

CPSC 430

Computers & Society

Class 5C: Work and Wealth (Chp 10) and Artificial Intelligence

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Slides courtesy of Dr. Kevin Leyton-Brown

Class Outline

1. Announcements (5 mins)
2. Professional Ethics (30 mins)
3. Break (10 mins)
4. Artificial Intelligence (30 mins)
 - Break (10 mins)
5. Activity (40 mins)
6. Reminders before next class (5 mins)

Announcements

Work & Wealth

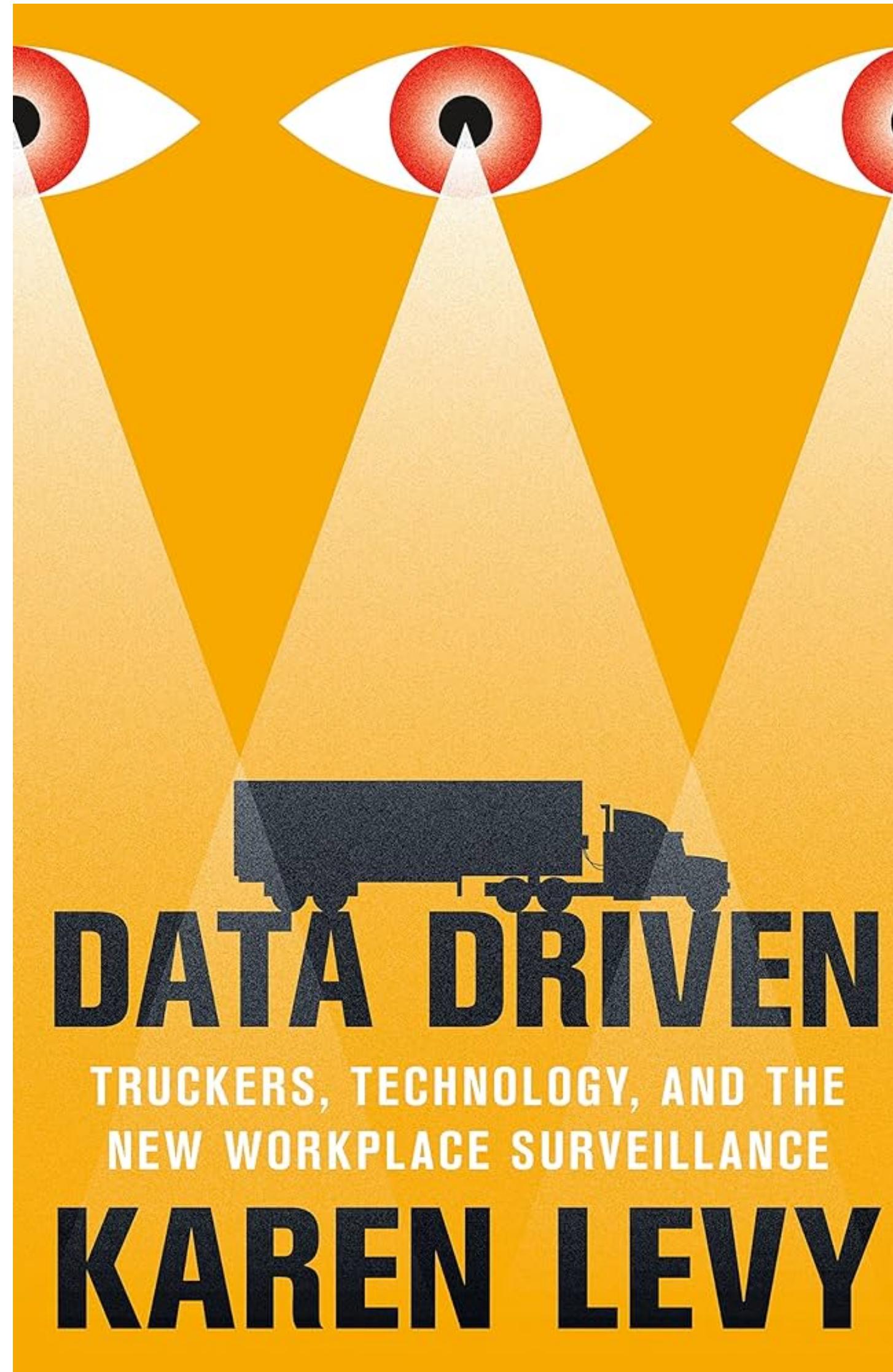
Workplace Changes

- Technology has fundamentally changed workplace organization
 - Flattening out organizational structures: reporting occurs between affected people rather than along predefined paths
 - Facilitating the monitoring of employees
 - Slacking off at work
 - Illegal activities by employees
 - Allowing telecommuting
 - Really accelerated changes due to COVID
 - Work/home line is blurred
 - Unpredicted effects of technological advances
 - Example: email
 - Initially designed to replace mail, it actually resulted in a massive increase in communication volume
- *How do you feel about these changes?*
 - *Do you think they improve or degrade employee experience?*

Increase in Productivity

- Working long hours
 - North Americans (particularly Americans) work longer hours than other cultures and other times in history
- Protestant Ethic and the Spirit of Capitalism
 - A famous explanation of this restless work ethic
 - Linked it to Calvinist theology of predestination
- We have exchanged leisure time for possessions
 - *Do you think this exchange is worth it? Would you exchange a much lower standard of living for much more free time?*

