The Artificial Intelligence Revolution

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COMMISSION

Research & Innovation policy

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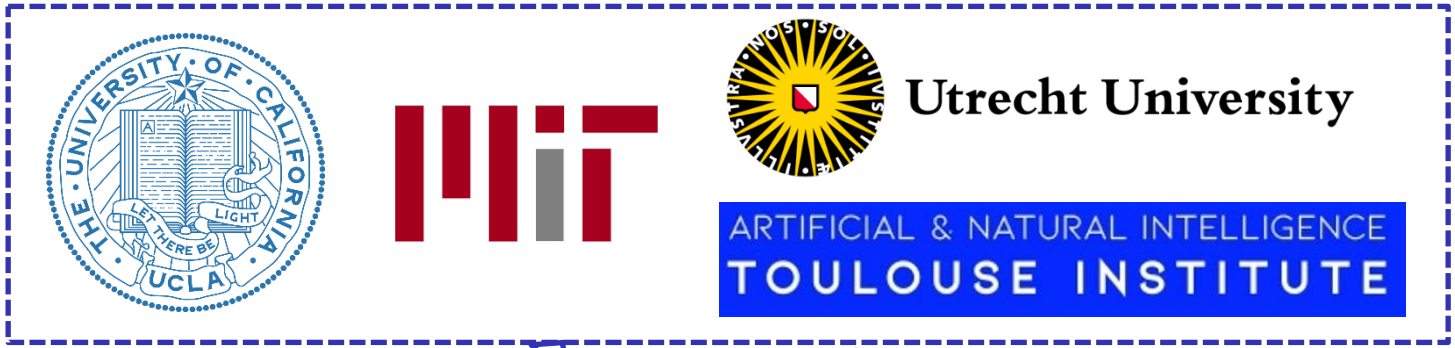

Research & Innovation policy

Smart investments recommendation systems

My mission for this class is to help you navigate our complex AI world

Navigating a complex AI world

- Gap between the **impact** AI has on your lives & your **understanding** of AI

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- How to benefit from AI: solve **real-world problems**

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- The **AI in books & movies** is not the AI to worship or worry about
- How to benefit from AI: solve **real-world problems**
- How to protect yourself from AI: pick the **skills** of the future

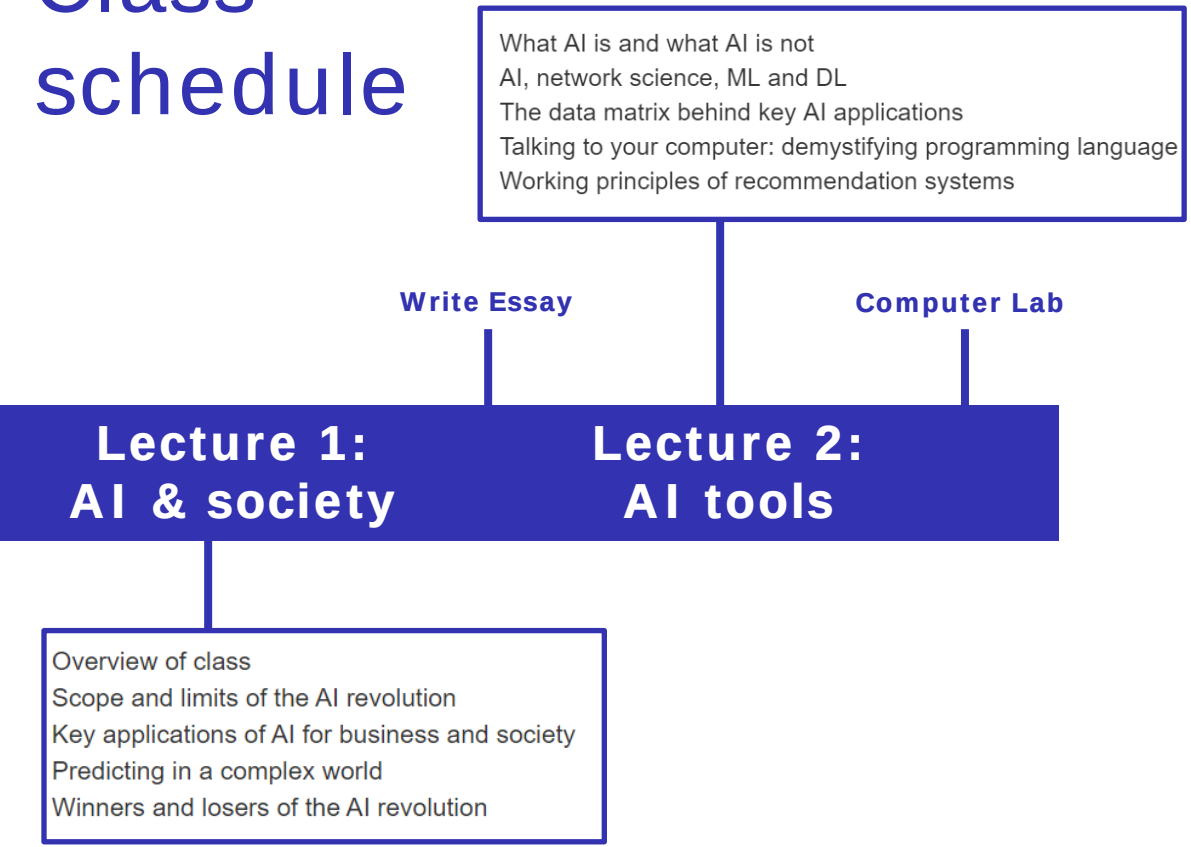
Class schedule

Write Essay

Lecture 1: AI & society

- Overview of class
- Scope and limits of the AI revolution
- Key applications of AI for business and society
- Predicting in a complex world
- Winners and losers of the AI revolution

