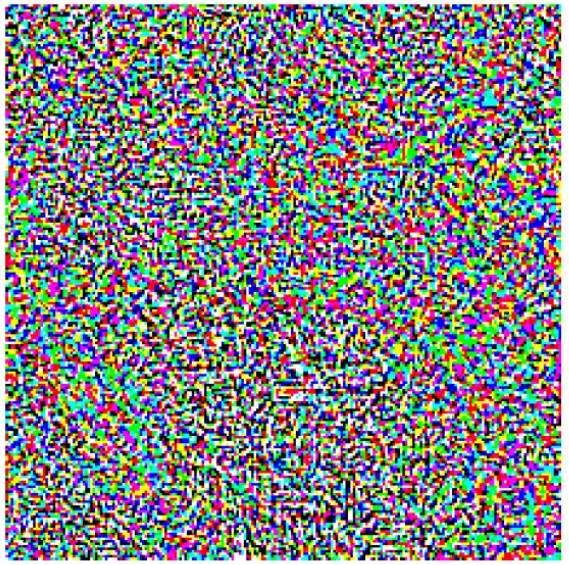
Image: Stanford

NIH released data set with 112 120 chest X-ray images with 14 labeled diagnoses.
4 Stanford radiologists annotated 420 images for indications of pneumonia.
After 1 month of training cheXNet outperformed all the radiologists.

https://spectrum.ieee.org/the-human-os/biomedical/diagnostics/stanford-algorithm-can-diagnose-pneumonia-better-than-radiologists
https://arxiv.org/abs/1711.05225