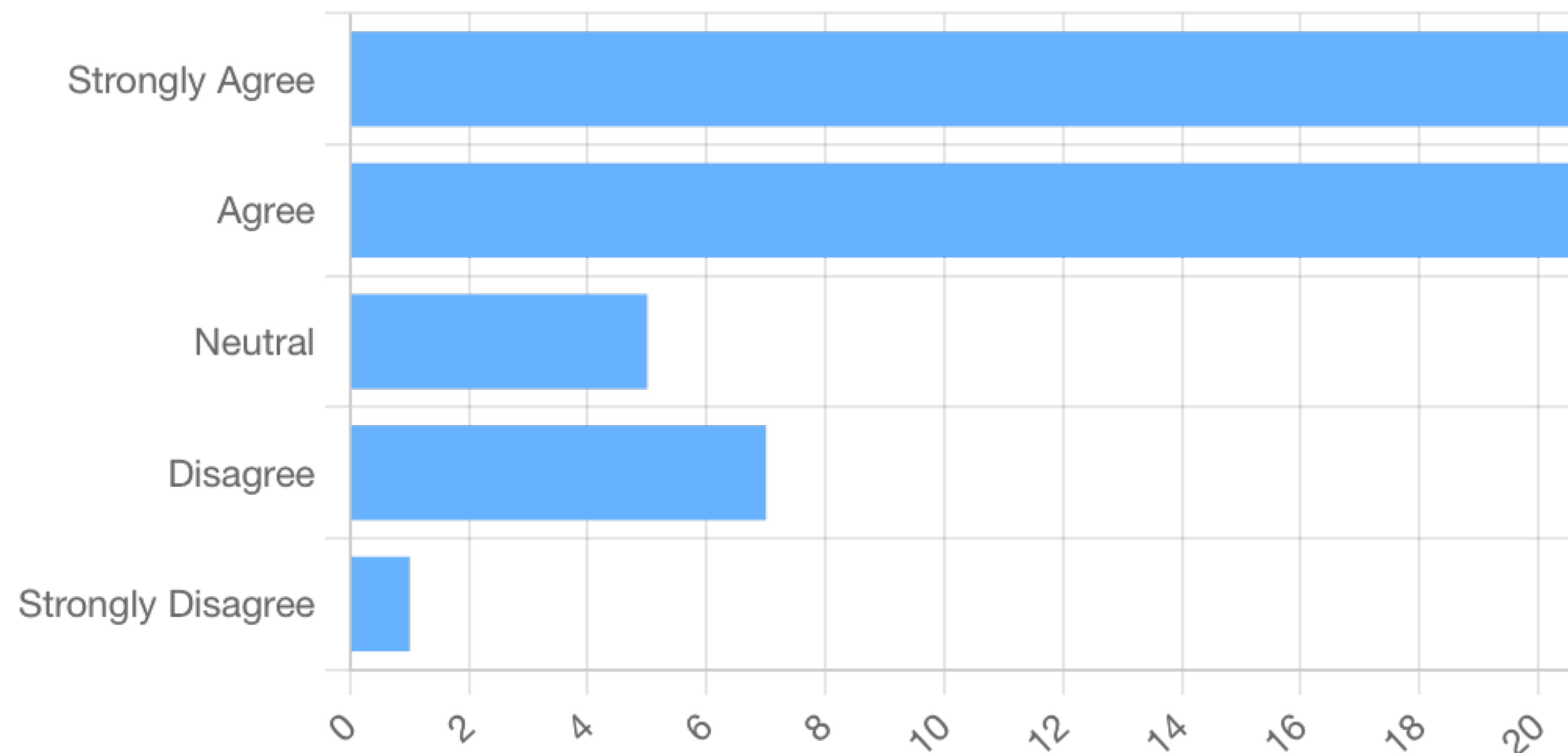
Example of increased monitoring



- Long-haul trucking is a hard job; because of its structure, drivers are incentivized to work for long hours
- Truckers' work time has been regulated, in some form or another, since the 1930s, but it wasn't strongly enforced
- Electronic logging devices (ELDs) were introduced to increase enforcement of hour limits (effective since 2017)
- Truckers strongly object
 - It is an affront to their privacy, dignity, and independence
 - It encourages dangerous practices, such as resting on the highway shoulder if the rest station is full
- Ultimately, ELDs increased compliance, but not safety!

Work and Wealth

The activity of a company's employees on their computers, such as what applications they have opened and for how long, is private and should never be tracked.



Globalization

- The marketing of goods and services across global rather than national scales
 - Manufacturing goods in China, often using Canadian or Australian raw materials, often designed elsewhere
 - Call centers in India
 - Most chips are made in Taiwan
- Effects of globalization
 - Increased shipping and travel
 - Foreign workers (visas), students
 - Outsourcing
- *Do you think globalization is a problem or a benefit?*

Break

LLMs in the workplace

OpenAI report:

- How “exposed” are different occupations to automation with large language models (LLMs)?
- ~80% of the US workforce could have at least 10% of their work tasks affected by LLMs
- ~19% may see at least 50% of their tasks impacted
- Most affected tasks: writing and programming.
- Higher-income jobs (such as translators, tax consultants, and web designers) potentially face greater exposure

GPTs are GPTs: An Early Look at the Labor Market Impact Potential of Large Language Models

Tyna Eloundou, Sam Manning, Pamela Mishkin, Daniel Rock

We investigate the potential implications of large language models (LLMs), such as Generative Pre-trained Transformers (GPTs), on the U.S. labor market, focusing on the increased capabilities arising from LLM-powered software compared to LLMs on their own. Using a new rubric, we assess occupations based on their alignment with LLM capabilities, integrating both human expertise and GPT-4 classifications. Our findings reveal that around 80% of the U.S. workforce could have at least 10% of their work tasks affected by the introduction of LLMs, while approximately 19% of workers may see at least 50% of their tasks impacted. We do not make predictions about the development or adoption timeline of such LLMs. The projected effects span all wage levels, with higher-income jobs potentially facing greater exposure to LLM capabilities and LLM-powered software. Significantly, these impacts are not restricted to industries with higher recent productivity growth. Our analysis suggests that, with access to an LLM, about 15% of all worker tasks in the US could be completed significantly faster at the same level of quality. When incorporating software and tooling built on top of LLMs, this share increases to between 47 and 56% of all tasks. This finding implies that LLM-powered software will have a substantial effect on scaling the economic impacts of the underlying models. We conclude that LLMs such as GPTs exhibit traits of general-purpose technologies, indicating that they could have considerable economic, social, and policy implications.