Class schedule



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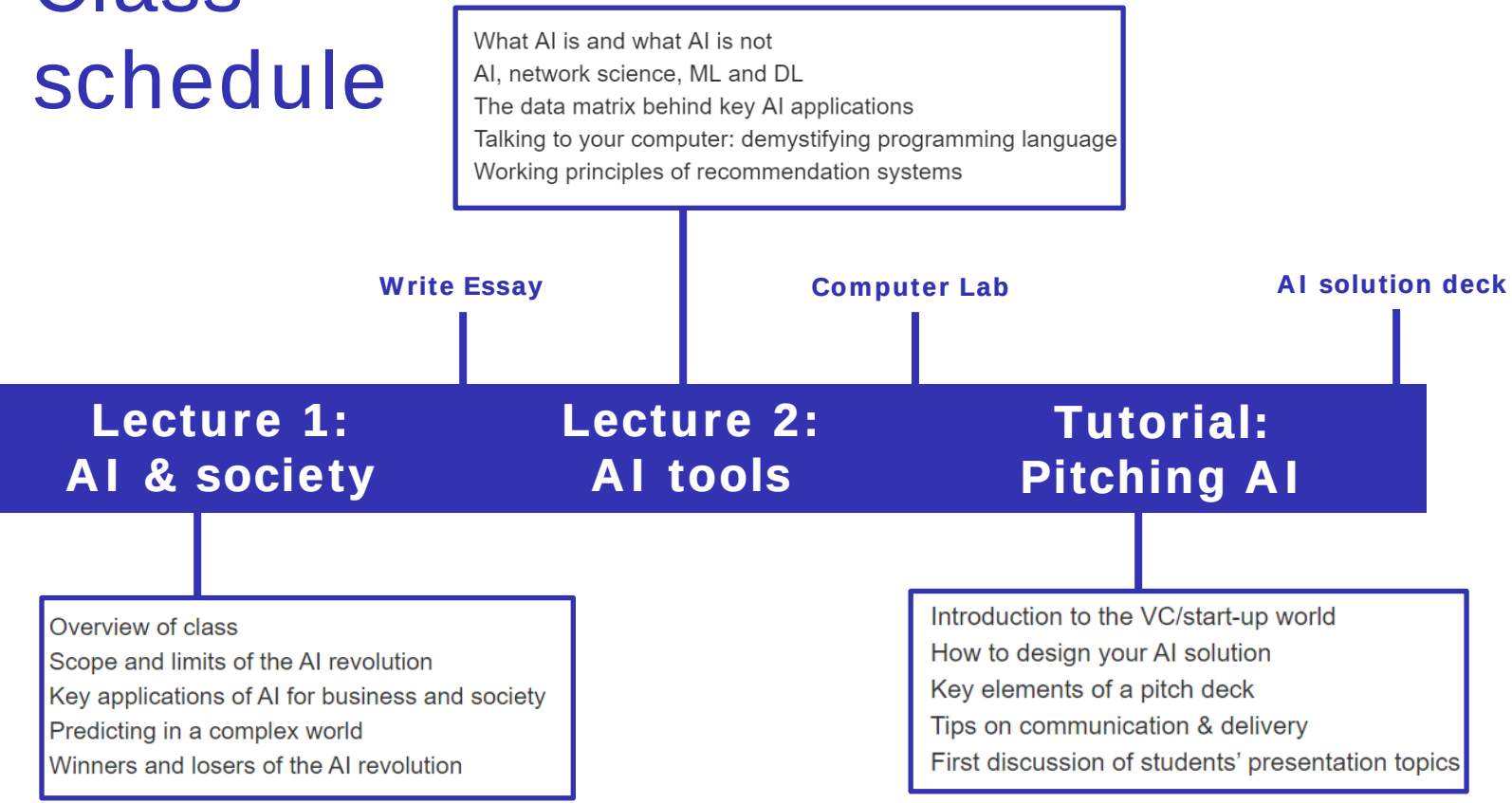

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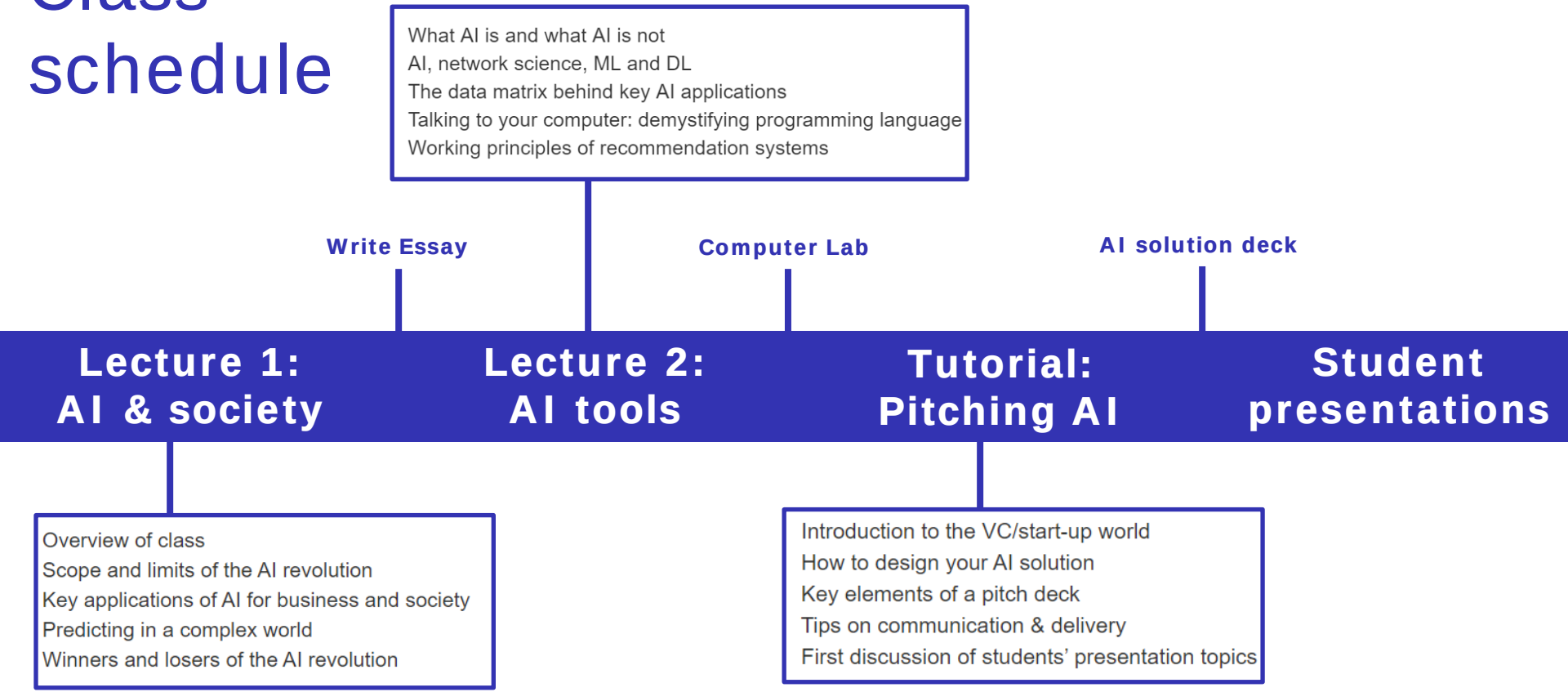


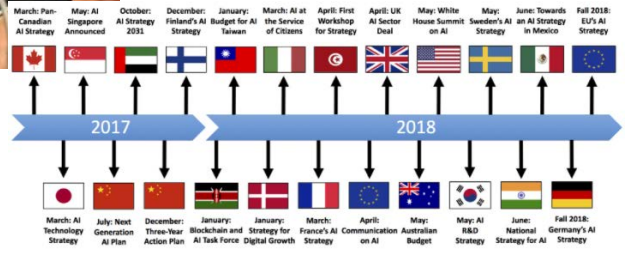
Lecture 1:
Artificial intelligence and human society