Machine learning is still brittle…

$+ .007 \times$



$=$

$\boldsymbol{x}$

"panda"
57.7% confidence

$\text{sign}(\nabla_{\boldsymbol{x}} J(\boldsymbol{\theta}, \boldsymbol{x}, y))$

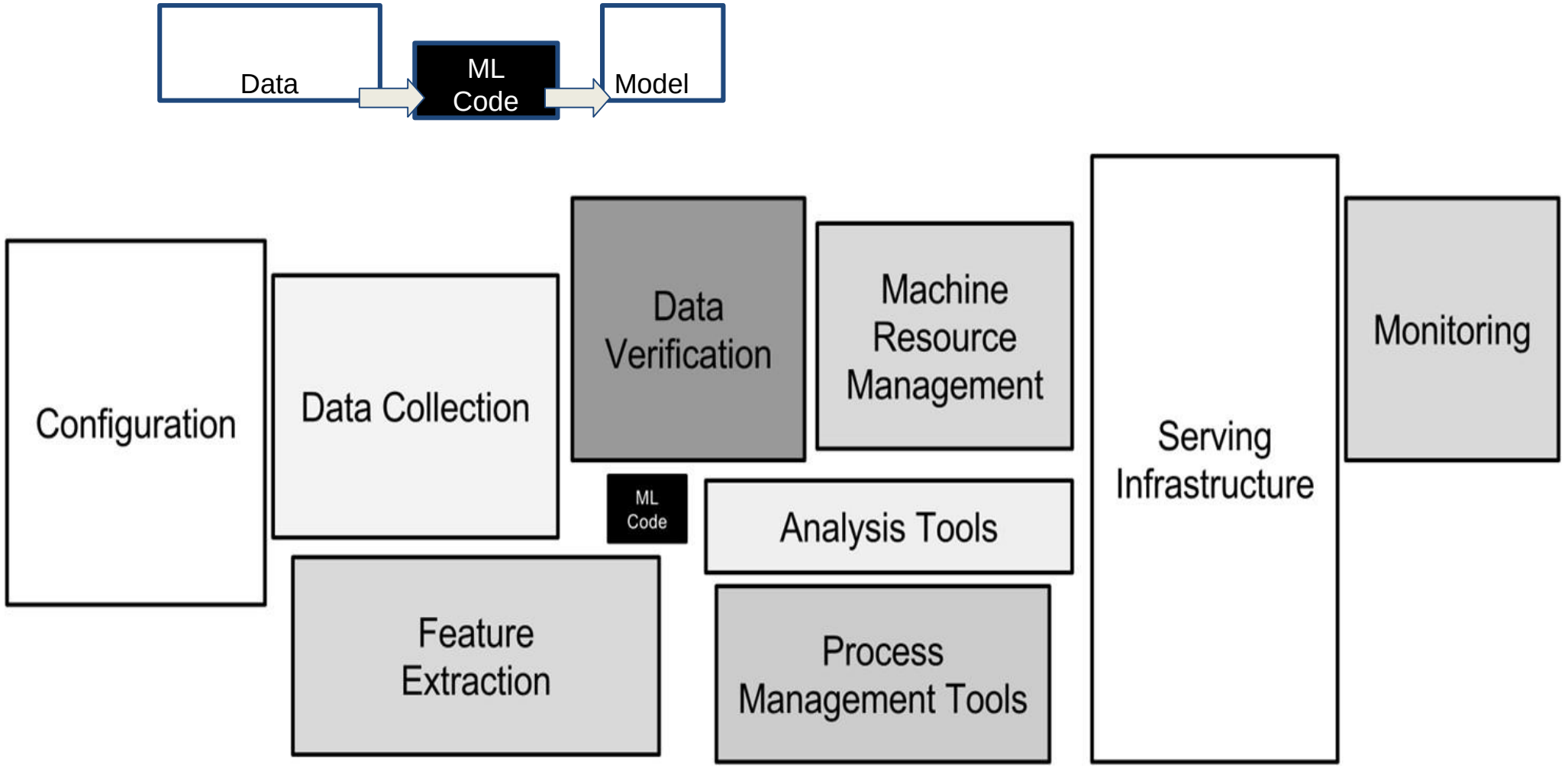
"nematode"
8.2% confidence

$\boldsymbol{x} + \epsilon \text{sign}(\nabla_{\boldsymbol{x}} J(\boldsymbol{\theta}, \boldsymbol{x}, y))$

"gibbon"
99.3 % confidence

Ian J. Goodfellow, Jonathon Shlens, Christian Szegedy. Explaining and Harnessing Adversarial Examples. ICLR 2015
https://arxiv.org/abs/1412.6572

The bigger system / picture

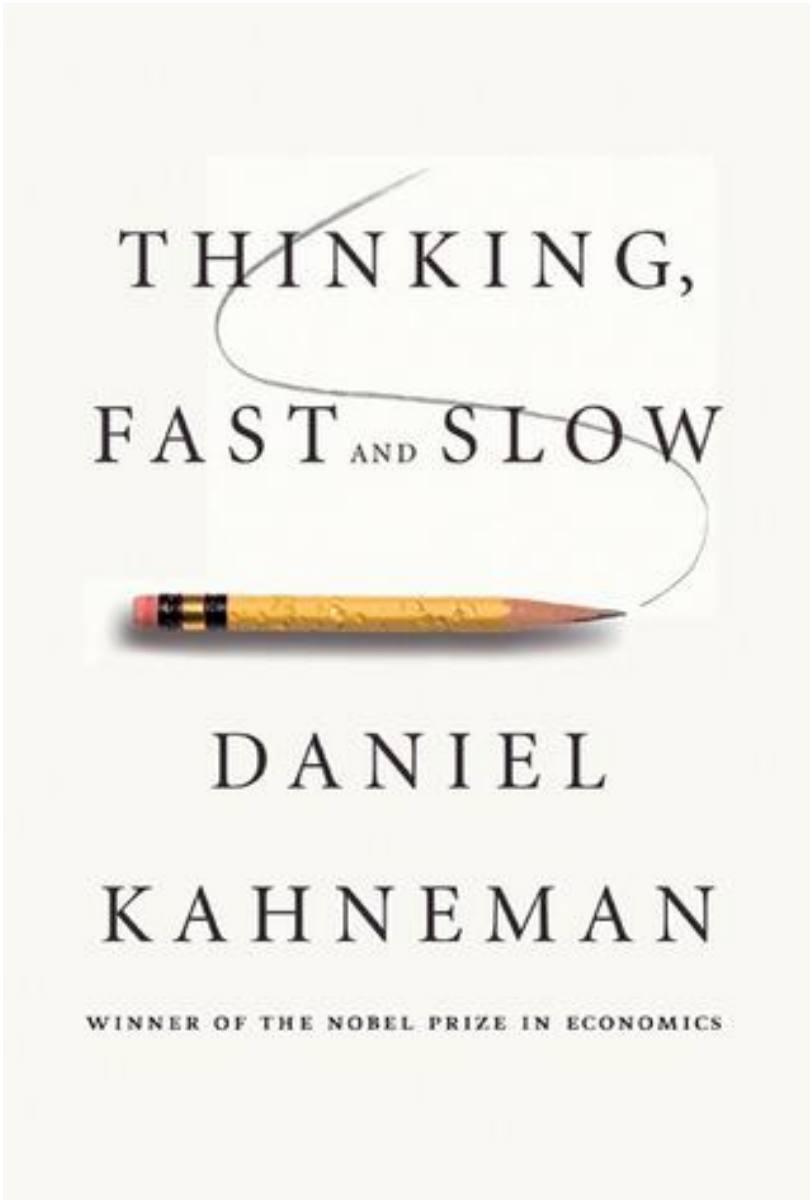


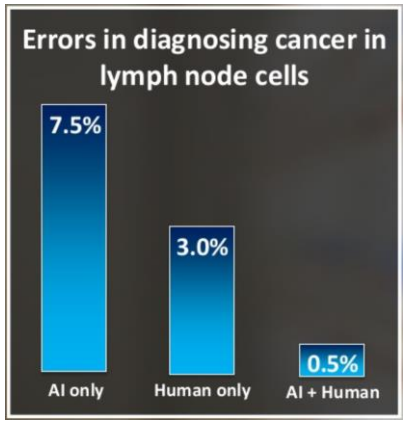
Hidden technical debt in Machine Learning Systems, Sculley et. al. (NIPS 2015)

Hybrid systems

Figure 1: A Comparison of System 1 and System 2 Thinking

System 1 "Fast"	System 2 "Slow"
DEFINING CHARACTERISTICS Unconscious Effortless Automatic	DEFINING CHARACTERISTICS Deliberate and conscious Effortful Controlled mental process
WITHOUT self-awareness or control	WITH self-awareness or control
"What you see is all there is."	Logical and skeptical
ROLE Assesses the situation Delivers updates	ROLE Seeks new/missing information Makes decisions





"Weak human + machine + superior process was greater than a strong computer and, remarkably, greater than a strong human + machine with inferior process."