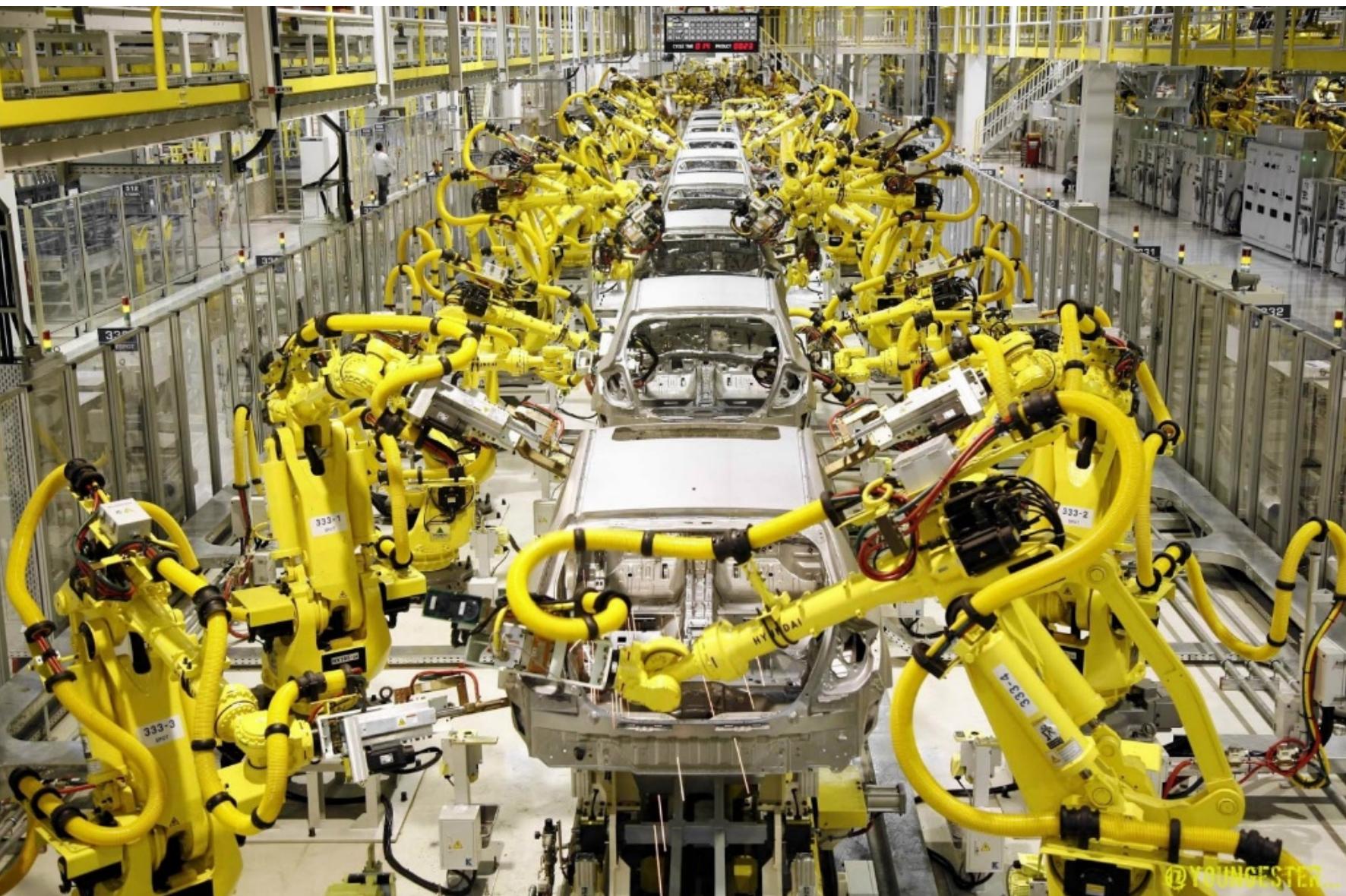
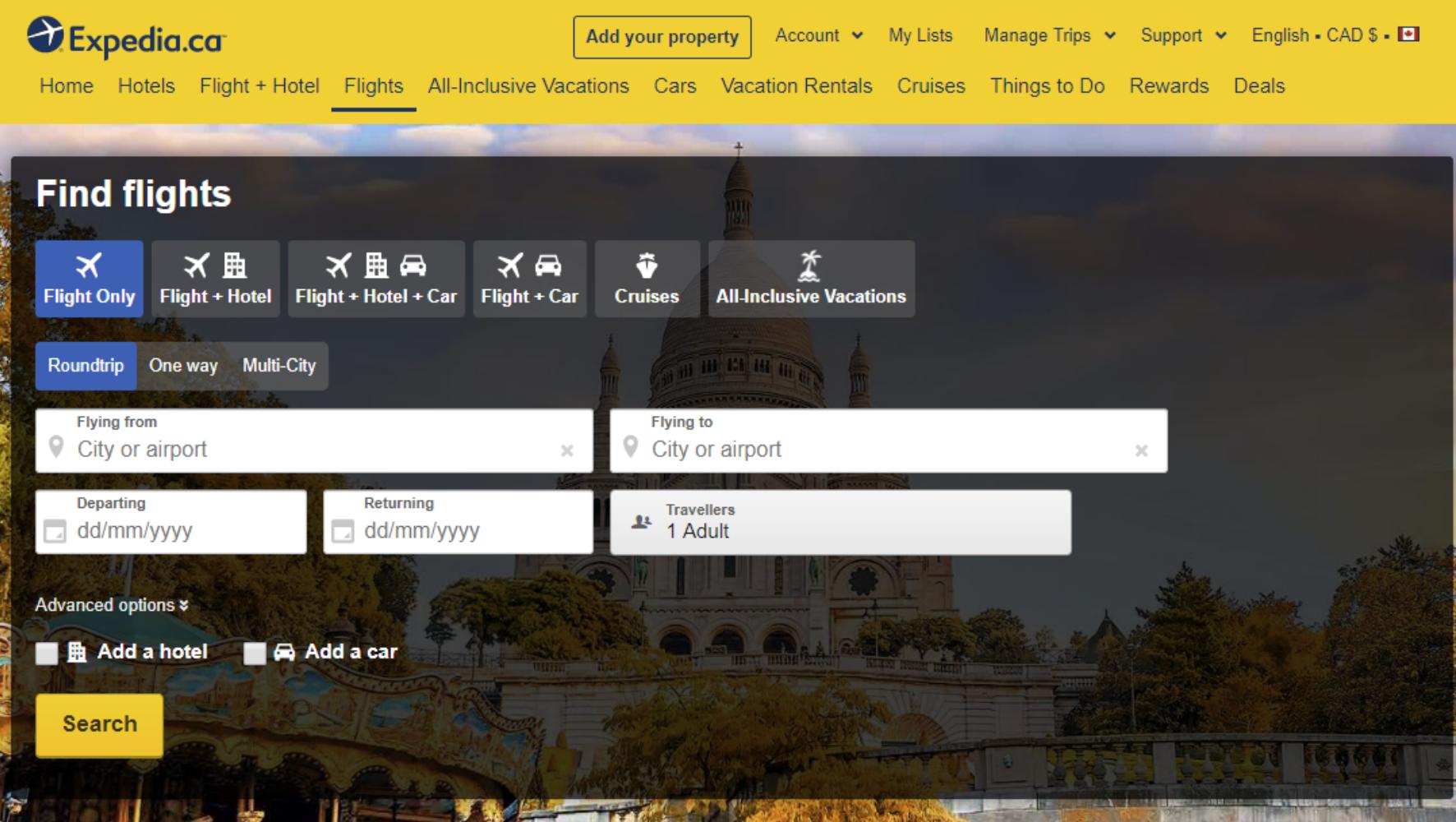
The report answers the question “which jobs do people think LLMs will automate” and not “which jobs will LLMs automate”.