AI is taking the world by storm

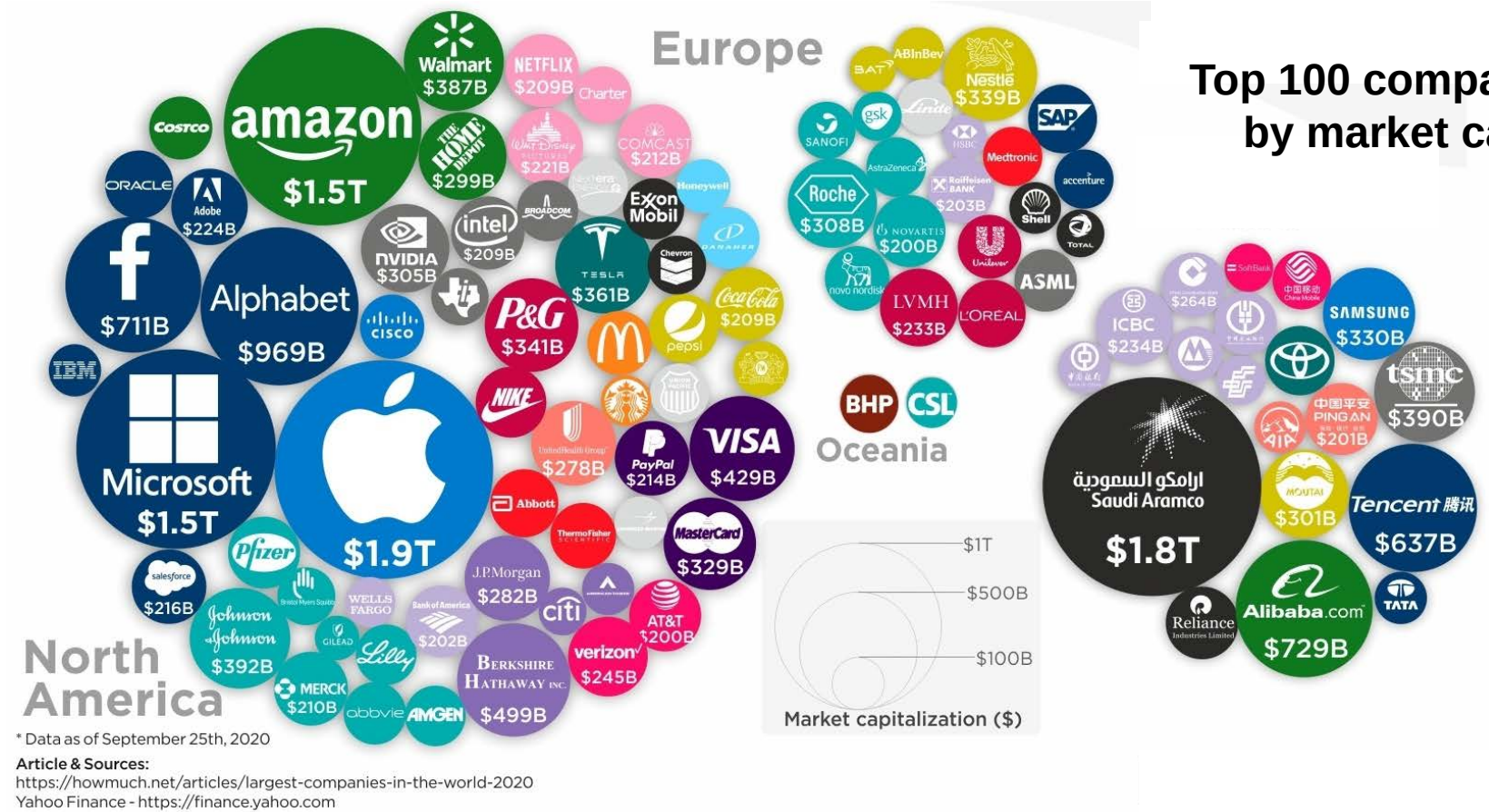
AI is everywhere – cultural products

AI is everywhere – national policy

New Generation Artificial Intelligence Development Plan
(新一代人工智能发展规划)



AI is disrupting the global economy



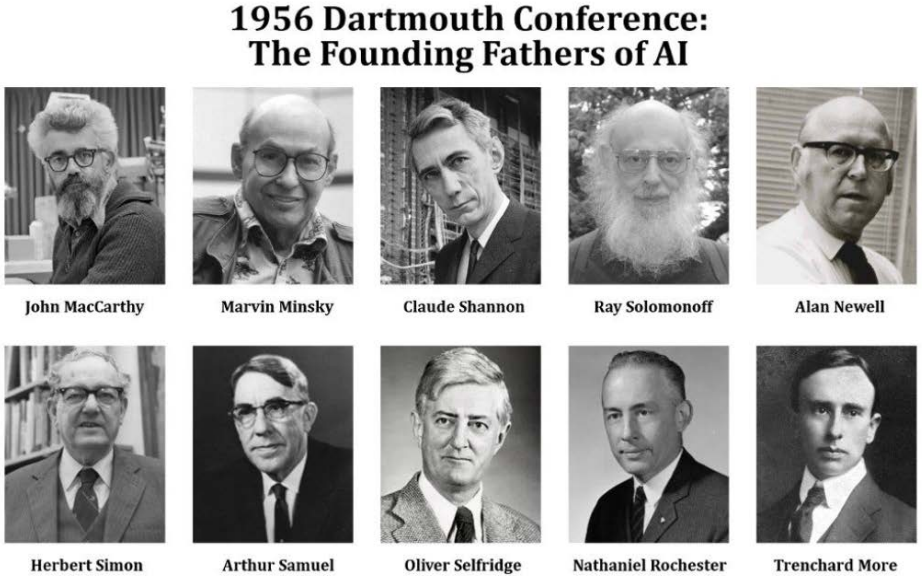
Top 100 companies by market cap

* Data as of September 25th, 2020

Article & Sources:
https://howmuch.net/articles/largest-companies-in-the-world-2020
Yahoo Finance - https://finance.yahoo.com

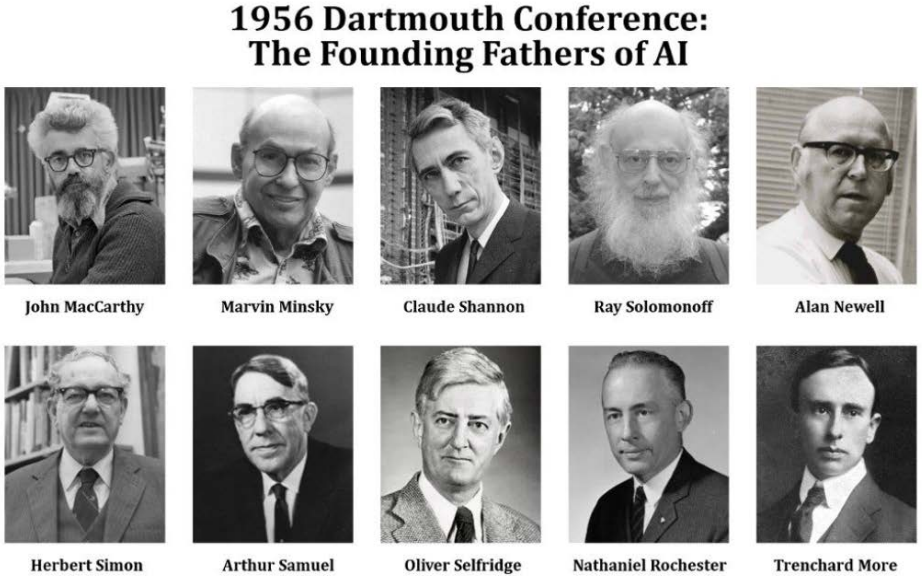
How intelligent did machines really become?