Garry Kasparov

AI Sustainability Center, Stockholm launched Jan 2019

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http://www.aisustainability.org/

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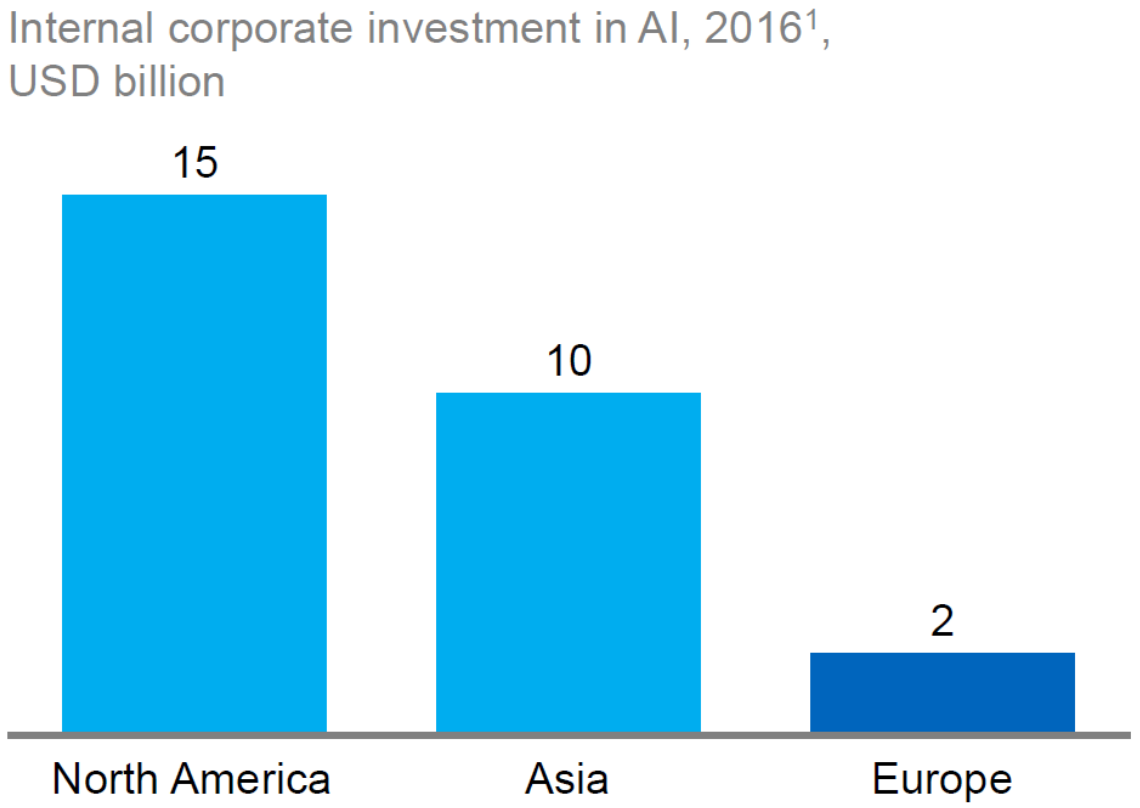
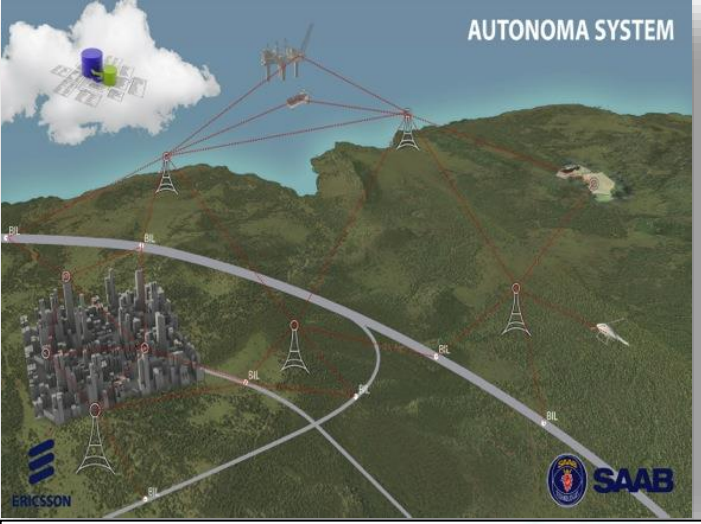
AI in Europe

- Low European investments in AI
- AI skills in short supply in Europe
- Industry digitalization in Europe low

European Commission is working towards 20 billion euros in AI investment per year. 3 billion EUR from the commission with the expectation of 6x from the private sector.





Wallenberg AI, Autonomous Systems and Software Program (WASP)

Ten year program 3500 MSEK

~350 million Euro

Extended 2017 with 1000 MSEK for AI.