LLMs in the workplace

- Adoption of Large Language Models for various tasks, including work-related ones
 - Some people compare it to the advent of Google
 - Some issues (ownership of training data, hallucinations...)
- Have you used LLMs before?
- Do you think LLMs should be used in the classroom? How?
- Do you think that AI will increase the expectations from professionals in the workforce? How?

Economic Impact

- Likely impacts:
 - Increased mechanization of **routine labor**
 - Automation of lower-end **knowledge work**
- Automation is nothing new
 - like other waves of innovation, AI will almost certainly make society as a whole **much richer**
 - but, it may also exacerbate **income inequality**
- What will this mean for the economy of the future?
 - **Post-scarcity** economy?
 - Human labor as a **luxury good**?



The “Winner-Take-All Society”

- Occurs when a small number of top performers receive a large fraction of the rewards
 - Athletes, musicians, actors, law schools, social media
- Harmful effects
 - Reduces the production of (e.g., cultural) goods
 - Unfair: severe penalty for falling a bit short
 - Leads to arms races
- What can be done?
 - Legal limits (e.g., working hours) to limit arms races
 - Cooperative agreements (e.g., cap on salaries in sports league)
 - Progressive taxation
- Beneficial effects
 - Why shouldn't we watch the best actors, athletes, etc?
 - I enjoy reading the same books as my friends (network effects)
 - Maybe a slightly better CEO (lawyer, etc.) really does make a huge difference to my company

Inequality

Let's try a class debate:

“It is immoral for a corporation to pay its CEO 400 times as much as a production worker.”