Defining AI



The ability for a machine to perform **a specific task** that requires human intelligence (**narrow AI**)

Defining AI



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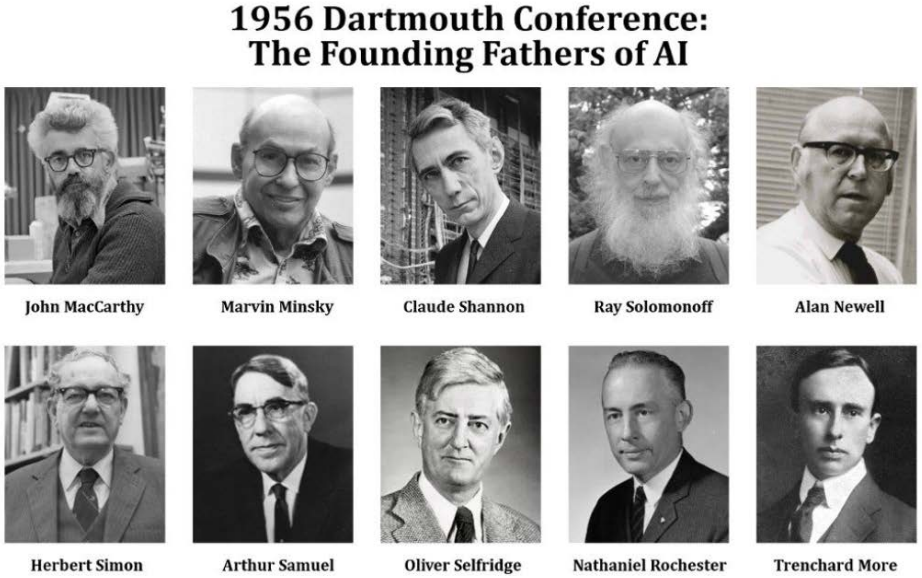

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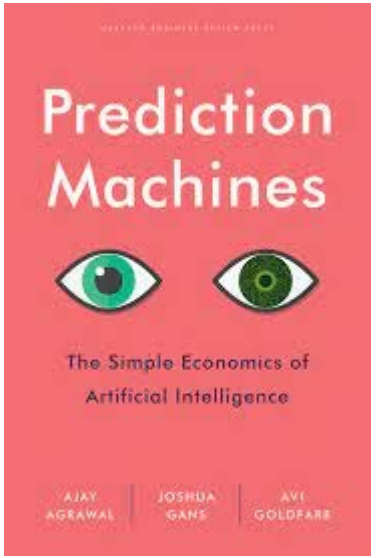
Above this stage is **superintelligence & singularity**

The state-of-the-art

- Artificial Intelligence is all about **specific AI**



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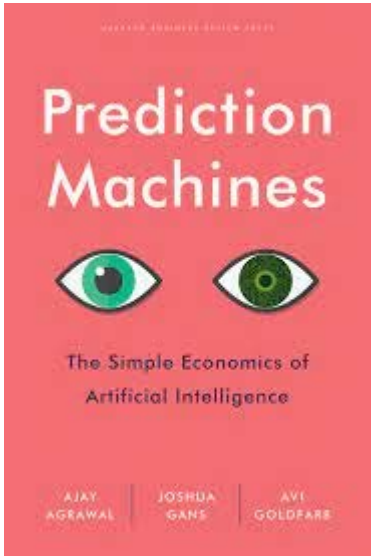
- Artificial Intelligence is all about **specific AI**
- **Huge transformative advances** have been made in specific/narrow AI (thanks to more data, computer power & better ML/DL algorithms)



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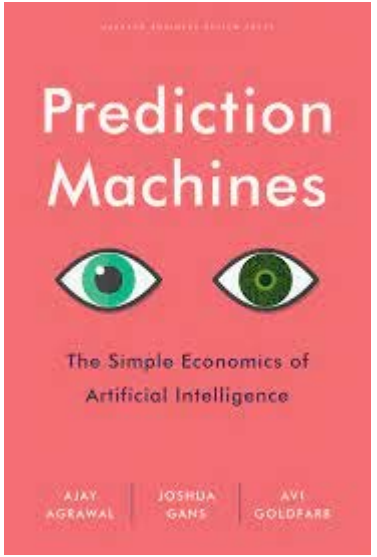

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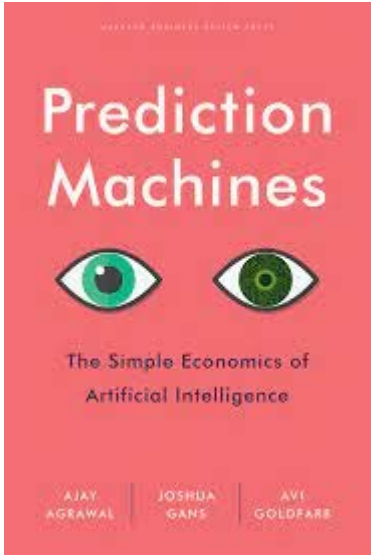

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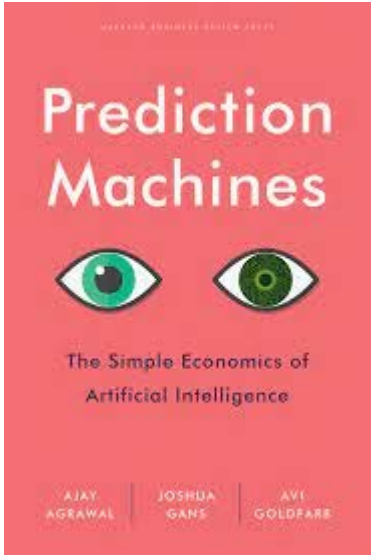

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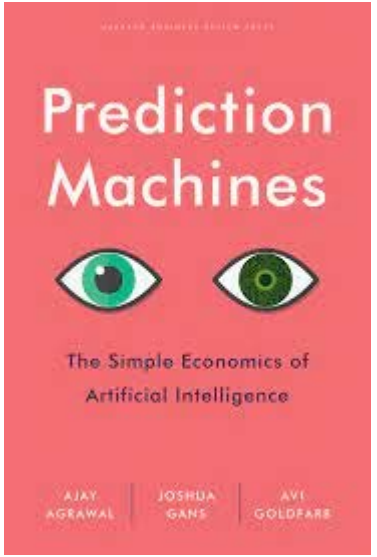
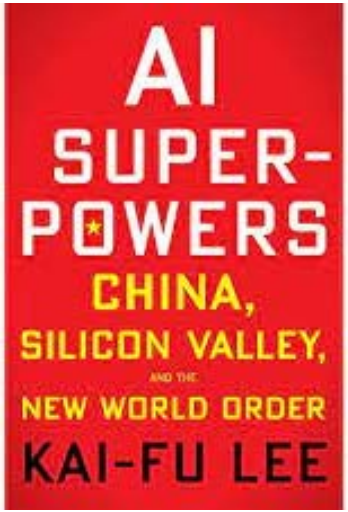
- Singularity is likely to happen but far, far away