AI/ML: Machine Learning, Deep Learning, eXplainable AI (XAI)

AI/Math: Theoretical questions related to AI in a wide sense

Research Program

The best researchers in the field

Graduate School

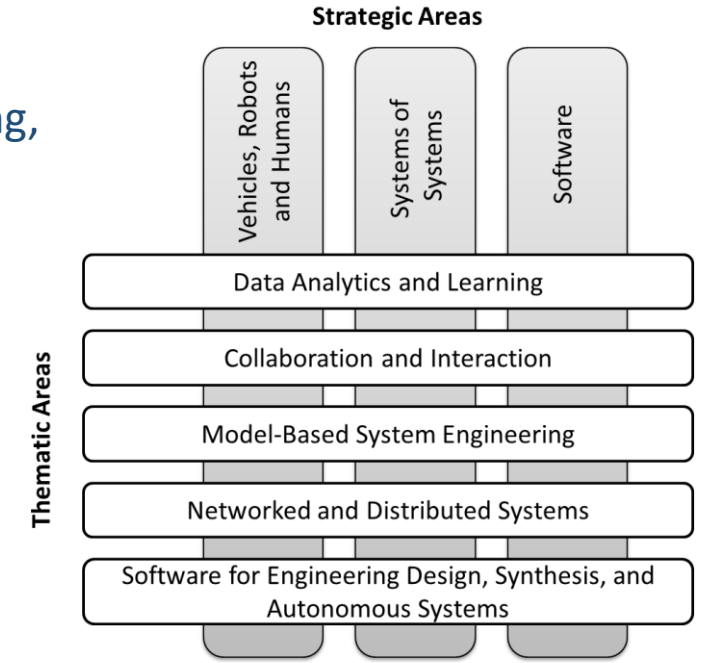
Ambitious program, Industrial PhDs

Demonstrator Arenas

Demonstrations with external parties

Recruitment Program

Internationally competitive offers



http://wasp-sweden.se/

CHALMERS UNIVERSITY OF TECHNOLOGY

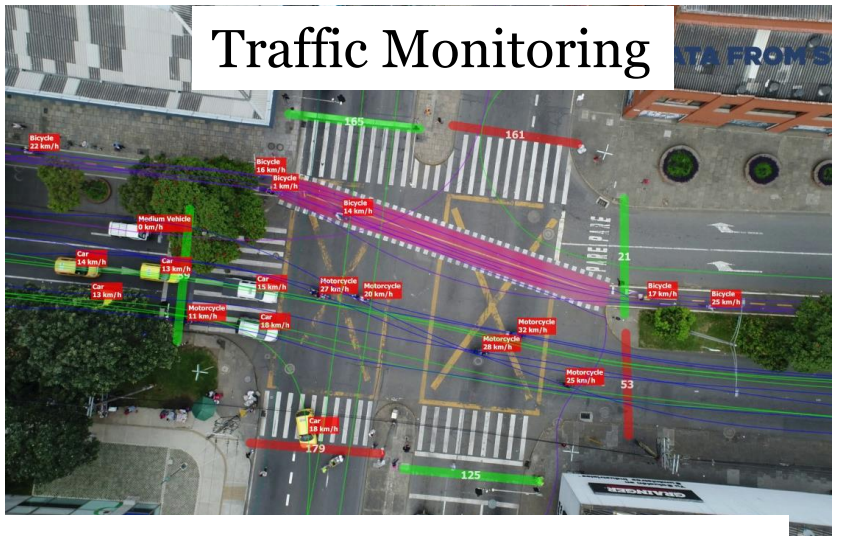
KTH VETENSKAP OCH KONST

LINKÖPINGS UNIVERSITET

LUNDS UNIVERSITET

UMEÅ UNIVERSITET

Research



Real-time sense and decision making through incremental learning and reasoning over streaming information

AI and Society

Robot styr försörjningsstöd i Trelleborg

I Trelleborgs kommun sköter inte längre handläggare de arbetssökandes ansökningar om försörjningsstöd, det gör istället en robot. Det nya initativet har lett till bättre medborgarservice och att de anställda på kommunen istället kan fokusera på att få folk i arbete.

TEXT FREDRIK ADOLFSSON | FOTO FREDRIK KRON | 12 JULI 2017 | DIGIT

Utmaning

- Anpassa arbetssätt efter modern syn på ekonomiskt bistånd.
- Ökade krav på tillgänglighet och snabb handläggning.
- Efterfrågan på smidiga e-tjänster från förvaltning och medborgare.

Lösning

- Omorganisation och förenklade rutiner.
- Digitalisering av arbetsprocessen gällande ekonomiskt bistånd.
- Medborgartjänster kopplade till verksamhetssystemet Procapita.

Resultat

- Mindre väntan för den sökande.
- Frigjorda resurser för verksamheten.
- Starkare fokus på arbetsmarknadsprocessen.