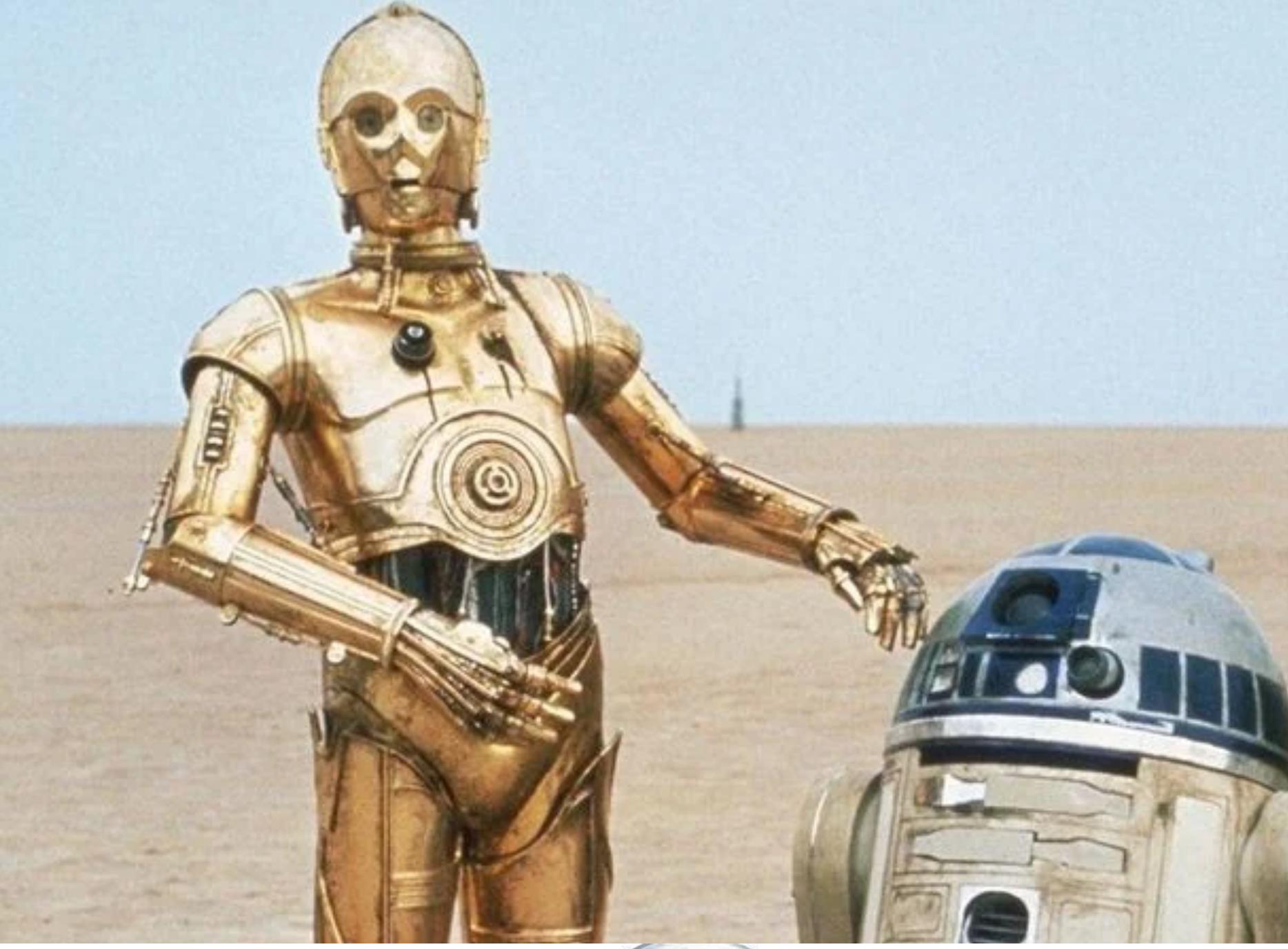
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