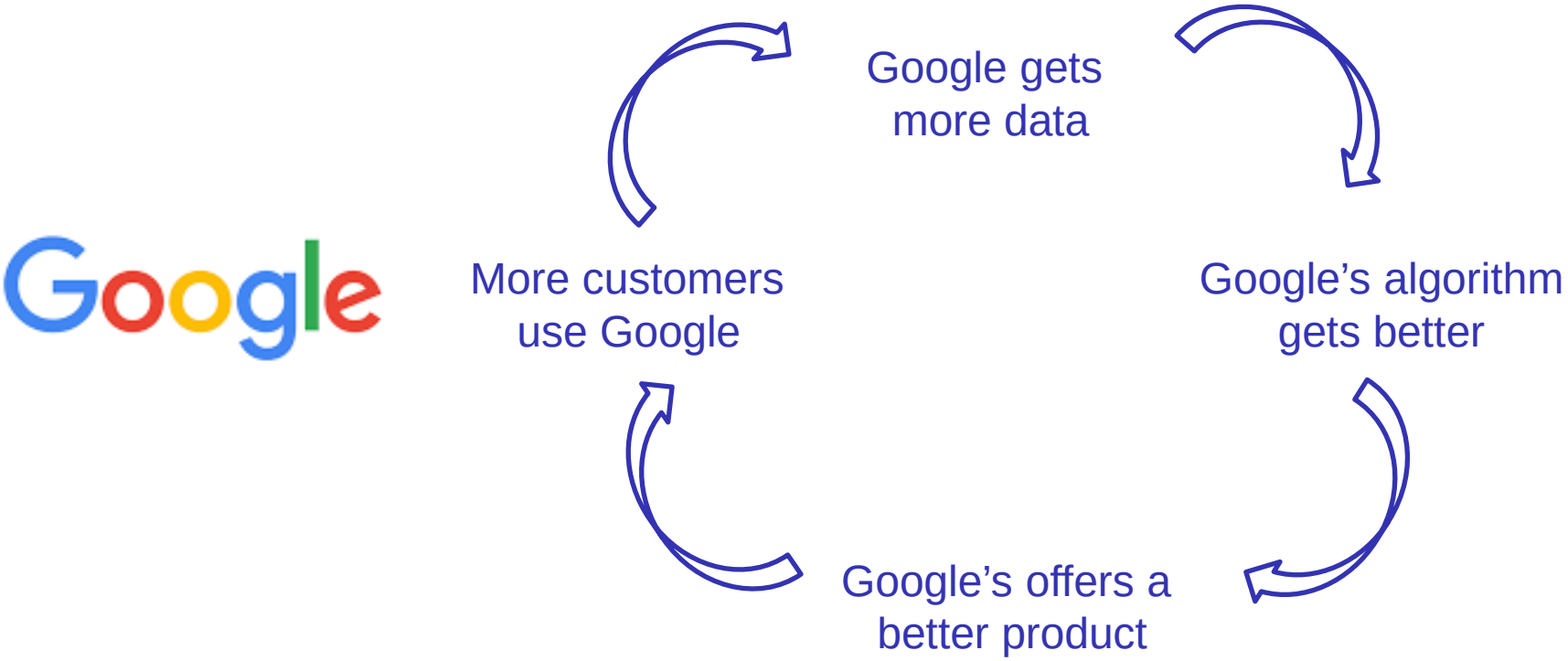
The 4 waves of AI

- 1: Building **recommendation systems** with **internet data**
- 2: Using **private data** for **decision-making**
- 3: Integrating prediction machines with sensors = **perception AI**
- 4: Fully-autonomous AI