TRELLEBORGS KOMMUN

- Sveriges sydligaste kommun, har drygt 43 000 invånare.
- Cirka 4 000 anställda i kommunen. Arbetslöshet 8,4 procent.
- Mellan 400 och 500 hushåll ansöker om försörjningsstöd varje månad.

https://www.tieto.se/sites/default/files/atoms/files/trelleborg_low.pdf

THE FUTURE OF EMPLOYMENT: HOW SUSCEPTIBLE ARE JOBS TO COMPUTERISATION?*

Carl Benedikt Frey† and Michael A. Osborne‡

September 17, 2013

Abstract

We examine how susceptible jobs are to computerisation. To assess this, we begin by implementing a novel methodology to estimate the probability of computerisation for 702 detailed occupations, using a Gaussian process classifier. Based on these estimates, we examine expected impacts of future computerisation on US labour market outcomes, with the primary objective of analysing the number of jobs at risk and the relationship between an occupation's probability of computerisation, wages and educational attainment. According to our estimates, about 47 percent of total US employment is at risk. We further provide evidence that wages and educational attainment exhibit a strong negative relationship with an occupation's probability of computerisation.

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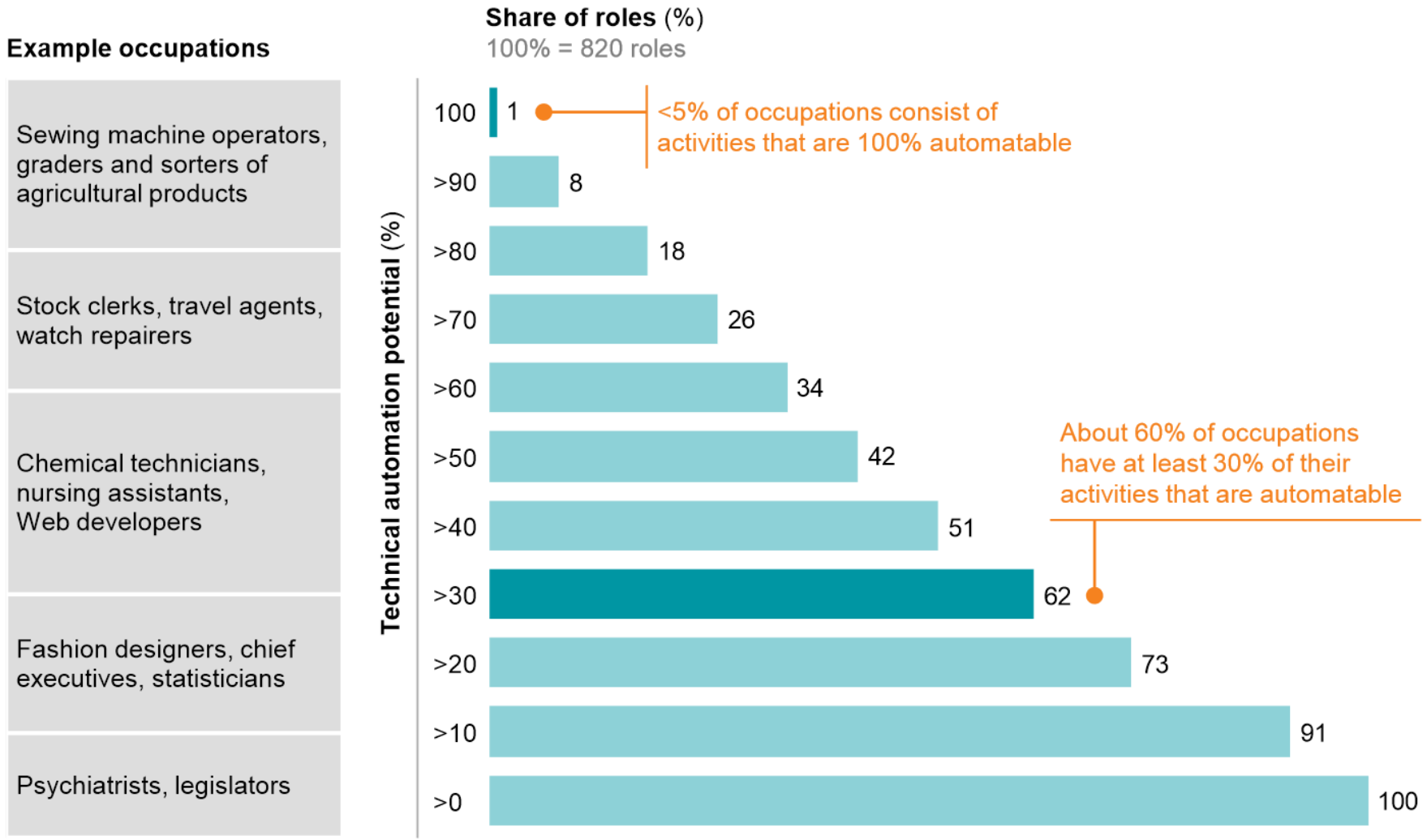
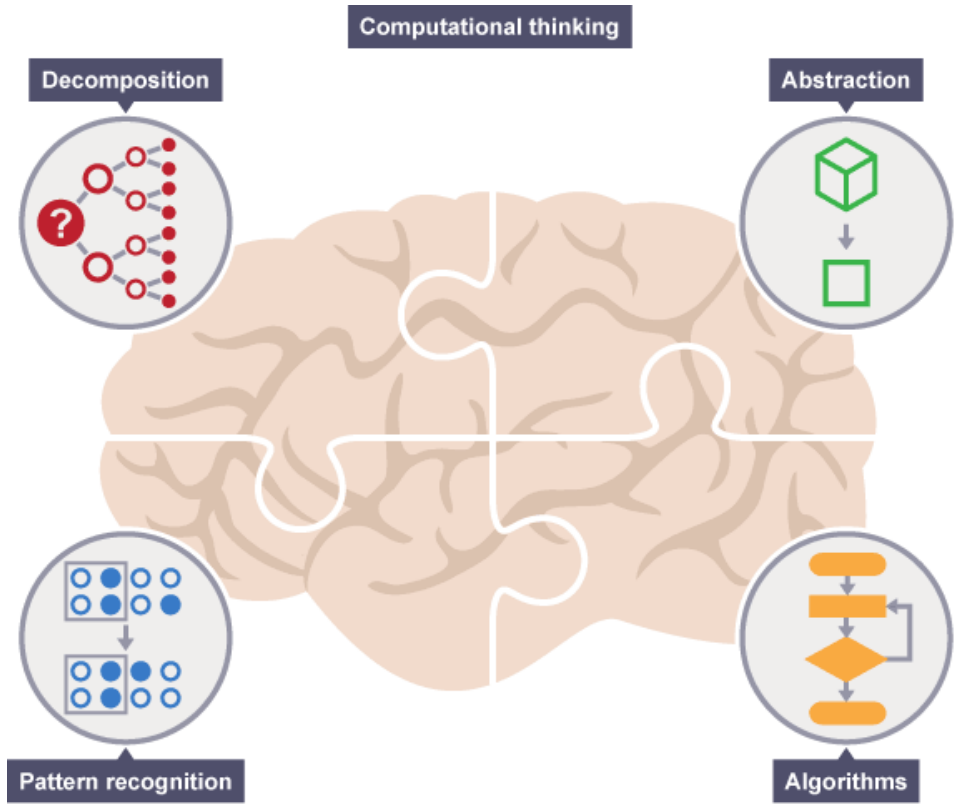
Automation potential based on demonstrated technology of occupation titles in the United States (cumulative)[1]