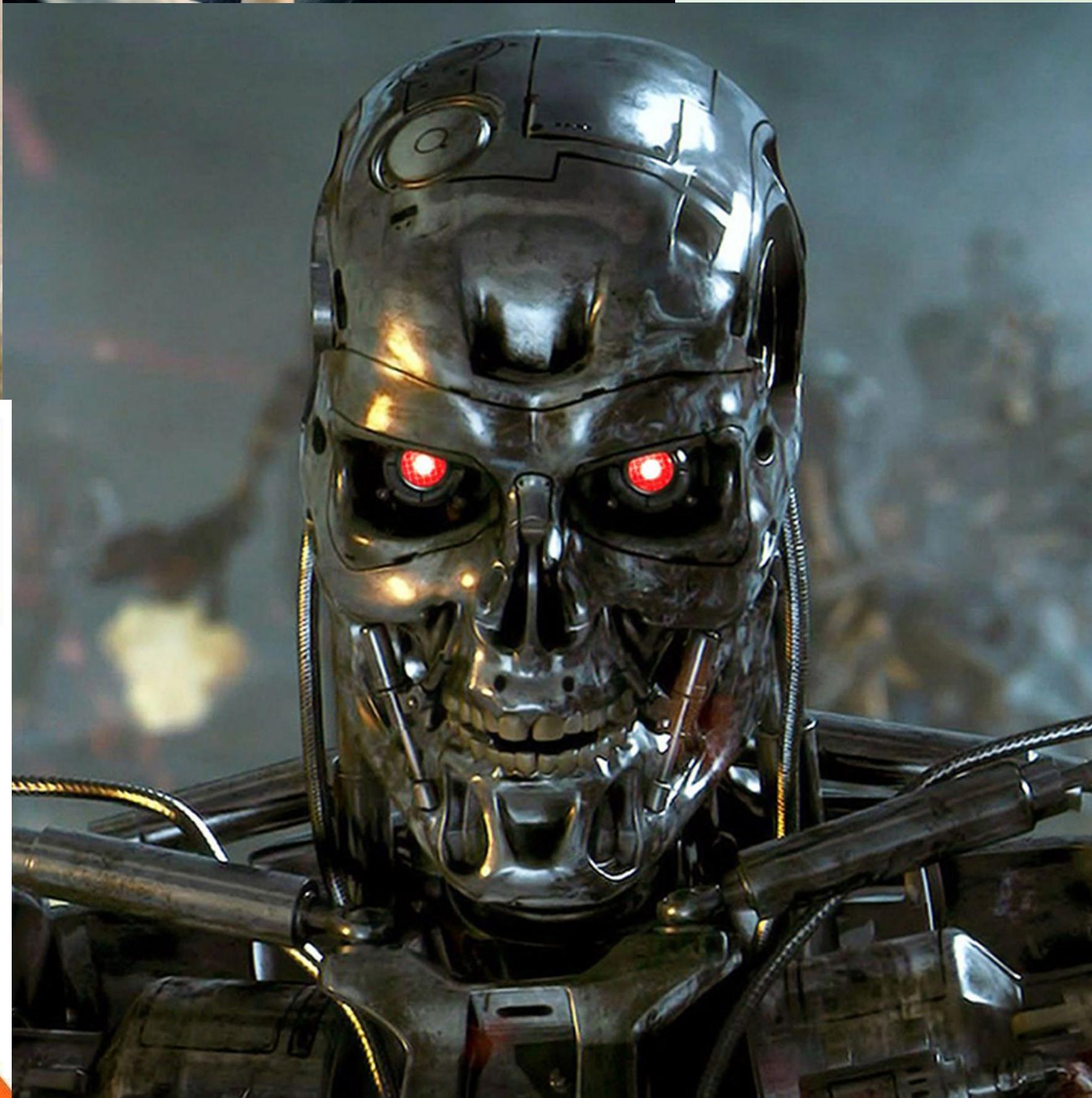
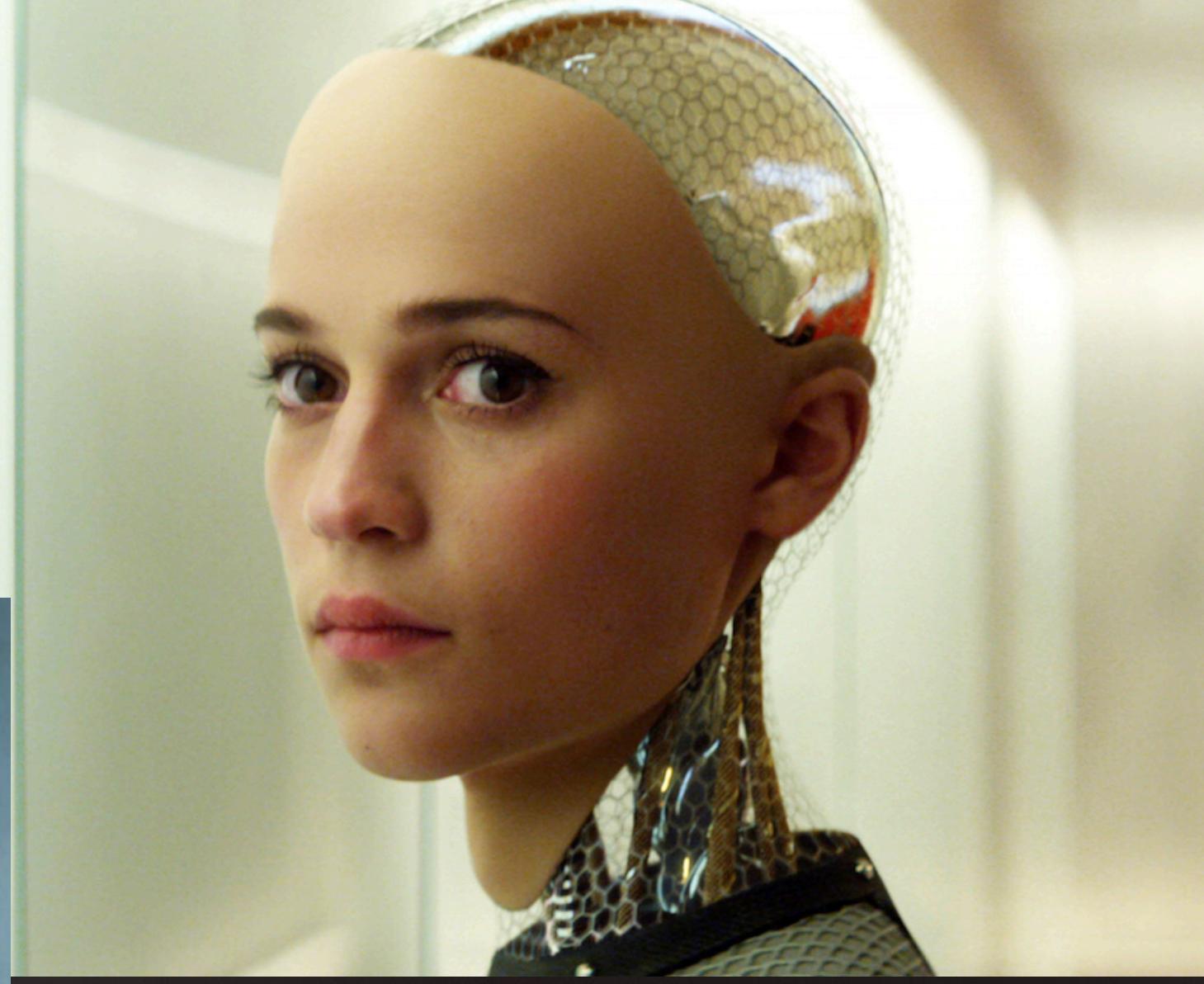
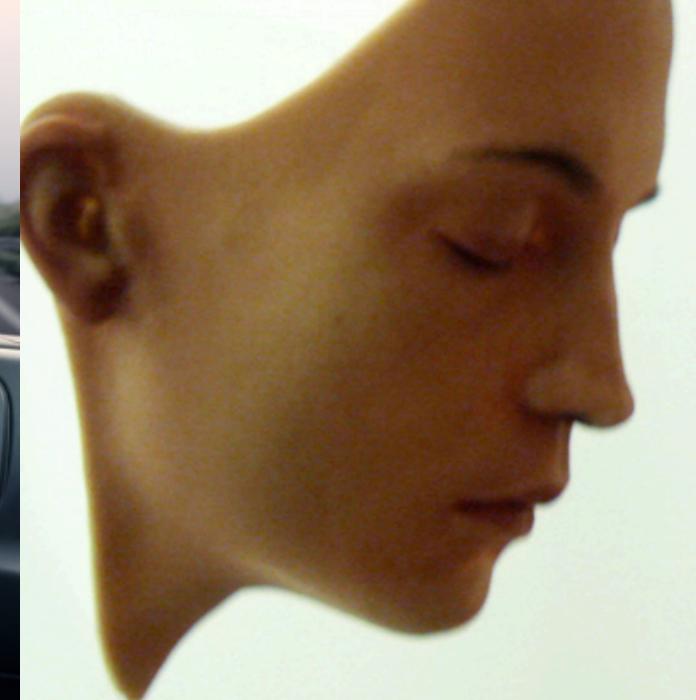
Break