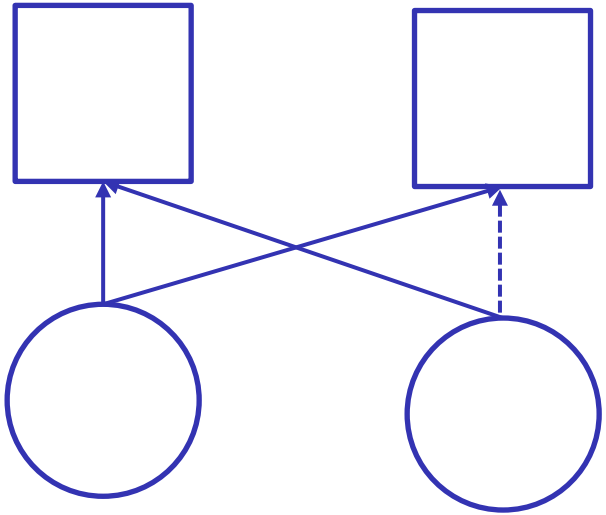
Champions of the first AI wave

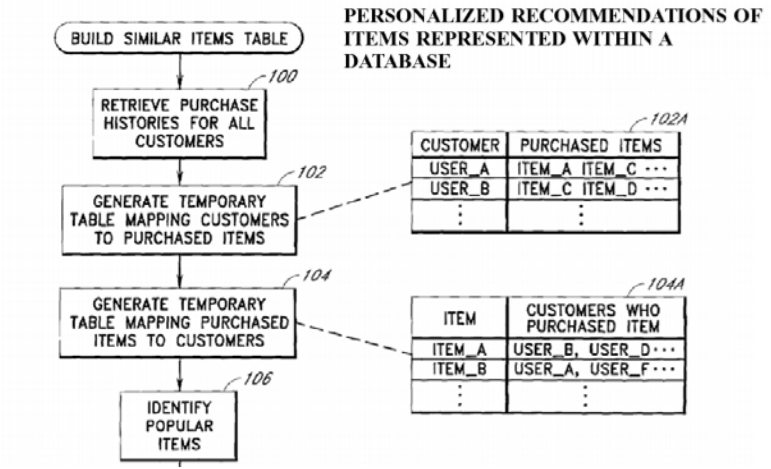
Reinforcing Feedback Loops in AI



Exploiting the network **structures** (matrices) to make **predictions**

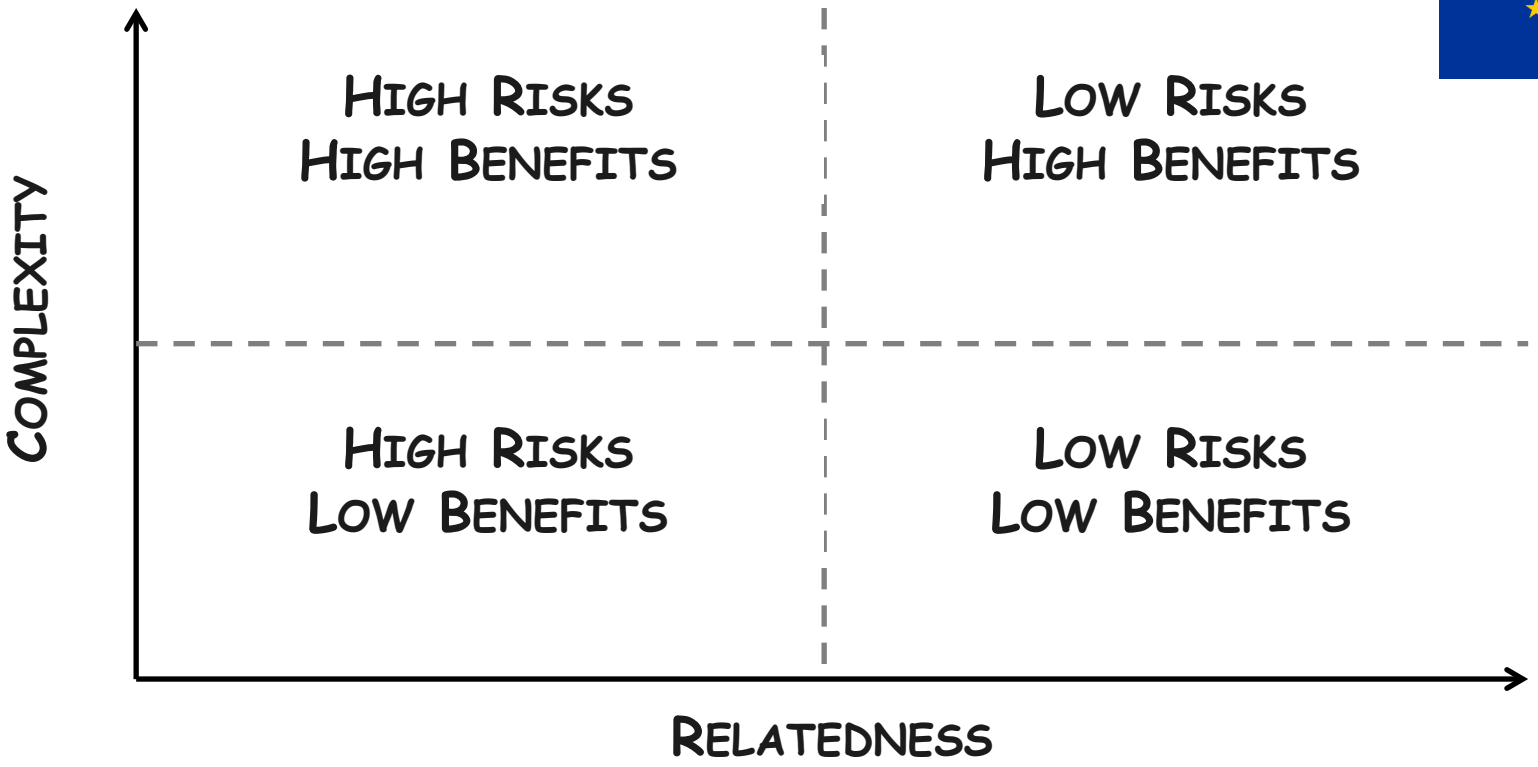
What AI can predict





Modern **AI** techniques are good at predicting the evolution of **simple** network structures

EU smart specialization ($120 billion)



Balland, P.A., Boschma, R., Crespo, J. and Rigby, D. (2019) Smart Specialization policy in the EU: Relatedness, Knowledge Complexity and Regional Diversification, *Regional Studies*

Private data for decision-making

Integrating digital & physical

AI in healthcare

- X-ray analysis, tumor detection
- Fully automated clinical diagnosis
- Predicting future health based on medical records & genetics
- Personalized medication
- Automated surgical robots (Smart Tissue Autonomous Robot)
- AI-enabled dynamic prosthetics (Hugh Herr, Media Lab)

Leveraging complex networks

Returns are increasingly decoupled from individual efforts

CODE

MEDIA

CAPITAL

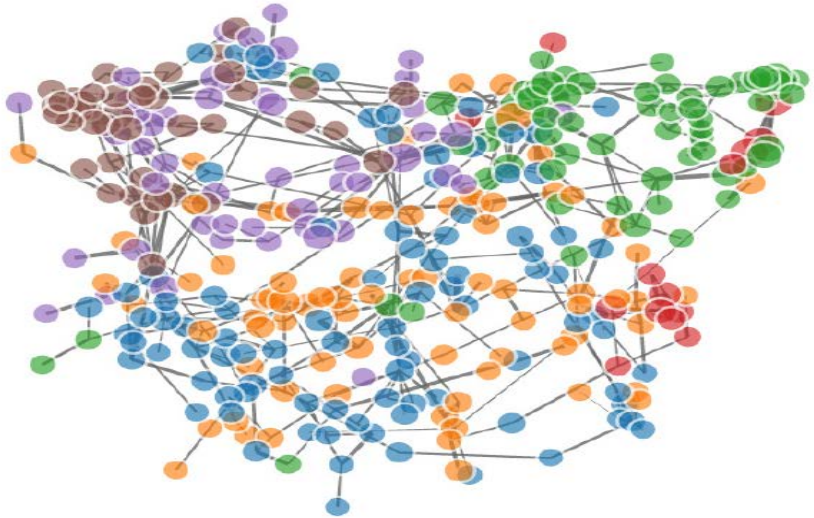
LABOR

Returns

Leverage

Beyond CS skills

$$v_i = \frac{1}{\lambda} \sum_j A_{ij} v_j$$



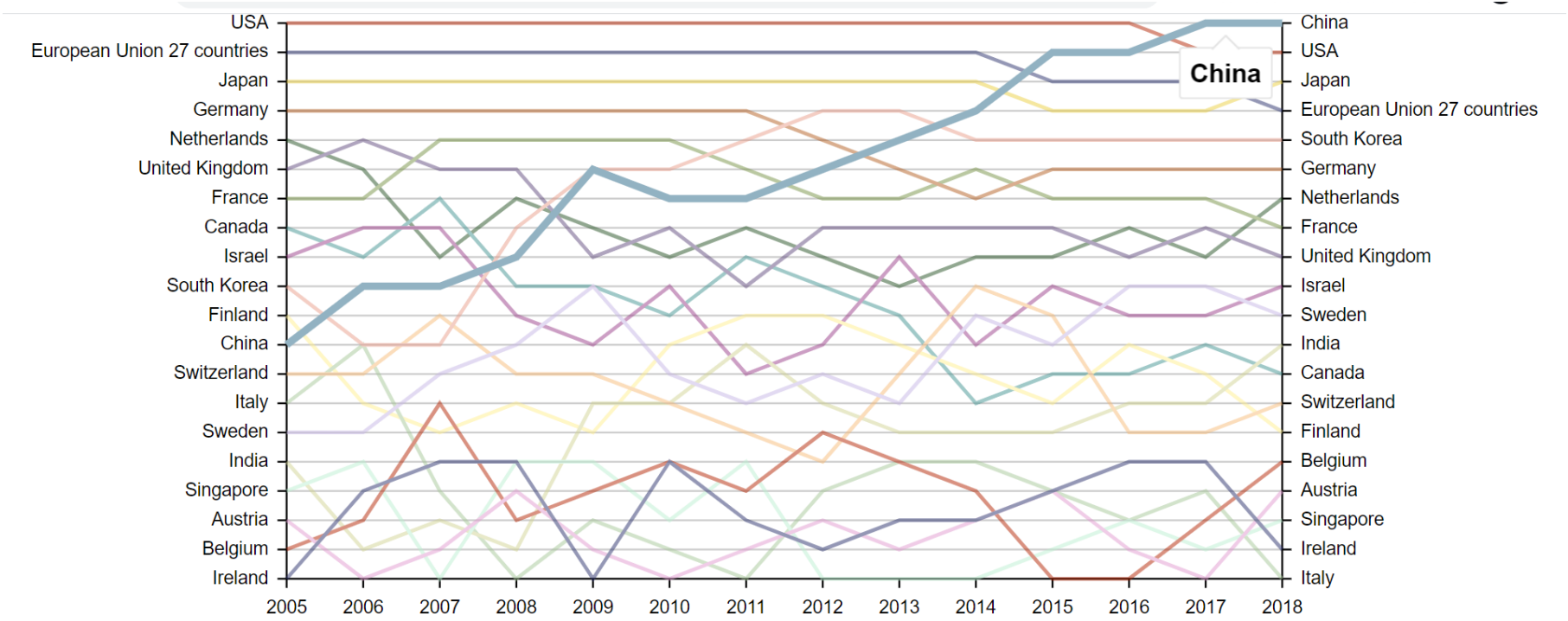
The ability to identify business problems and re-frame them as a data science solution is as important as the programming skills needed to develop AI tools

The future of work

- These skills are the **foundation** of an AI world:
  - complex decision-making
  - creative content
  - business-technology interface
  - inter-human relationships
  - programming language