1 We define automation potential according to the work activities that can be automated by adapting currently demonstrated technology.

SOURCE: US Bureau of Labor Statistics; McKinsey Global Institute analysis

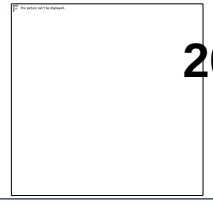


Digital Competence

Computational Thinking

AI Sverige – Regeringens AI-kompetenssatsning

Regeringen



20 mnkr 2018 (motsv beräknat 2019)

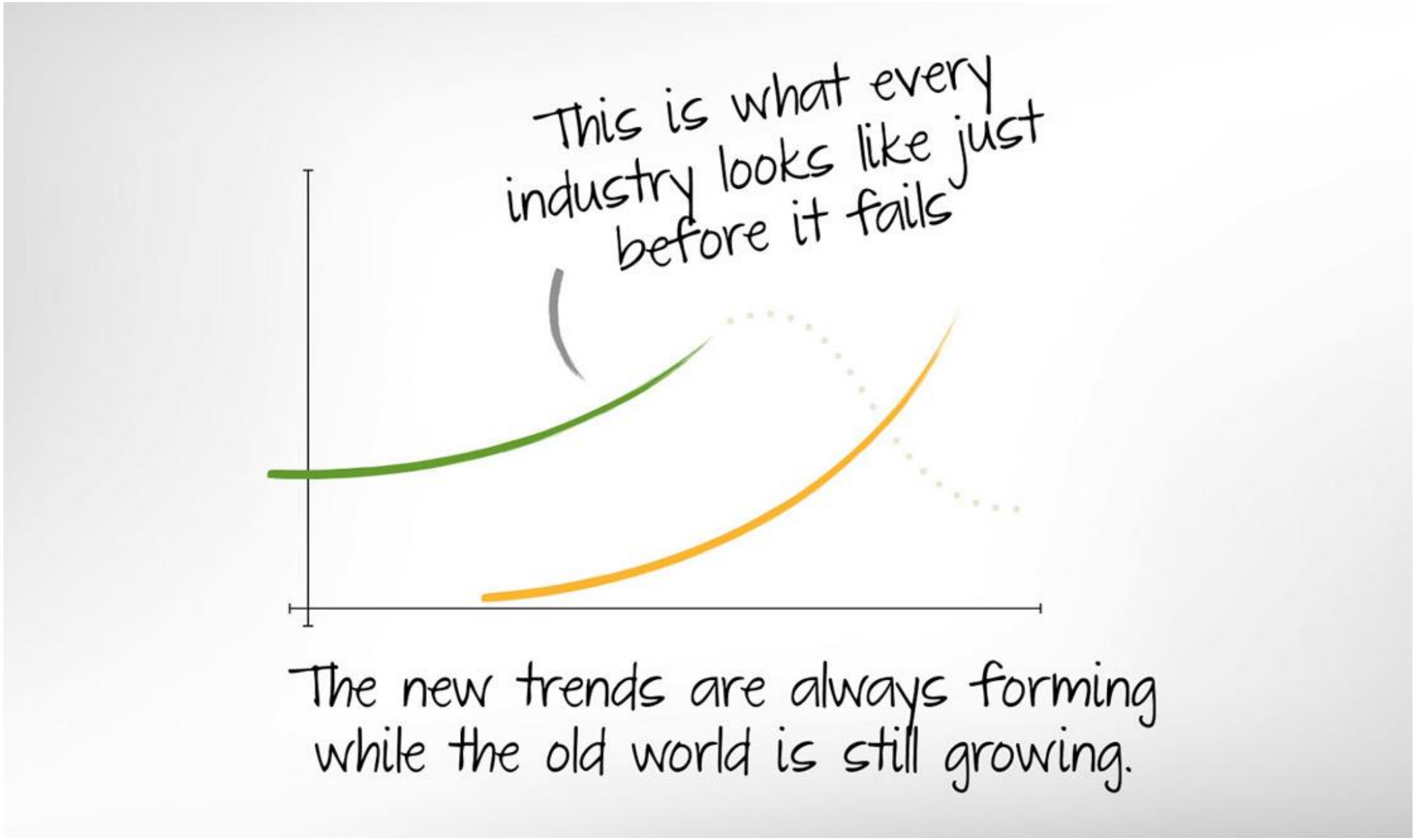
CTH, LU, GU, LiU, OrU, KTH, UmU

Syfte främja fördjupad kunskap om artificiell intelligens inom både näringsliv och offentlig sektor för stärkt konkurrenskraft och utvecklad välfärd.

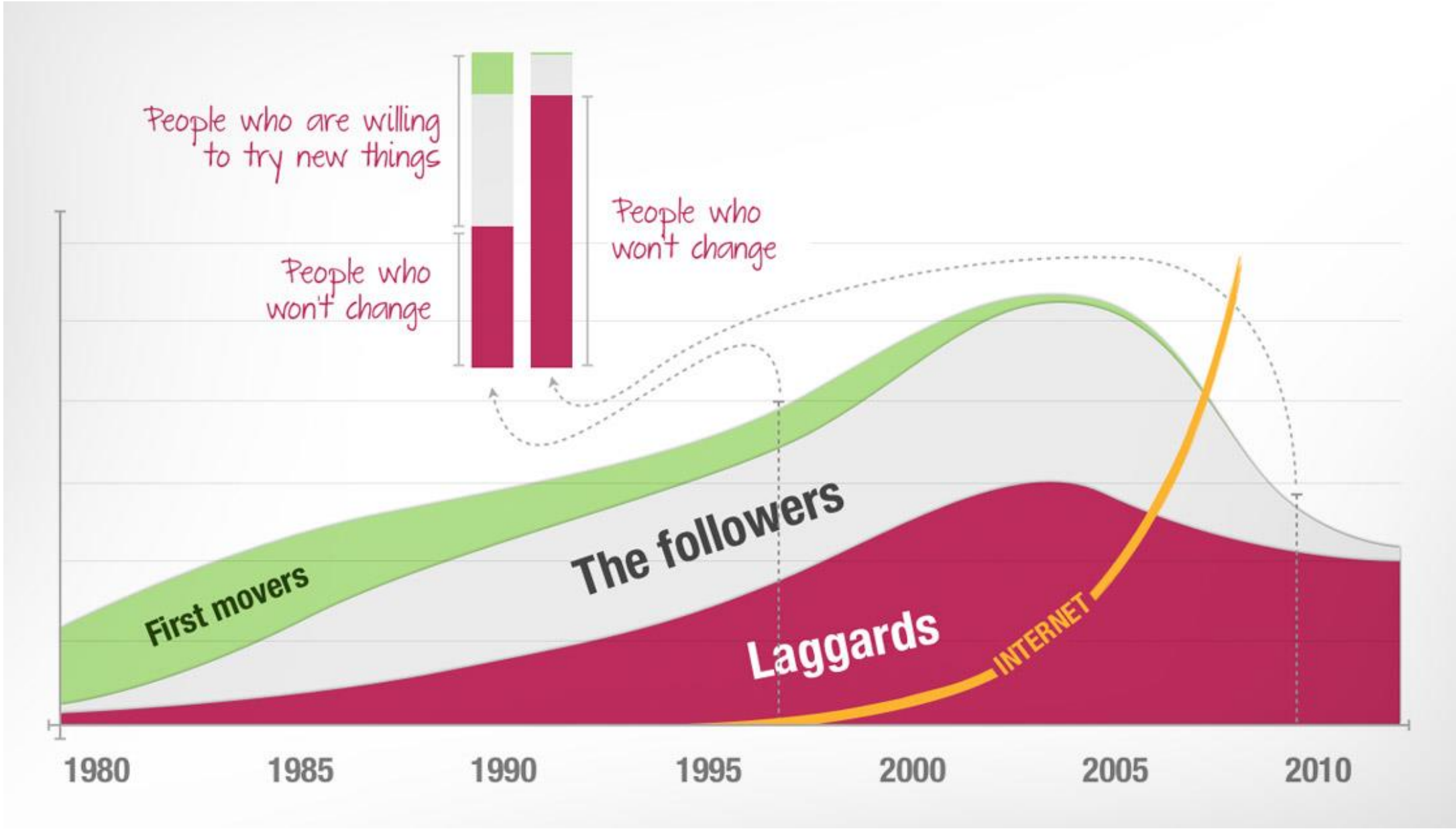
Kunskapsplattform (5 mnkr)	Kompetensutvecklingsinsats (15 mnkr)

How to learn more about AI?