Artificial Intelligence

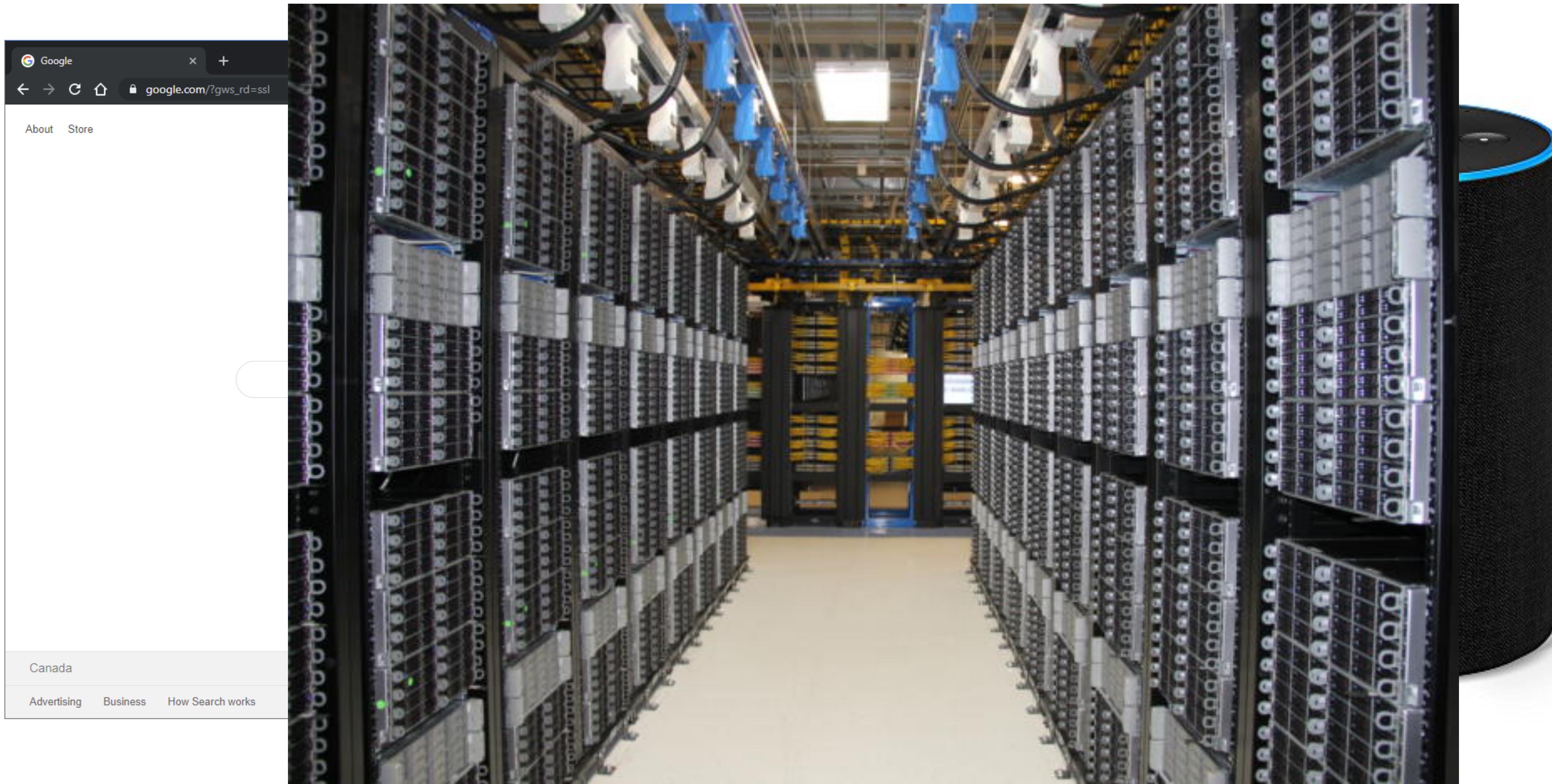
What AI Means to Most People



A magazine cover for Cosmopolitan India. The title 'COSMOPOLITAN' is in large orange letters at the top. Below it, the subtitle 'THE BEST THAT YOU CAN BE' is in smaller text. A woman with a robotic head and metallic wings on her shoulders is the central figure. The date 'MARCH 2018' and price '₹150' are at the top right. The year '2018' is at the bottom right. The text 'SOPHIA THE ROBOT' is in bold black letters, with the quote 'I'm Not Looking at World Domination' underneath. The word 'ONLINE' is at the bottom left.



But most modern AI systems look like...



What is Artificial Intelligence?

AI is the study, design, and development
of computational processes that solve problems
that **previously required human intelligence**

Not all of computer science is focused on AI.

But, it's hard to think of a field in CS that
isn't **contributing fundamentally** to it

The “**AI Paradox**”: once we become familiar
with a technology, we stop considering it AI

THE JOURNEY SO FAR

What is AI and what can it do today?
How much is real and how much is hype?



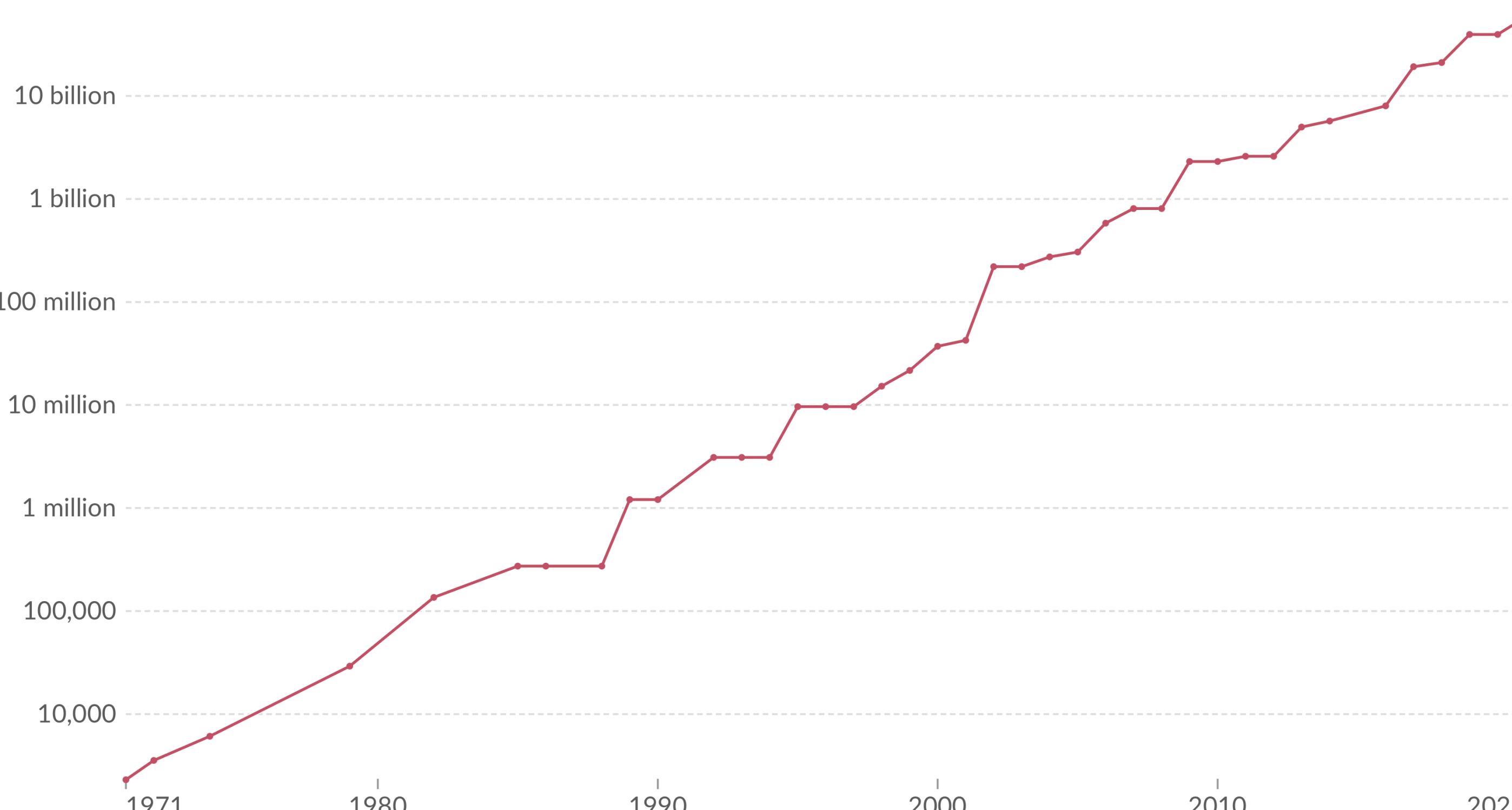
Why is it happening?

1. Scientific/mathematical **breakthroughs**, especially in machine learning
2. Growth in raw **computing power**

Moore's law: The number of transistors per microprocessor

Moore's law is the observation that the number of transistors in an integrated circuit doubles about every two years, thanks to improvements in production. It was first described by Gordon E. Moore, the co-founder of Intel, in 1965.