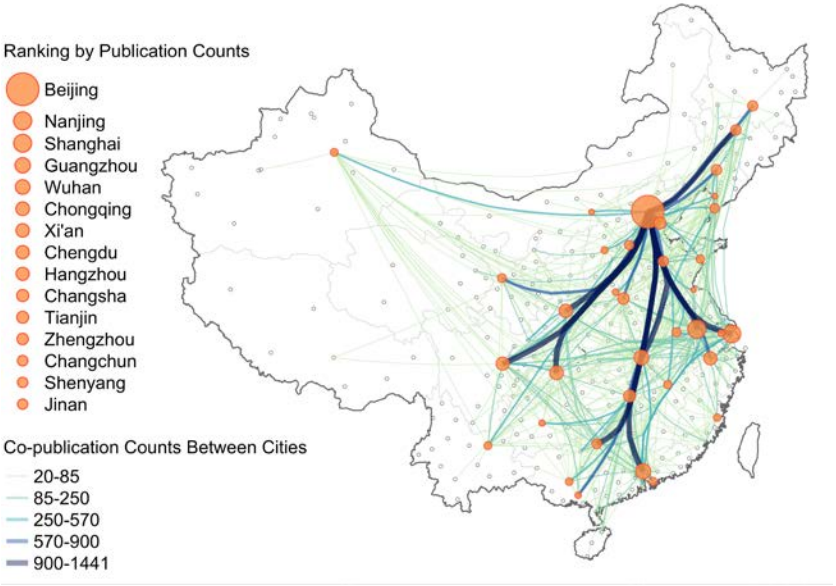
- They are:
  - hard to automate
  - requires new modes of education (hard to train at scale)
  - requires the re-invention of corporate culture, work ethics and lifestyle

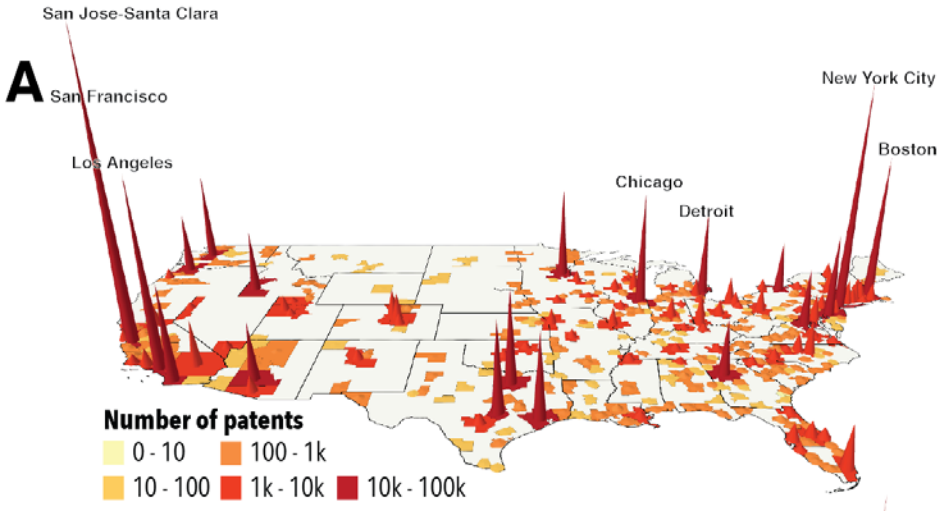
The geography of AI patents



Source: Balland (2021) – Report for DG Grow

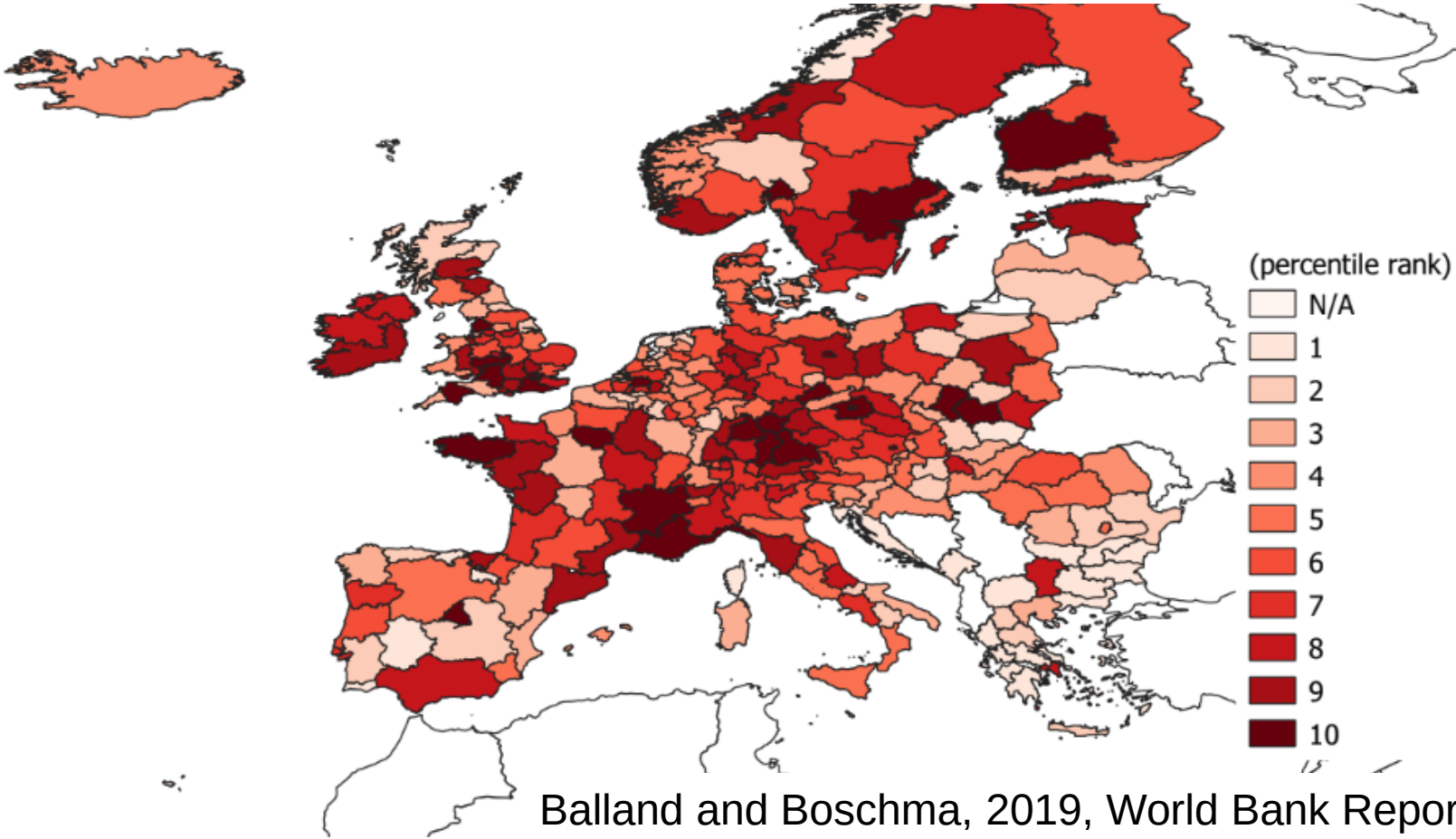
Being in the right place matters (more)