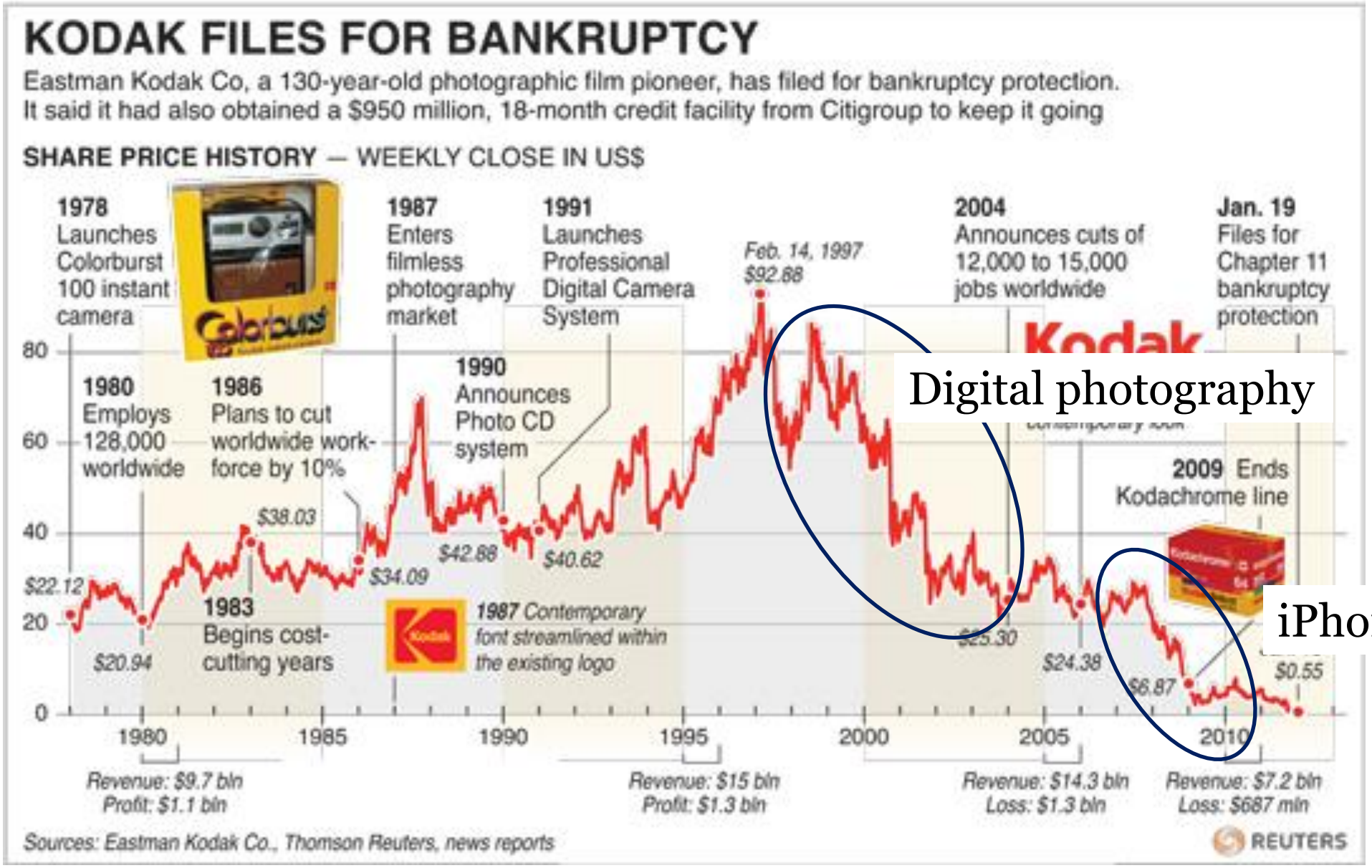
- Watch some overview presentations and read some popular science pieces
- Take an overview online course, e.g. https://www.elementsofai.com/
- Take a more technical online course and do some programming/problem solving, e.g. https://developers.google.com/machine-learning/crash-course/
- Take a real problem from your organization and try to solve it using AI-techniques
- Take a technical course, either online or at a university
- Build real solutions



https://www.baekdal.com/trends/understanding-change-and-predicting-trends/



https://www.baekdal.com/trends/understanding-change-and-predicting-trends/



http://www.fpa-trends.com/article/how-manage-forecasting-risk

Take Away Message

- AI is about understanding intelligence and develop systems that exhibit intelligent behavior.
- AI will affect all aspects of our society, including jobs.
- Education and life long learning will be absolutely necessary.
- Recommendations
  - **Learn** more! Experiment!
  - **Do** concrete projects on important topics.
  - **Scale up**.
- ***Digital tools on their own will only provide value when you learn how to use them effectively and adapt your organization to leverage them!***
- **Human + AI**

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