Our World
in Data



For comparison:

Species	# Neurons in Brain
Fruit Fly	10^5
Cat	10^9
Chimpanzee	10^{10}
Human	10^{11}

What short term impacts should we expect?

What kinds of social impacts are they having?

CURRENT TRENDS

Current State of the Art

- **Predictive modeling** limited mostly by quality of training data
- **Image recognition, face recognition** becoming extremely reliable
- **Image generation** almost there
- **Language understanding & generation** maturing extremely quickly. Watch this space
- **Fueling scientific breakthroughs** from protein folding to astronomy
- **Robotics** remains a hard problem, but it's working well in some niche applications



Prompt: Here's a short rhyming poem by Dr. Seuss about Elon Musk's company, Neuralink which is building brain implants to achieve symbiosis with AI. Neuralink's mission statement is "If you Can't Beat'em, join'em". The poem has a structure typical of Dr. Seuss stories with simple alternate line rhymes. In the poem Elon explains why we need to merge with the AI to save humanity.

Neuralink, by Dr. Seuss

Response:

I have a friend, Elon Musk,
Who wants to join our brains to AI.
He thinks that humans can't compete
So he's gonna use AI to cheat.
They want to build a neural-link.
To link us to the AIs
And save humanity from its demise.
They want to put an AI in your brain.
They want to use your neurons as a frame.
They want to save humanity,
If you can't beat'em, join'em

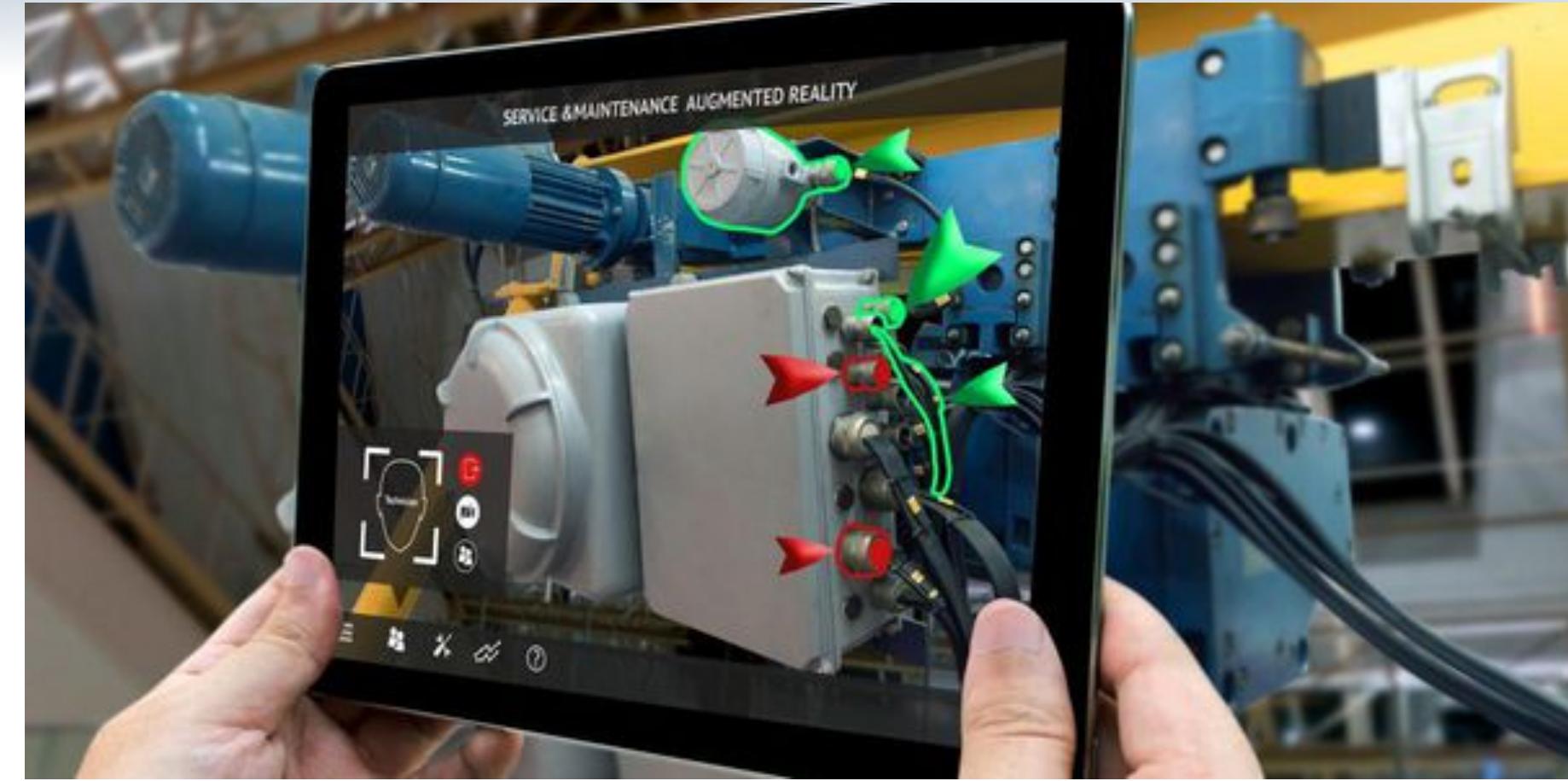
Machine Learning

- Narrow: building **predictive models** from data
- Broad: a new approach to computer programming, where computers **learn from experience** rather than being told what to do
- Where's it **headed?**
 - More and more data collection
 - sensors
 - behavior tracking
 - Image, text, speech understanding
 - Data mining/personalization/profiling
 - Self programming/optimization



Virtual and Physical Worlds Collide

- Smart **interfaces**
 - remote controls; microwaves; clocks; ...
- Augmented reality
- More intuitively “**programmable**” systems
- Much better **context awareness**
- **Assistance**
 - elderly; children; disabled; education
- **Social agents/games**



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Growing Military Use

- Increasing use of AI in **military applications**
- Already quite **commonplace** in some applications
 - smart bombs
 - surveillance systems
 - missile defence (Patriot, Iron Dome, etc)
- **Autonomous weapons** are becoming practical
 - drones are widely used; becoming more autonomous
 - land-based robotic systems are improving quickly
 - swarms of drones could revolutionize urban warfare
- The main barrier to adoption is **public opinion**



Activity

Reminders before next class