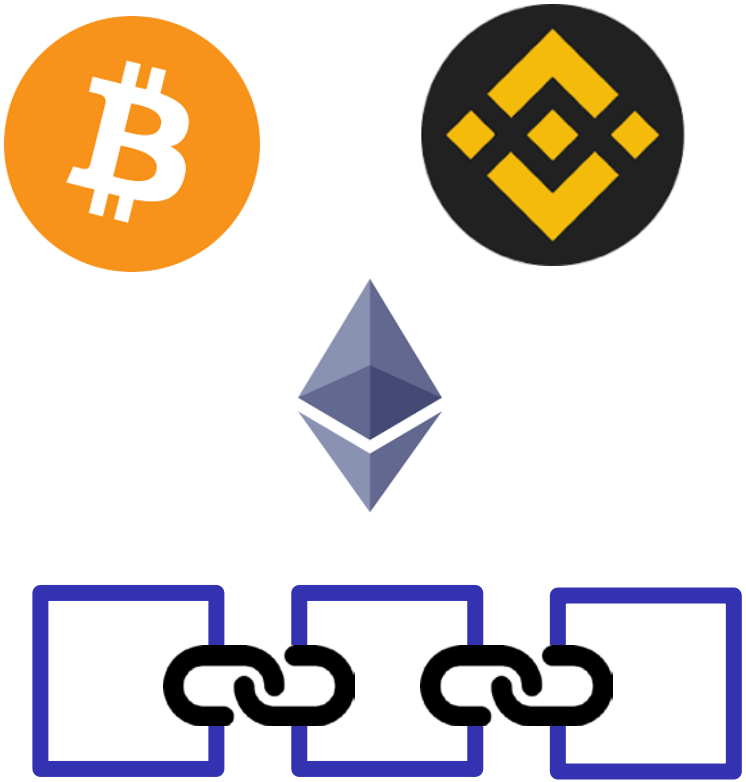
Balland et al. (2020):
nature.com/articles/s41562-019-0803-3

European Hubs of the industries of the future



Balland and Boschma, 2019, World Bank Report on I4.0

Blockchain is the other automation revolution



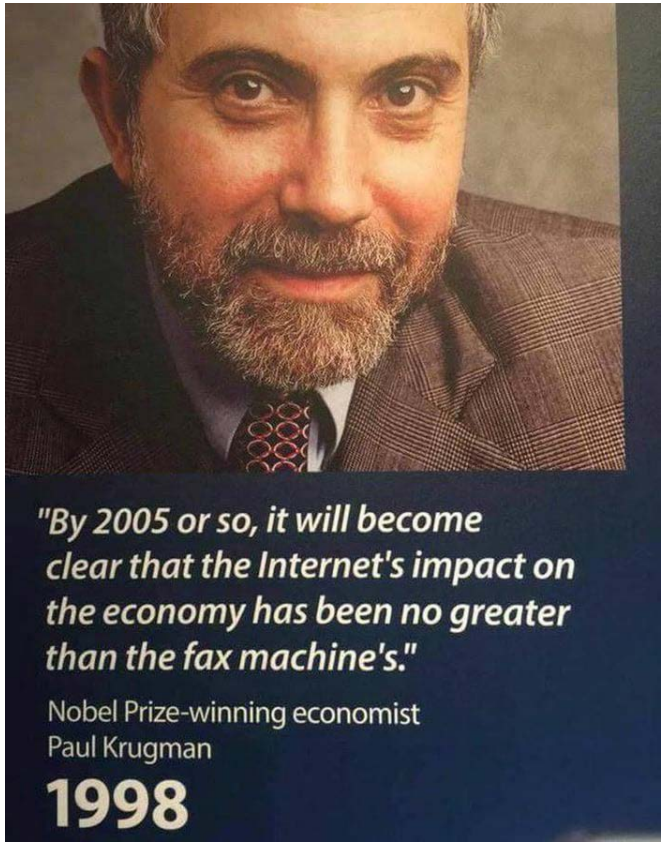
Crypto will:

- **disrupt** every industry by automating transactions
- enable the **scaling** of AI solutions (structured + interoperable data)
- increase hyperconnectivity by providing **trust** at scale

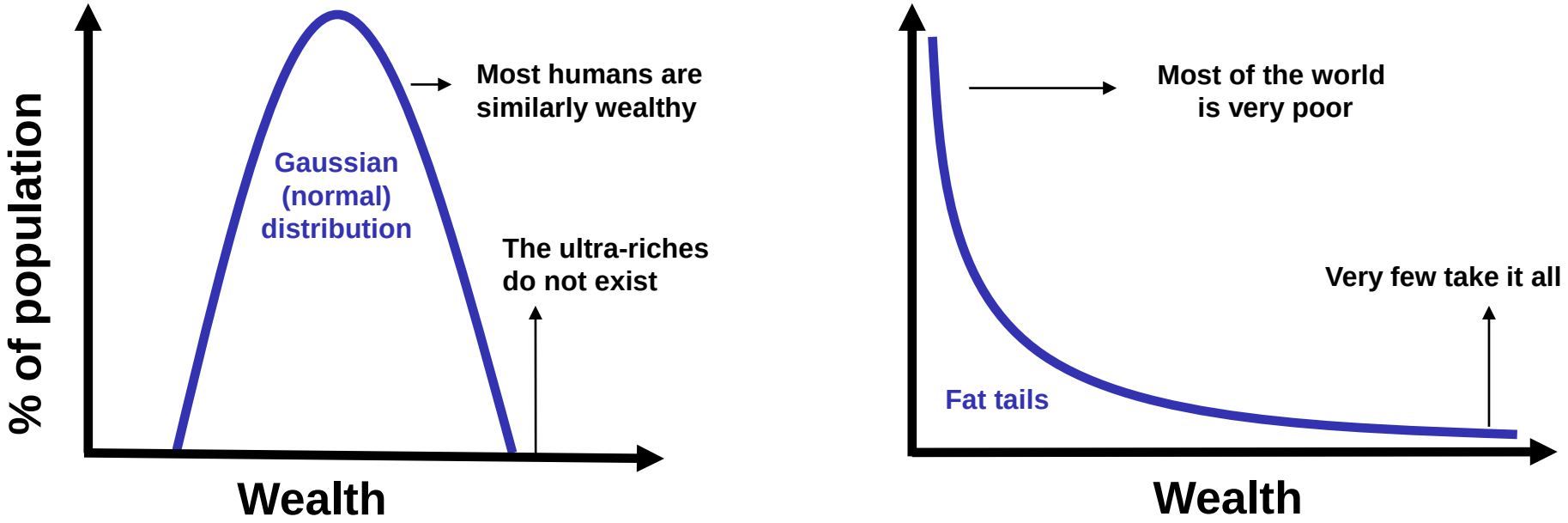
When the **structure of our world is too complex:**

what machines can’t predict and
the strength of **human wisdom**

What you can not predict in a complex world



Complex systems are governed by fat tails



Systemic complexity generates probability distributions with relatively **high probability** of **extreme** (positive or negative) **outcomes** that even the best AI **can not predict**

Complex systems & human wisdom

- **Complex systems heuristics**

  → Leverage, optionality & redundancy

  → Exposed to upside and protect from downside

  → Risks/rewards come from multiplicative systemic effects

- **Evolutionary collective wisdom**

  → Those who used it survived

  → No science – error and feedback evolutionary loops

  → You don’t know you are using it

Merci

Thanks

谢谢

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